



PUNE INTERNATIONAL CENTRE

**STRATEGIC PATIENCE AND FLEXIBLE POLICIES:
HOW INDIA CAN RISE TO THE CHINA CHALLENGE**

March, 2021

Authors

Gautam Bambawale

Vijay Kelkar

Raghunath Mashelkar

Ganesh Natarajan*

Ajit Ranade

Ajay Shah

** Dr Ganesh Natarajan was the Convener of the policy research group for this paper. The research group acknowledges the valuable contributions from the following in the drafting of this document: Ankit Agarwal, Anurag Ray, Arogyaswamy Paulraj, Arun Firodia, Arvind Subramanian, Harsha Vardhana Singh, Ipsita Nayak, Prakash Hebalkar, Shamsher Singh Mehta, Sudhir Devare, Vijay Gokhale and V. Sundaresan.*

Recent developments have profoundly changed the outlook on the India-China relationship. For many decades, the prevailing framework was one where border and military disputes would be held in abeyance, while the countries concentrated on economic development and increased engagement. It is now clear that this framework must be discarded. What is less clear, however, is the new intellectual framework that must be adopted from the Indian perspective. The enumeration of policy choices, the development of a strategic perspective, and a carefully considered strategic framework, is the need of the hour in India.

The Pune International Centre community embarked on this work once the events in Ladakh unfolded. What we present here is the paper which has been written to stimulate thinking in the Indian policy community and help illuminate the complex trade-offs over long time horizons.

The reader of this paper is also welcome to read the more detailed document which will be made available on the website of the Pune International Centre (www.puneinternationalcentre.org) at a later stage.

Due to Covid-19, India has been in a period of economic stress and a health crisis. The unprovoked border aggression by China was an unexpected addition to the difficulties of 2020. In the short term, there was a magnificent military response from the Indian side. But the problems do not start or end with battles on the border. There is a need to think about the India-China relationship from a more strategic perspective and undertake actions that put India on a sound path. In our proposed approach of strategic patience, economics is a key element.

The rise of the Chinese economy

The relationship between the two giant Asian neighbors is one of the most dynamic ones in the twenty first century. China's economic reforms, which led to its high and sustained growth, began in 1978. India's big push for reforms which included delicensing of industrial production and reducing barriers to cross-border trade and finance began in 1991, i.e. with a lag of 13 years. This lag is an important element of the explanation in the imbalance between the two countries that is visible today. From about 2010, a significant gap between the two growth rates opened up, which has cumulated into a large gap in the size of the two economies.

Until 1978, the Chinese Communist Party centralised power into one person, Mao Zedong. Deng Xiaoping is famed for initiating China's economic reforms. Alongside this, Deng Xiaoping initiated a process of dispersion of power within the Chinese state and the Chinese Communist Party. The power of any one individual was checked, there was greater dispersion of power and there were also greater checks and balances. These developments of the political system were integral to the economic reforms and to China's economic success of the 1978-2012 period.

After 2012, when Xi Jinping took office, many of the reforms of the 1978-2012 period have been reversed. The new regime has gone closer to the environment of Mao Zedong, where power is centralised into one person. Centralisation of power has gone with inferior decisions on economic policy, a loss of confidence by private persons and reduced investment which meant inferior economic outcomes. As is typical of authoritarian regimes, faltering

performance has been papered over through nationalism, veneration of the military and political purges disguised as an anti-corruption campaign.

In 1980, the size of China's economy was 305 billion USD and by 2019 it was USD 14 trillion. During the same period, India's GDP rose from 189 billion to 2.9 trillion. While the two countries were not that different at the starting point (i.e. a difference of about 1.5 times), there is a large gap at the end point. This reflects the power of compounding, of the difference between the growth rates of 10 per cent vs. 7 per cent applied over a period of 40 years.

Comparisons between India, China and the US are best done using purchasing power parity estimates. India's GDP measured in PPP terms is presently at 8.6 trillion, just about half of that of the US, and one third of that of China. In purchasing power parity terms, the present Chinese economy is one third *bigger* than the US.

Over recent decades, India-China trade has grown dramatically. From the year 2000, when bilateral trade was barely 1 billion dollars, India-China bilateral trade grew rapidly at more than twice the rate of their GDP growth. It was approaching a hundred billion dollars by 2018 and has declined somewhat since then. While bilateral trade balances have little useful interpretation, India's exports to China are presently less than one fourth of its imports from China. India was ranked number 19 among China's export destinations in 2001, and rose to rank 6 by 2015. In the future, given that India is a high growth country compared to the world economy, India's importance in Chinese exports will go up. Similarly, China's importance in Indian trade is also likely to rise.

China's long and sustained growth has been characterized by a high investment rate, with an investment to GDP ratio exceeding 50 percent. By contrast, India's growth was obtained at a considerably lower investment rate of about 30 percent of GDP. This means that India was faring better on allocating and using capital; India was getting higher return on capital invested as compared to China.

China was able to attract foreign direct investment on a large scale, as it developed special economic zones, where foreign companies could build production facilities and create jobs for locals while being largely immune to the difficulties of Chinese state institutions. Between 1997 and 2019, the cumulative FDI into China was 12.7 trillion USD. By comparison, FDI to India cumulated to a meager 460 billion USD.

For both countries, there has been a hierarchy of complexity in attracting investment:

- When there is high asymmetric information and when there is low trust in local institutions, the best path for capital flows for foreigners is FDI by diaspora Chinese/Indians. FDI requires low trust and diaspora Chinese/Indians are best able to overcome asymmetric information.
- Portfolio flows require high institutional capabilities on accounting, statistical system, exchange institutions, financial regulation, etc. When asymmetric information is reduced, but if local institutions are weak, foreigners are able to join diaspora Chinese/Indians in doing investment, but FDI is the pathway of choice.

- When good institutions develop, capital flows can shift towards portfolio flows and do not have to be centred around FDI. Here also, diaspora Chinese/Indians are key intermediaries who are able to overcome asymmetric information and foster global capital flows into China/India.

In both countries, diaspora Chinese/Indians have been important elements of international economic integration. China has done better than India in creating conditions where diaspora Chinese/Indians are welcomed for FDI and as information intermediaries for portfolio flows.

From 1978 to 2017, China added 375 million jobs. For six consecutive years prior to 2019, the country added a net of 13 million jobs every year. In many ways, the story of employment and output growth over a long period was consistent with the 'Lewis model' of growth enunciated by W. Arthur Lewis in 1954. In this model, the modern, urban, industrial sector draws upon an almost unlimited supply of labour from the traditional, rural, agricultural sector. In the model, the rural sector labour at the margin is operating with zero productivity, due to its excess supply or disguised unemployment.

The unlimited supply of labour kept a lid on wage growth for a very long time. For the first thirty years of reform since 1978, the growth in real industrial wages was nearly zero, whereas the growth in real GDP was 10 percent. Thus, the spoils of growth were split unevenly between labour and capital. Most of the profit embodied in high GDP and industrial growth was ploughed back as reinvested capital, i.e. there were consistently high investment to GDP ratios.

There is an accounting identity in macroeconomics: The current account surplus is the extent to which domestic savings exceed domestic investment. In China, the suppression of domestic consumption generated large savings and even though the investment rates were high, savings were even higher, thus generating current account surpluses and capital export. Chinese policy decisions on managing the exchange rate led to accumulation of foreign exchange of nearly 4 trillion dollars in 2016. There was a relaxation of exchange controls in 2017 which led to a rapid flight of nearly 1 trillion dollars, after which exchange controls were tightened again. The currency was ostensibly made more market oriented from 2005, since China's trade partners and also the IMF had expressed concerns about deliberate undervaluation of its currency. In practice, the RMB remains a highly managed exchange rate, shaped by policy makers and not the currency market.

In the recent years, China has been consciously trying to rebalance its economic growth. There are five dimensions to this rebalancing as they see it:

- To move away from export oriented to domestic drivers as engine of growth.
- To move away from investment to consumption as the bigger component of economy.
- To move away from industry as a dominant growth and employment engine towards services.
- To move away from old economy "dirty" industries like metals, mining and chemicals to modern "clean" sectors such as renewables, electric cars and other green industries.

- To shift from the present to the future, in terms of emphasizing industrialization 4.0, artificial intelligence, space, advanced software and semiconductors.

External analysts have noticed the fact that while China has these five sensible pathways to build a more sustainable future, one element of transformation that is not in their thought process is modernisation of the political system. There is no aspiration in stated Chinese policy strategy, to reduce the grip of one-party rule, to achieve rule of law, to become a republic. Such dreams remain the preserve of dissidents and intellectuals.

There is a growing recognition in China that the pure pursuit of GDP growth leads to difficulties on sustainability of this growth. Policy makers have lowered the target for GDP growth from 7 to the range of 6 to 6.5 per cent. There is also conscious rebalancing of growth toward backward regions like Xinjiang and rural areas.

China proposes a 'Community for the Shared Future of Mankind,' which appears to be an attempt to build a coalition of countries which are disaffected with democracies and the West. Their aspiration is for some such coalition to replace the global dominance of the West and create a new global multilateral system that better caters to their interests.

In democracies, the everyday processes of freedom of speech, criticism, debate, dispersion of power and the rule of law continuously renew the legitimacy of government. In contrast, authoritarian governments, who achieve and maintain power through force, face difficulties in achieving legitimacy. When critics are muzzled, positive media coverage loses trustworthiness and an aura of failure comes to cloud the authorities. China's Communist Party lacks the political legitimacy that comes through an open democracy, and derives legitimacy from the state of the economy. Upholding legitimacy requires delivering consistently higher standards of living to its people. Every time growth has faltered in China, this has generated discontent of the populace. The CCP is hence extremely focused on obtaining sustained growth.

In India, there is a ready opportunity to double the number of persons who are working (from about 400 million to about 800 million) and simultaneously double the capital stock of the economy so as to obtain a doubling of GDP: This kind of opportunity is not present in China as their labour force participation rate is already at high levels like 70%, the size of the working population has started shrinking and the economy is already reasonably capital-rich. While a great deal of the growth of the past was based on simple mobilisation of resources, these methods will not continue to work in the future. As a consequence, Chinese economic policy thinkers believe that the growth of the future will come from an innovation economy, as opposed to the growth of the past which came from relatively simple mobilisation of resources into traditional areas. An authoritarian country is, however, a poor host for an innovation economy.

There are tight connections between the foundational objective – to shore up the legitimacy of the CCP through sustained Chinese growth at the frontiers of technology – and Chinese foreign policy which aims to construct a global economic system that is more conducive to Chinese aims. China has been building a parallel global system; an alternate trading system (Belt & Road); a multi-lateral banking system (AIIB, NDB, Silk road Fund); their own global positioning

system (BeiDou); an alternative global currency (RMB); alternative digital payment platforms (WeChat Pay and Alipay); alternative computer network standards (Huawei / 5G); cutting-edge technological processes in sunrise industries etc. It is popular to talk of how Trump is de-coupling America from China, but it is in fact Xi who began the de-coupling from America in 2013. Chinese diplomats confront the leadership of each country of the world with this 'China Platform': offering participation in this world at attractive terms, as an alternative to participation in the conventional notions of globalisation.

The challenges of diplomacy

While China often claims that it will never seek hegemony, Xi Jinping's own words (at the Party Congress in October 2017) were, "*a military is built to fight.*" The Chinese are systematically undertaking military modernisation in the context of an aggressive foreign policy.

By moving several Divisions of PLA troops to eastern Ladakh in the summer of 2020 along with armor and artillery and attempting to move their ground positions up to what the Chinese consider their Line of Actual Control (LAC) at several different points, China attempted to define the LAC unilaterally. They were also demonstrating that they were the pre-eminent power in Asia and they could do as they pleased, particularly as their comprehensive national power was several times larger. They were exhibiting their contempt and disdain for India both tactically as well as strategically. They were saying to India, Asia and the world at large, that the 21st Century is a Chinese Century.

By taking military action in 2020, China has clearly indicated that she does not desire a stable, balanced, forward looking relationship with India and that she is willing to use military coercion to resolve her disputes with India. All earlier bilateral agreements aimed at maintaining peace and tranquility in the India – China border areas have been violated by China. China has decided the nature of the future India – China relationship: she appears to desire a conflictual, unbalanced and tense relationship with India.

India cannot but recognize these signals and react accordingly. India does not desire a conflictual, unbalanced and tense relationship with China. The military message that India has sent China is that it will not accept this bullying and attempts at coercion, lying down. India has shown the spirit of fighting back. The India – China relationship is predicated on peace on disputed borders. If and only if there is tranquility on the border, then the rest of the relationship can potentially move ahead as it has done over the past three decades. Therefore, India will have to reset its China policy. It cannot be business as usual. This is a time for a fundamental rethink of the India-China relationship.

In the work process that led up to this document, a diverse array of alternative strategies were considered, from the Indian point of view. Completely disconnecting the economic relationship with China, or business as usual, or even accepting a junior position: all these possibilities were analysed in considerable detail. The main pathway reported in this document is the consensus view, the middle road that is most desirable.

There are no easy answers to the Chinese challenge. Considerable attention has been paid to a *short term* and *military* perspective. However, the India-China relationship is much more than the problem of mobilising troops in Ladakh in 2021. It is a long-term game. It is not just about military affairs; it is about economics, science, technology, etc. It is a unique situation where diplomacy must come to the fore: there has never been a greater challenge for foreign policy, in the entire history of the country. The main argument of this document is that India can prevail in this long game by mixing a short term strategy of sophisticated and nimble foreign policy with a long term strategy of strategic patience with domestic reform which generates high economic growth.

In the short run, the hand of cards which India has been dealt is not favourable. Indian economic and military power cannot be easily changed in the short run. In the short run, containing China will require forming coalitions of like-minded countries, a path that is new for Indian foreign policy. Alongside this, a long-run strategy must simultaneously be put into motion. In many ways, India is better placed to establish a dynamic market economy located in a liberal democracy, as compared with Xi Jinping's China which is characterised by concentration of power into one person and one political party. This gives an opportunity for India to achieve superior GDP growth for 20 years or so, after which Indian foreign policy will hold a better hand of cards.

The demands upon foreign policy for the short run

In the short run, India is outmatched. Even if power flows from the barrel of a gun, these guns grow out of the economy. With Chinese GDP at \$15 trillion a year while India is at \$3 trillion a year, there is a gap of five times and it is hard for India to confront China in terms of raw military capabilities.

This is a unique moment in India's history in terms of the challenges faced by diplomacy. In the past, India faced a weaker rival (Pakistan), a comparable rival (China in 1962) or non-state actors. Never before has India faced a much-stronger rival that has adopted an aggressive military posture and has inched into Indian territory. There are analogies between India's position today, and the puzzles of foreign policy for smaller nations in the great power politics of Europe in the 20th century.

As a consequence, in the short run, India will fare best through participating in coalitions to balance China. These coalitions would naturally consist of countries with shared values and interests. As an example, once an appropriate deep trade agreement is in place, the natural focus of finance and trade for Sri Lanka or Bangladesh is with India and after that, their interests would lie in supporting a strong and successful India. Three groups of countries are our natural partners in such coalition building: (a) the major democracies of the world, (b) the countries in the Indian region and (c) countries that share a border with China, including major powers such as Russia, who are our natural partners in this venture. Building such coalitions including the Quad and others is the need of the hour.

It is too easy to slip into the vision where heads of states play a chess game of foreign policy and establish treaties with each other. Deep connections between democracies, however, flow

from deep connections between the people and from shared interests. Deep linkages in a coalition are not merely matters of treaties signed by foreign ministers. They must ultimately build on deep linkages in the people, in commercial and cultural connections, cross-border traffic grounded in education, financial and physical investments, trade and cultural links. Good partnerships are grounded in give and take, where each country reshapes its *domestic* policy in ways that are favourable to the other. India has little experience with such conduct of foreign policy and with such deep linkage with other countries, in the post-independence period.

Fresh thinking in international relations is required at this critical juncture. Are we in India too wedded to the concepts of non-alignment or strategic autonomy? Are we able to pragmatically reshape foreign policy in the ways that are required to contain China? A clear-eyed appraisal suggests that India can only confront the China problem through coalitions. The essence of such coalition-formation is a flexible approach of give and take, of binding economies and societies deeply together through diverse kinds of relationships and accommodation in areas that the other considers important. This will require a pragmatic approach of negotiation with 20 key countries, where the international relations community plays a leadership role in reshaping Indian domestic policy in a diverse array of areas based on the priorities of our key partners. International relations need to come to the fore in Indian policy thinking, in a way that has never happened before. Not building such coalitions will leave us facing China alone, which will be to our disadvantage.

Alongside this, is the need for a long-run strategy. The strategy of coalition-formation gives us the time to raise our game, enhance our economic growth, decrease asymmetry, build resilient supply chains and rise to the China challenge.

Matching China in the long run

In a gloomy scenario, Indian power – whether economic, cultural, technological or military – will lag behind that of China's for a sustained period. Within China, most people view India as a smaller country; this is a bit like the way India today views Pakistan. In this gloomy scenario, India will have to remain on the path of forming deep partnerships with numerous countries and engaging in a continuous process of give-and-take with these coalition partners, in a new level of capability in foreign policy, in order to contain China. In a more optimistic scenario, India would get back to high GDP growth and over a 20 year period, would match the economic – cultural – technological -- military power of China. This is not assured destiny, but with modified policies, this is within reach.

Traditionally, there has been a strong *domestic* imperative for achieving high GDP growth. India needs a dynamic economy that creates jobs and prosperity, as this is in the best interests of the people. Development thinkers have always emphasised that India must get rich before we get old. With the Chinese threat, there is now an additional powerful *external* imperative that pushes in the identical direction. India needs to find the solutions for the growth slowdown and get back to the high growth environment of 1991-2011.

India's growth slowdown is now reasonably well understood. At a conceptual level, the institutions did not keep pace with the capabilities required in a fast growing private-led economy.¹

There are three critical challenges which India faces: (a) The increased tendency towards government micromanaging the economy, (b) The expanding administrative state and (c) a growing erosion of the rule of law.

The Indian state is excessively involved in the world of business, in determining the firms or sub-industries or technologies that win in the marketplace. An array of laws constitute an unreasonable interference in the activities of firms and there is the risk that more intrusive laws will come about in the future. Every day, the Indian state is prescribing details of products/processes/technology and even placing additional activities in public sector monopolies. This creates business model risk for private persons and reduces the incentives for private persons to commit resources to compete in fair ways.

Legislative functions are increasingly creeping into the hands of officials (e.g. writing of law or writing of a regulation). Judicial functions are creeping into the hands of officials (e.g. an official choosing what is the punishment that an individual must suffer). The emergence of an *administrative state*, the rule of officials, has created a different nature of concentrated power, when compared with the balance of power between legislature, executive and judiciary that was envisaged in the Constitution and characterises all successful states.

The rule of law problem lies in the discretion that officials and politicians have, to behave differently towards different private persons. An array of laws have given officials and politicians draconian powers of investigation, prosecution and punishment, with high discretion on how each situation should be treated. These problems have forced private persons to become supplicants and created the risk of expropriation. This reduces the incentives for private persons to commit resources into building organisations in India.

Indian policy thinking needs to change course in a fundamental way, around these three big themes of scaling back state intervention, restoring the separation of powers and achieving the rule of law. These changes will induce a next phase of high GDP growth, in which India should be able to match Chinese GDP.

In economic thinking, China is ahead of India in terms of shedding the autarkic mindset. This is visible in Chinese openness to international trade and FDI and most visible in the area of international finance and RMB internationalisation. There is a need for Indian economic policy to do much more by way of embracing international trade and finance. In financial economic policy, there was pioneering work in 2003-2007, of building Mumbai into an international financial centre and the rupee into a global currency, which is freshly relevant in the context of competing with China. The first element of that is to reverse the long-term decline of the share

¹ The Indian malaise in the post-2012 period is analysed in [*In Service of the Republic: The art and science of economic policy*](#) by Vijay Kelkar and Ajay Shah, Penguin Allen Lane, 2019.

of India in global activity on Indian underlyings, that has arisen owing to poor choices in India on financial economic policy, taxation and capital controls.

In military affairs, China is substantially ahead of India on the agenda of modernising the armed forces, of reducing the headcount and increasing the technological intensity behind each soldier. There is a need to fundamentally reorient Indian military spending away from the predominance of wages and pensions towards right sized armed forces who have more modern capabilities, where the share of wages and pensions in overall military expenditure comes down to below half.

Alongside these issues, the long-run foundations of Indian success lie in the maturation of the liberal democracy. This requires renewed vigour of protecting civil liberties, enshrining each individual and overcoming the fault lines of caste and creed. While India has moved to a greater extent than China on achieving a liberal democracy, there is a long distance to go before Indian democracy is able to live up to the letter and spirit of the Constitution of India. It is important to reiterate that the conflict with China is ultimately a challenge of building a market economy located in a liberal democracy; to the extent that a vibrant liberal democracy does not come together, it will mar the possibility of achieving economic dynamism.

Is the thought of matching China just wishful thinking?

The fundamental arguments of this paper are not predicated on China faring poorly. However, there is reason to believe that India can fare better than China in the coming 20 years or so:

1. Demographic factors are in favour of India, where the outlook for the working age population is superior to that of China, where the one-child policy of 1979-2015 coerced households into a premature 'baby bust'. Recent estimates² suggest that the Chinese working age population has already peaked (at about 1 billion) and will now decline steadily. The Indian working age population is expected to peak at about 1.15 billion in 2045, which gives a 25 year period of increases in the working age. We must of course be cautious about the extent to which persons in the working age translates into persons who are working and producing GDP. This maps to the underlying problem of igniting private investment that can get the labour force participation rate up from the present levels of about 43% to Chinese-style values of about 70%.
2. The Indian financial system allocates capital better than the Chinese financial system. This gives India an edge in translating the flow of investment into increased GDP and thus reduces the consequences of the gap between investment in India vs. investment in China.
3. Chinese exports are fragile to the extent to which they have been led by state interventions, the extent to which they are shaped by distortions in finance, exchange rates and subsidies. This raises questions about sustainability of the level and the growth

² *Fertility, mortality, migration, and population scenarios for 195 countries and territories from 2017 to 2100: a forecasting analysis for the Global Burden of Disease Study*, Vollset et. al., The Lancet, 14 July 2020.

rate of Chinese exports. The exporting that takes place from India is grounded on the true competitive advantages of operating in India. If anything, the Indian state generally impedes firms that seek to export from India, which suggests the up side potential from rational policies which remove these impediments.

4. In the ultimate analysis, the successful nations of the world are characterised by market-oriented economic policy located inside a liberal democracy. While this is true at all levels of per capita GDP, this is particularly true of a modern dynamic economy that is participating in the information age. China's path into the future requires political and economic freedom. However, it is difficult in each country, to learn how to do market-oriented economic policy and to operate a rule of law system. The experience of countries such as the USSR, China and India has shown that there is a long and difficult journey in order to put the elements of liberal democracy and market-oriented economics in place. In this journey, it is likely that India is ahead of China. Indeed, it is not hard to see the links between the rise of Xi Jinping as a strong leader in China, the decline in Chinese optimism and growth and the increased stress that has come for China from militarism and nationalism, from enhanced conflict with many neighbours.
5. In the history of global economic growth, latecomers have achieved faster and faster catchup to the global frontier of knowledge; there are such possibilities for India to achieve extremely rapid growth over the next 20 years or so.
6. China has embarked on the course of having conflicts with a large number of countries. There is the risk of over-reach. India's position in foreign policy, in contrast, is much more equanimous, with good relations with many (though not all) of the natural partners in the desired coalition.

These differences suggest that the notion of 'strategic patience' is not just wishful thinking. There is reason to expect that at a future date, India will have the economic, commercial, intellectual and cultural might to compete directly with China. The puzzle lies in refocusing upon the domestic policy flaws which have held India back, and in finding the energy and intellectual capacity to address them.

At present, the difference in GDP between the two countries is large. In nominal terms, Chinese GDP is at \$14.9 trillion while India is at \$2.6 trillion. Expressed in comparable PPP terms, China is at \$24.2 trillion while India is at \$8.7 trillion. Looking forward, reasonable scenarios for Chinese growth involve growth rates like 3, 4 or 5 per cent. Reasonable scenarios for India's growth involve growth rates like 4, 6 or 8 per cent. If India is able to address domestic policy flaws, then growth rates like 6 or 8 per cent become more feasible. There are many scenarios over the next 20 years or so where the comparison becomes less unequal. As an example, if India grows at 8 per cent and China grows at 4 per cent for the next 20 years or so, the two GDP values in comparable PPP terms emerge in 2041 at \$53 trillion for China and \$40 trillion for India.

The outlook for trade liberalisation and FDI

India has been a great beneficiary of opening up to the world. The path to prosperity and strength lies in deepening that engagement. This involves going beyond trade in goods to trade in services and agriculture. Most global trade takes place *within* corporations; the agenda of increasing trade activity is synonymous with creating conditions for global firms to operate in India. The first phase of trade liberalisation involved simple problems such as removing outright bans or quantitative restrictions and removing customs tariffs. The focus has now shifted to 'Deep Trade Agreements' (DTAs) which constitute comprehensive removal of barriers and creating conditions for deep engagement.

India's approach to trade agreements has been grounded in skepticism about the gains from trade. As a consequence, in India's long history of trade relationships with the world, the rate of growth of Indian exports is not significantly higher to those countries with FTAs as compared to countries with which such agreements are absent. Addressing this paradox requires many elements, including a fresh awareness of the gains from cross-border trade and finance activities, engagement with the needs of our domestic industry, addressing the needs of all interest groups, walking away from potentially harmful deals, like we may have done with RCEP (Regional Comprehensive Economic Partnership) and negotiating comprehensive agreements rather than separate ones for goods and services.

A major decision has been taken, in the form of not being part of the RCEP. The analysis and back channel negotiations about RCEP needs to be nurtured to be able to preserve flexibility at future dates. Strategic thinking about India's relations with ASEAN countries will help illuminate future paths for India on RCEP. Going beyond trade agreements, there are considerable gains which can be obtained from unconditional unilateral liberalisation for cross-border trade and finance.

About half of global trade takes place *within* multinational firms, with participation in global value chains (GVCs). Central to the objective of a greater international economic engagement by India is the problem of India becoming a good host to multinational firms (both Indian and foreign). Thousands of global firms are presently in the process of reviewing the extent of their exposure to China. This has created an opportunity for greater FDI into India. The barriers that inhibit FDI into India consist of capital controls, taxation, regulation and rule of law. Fundamental reforms to these areas, based on root cause analysis, will simultaneously help the domestic economy and influence the decisions of global firms who are evaluating new locations for production. These fundamental reforms are good not just for foreign and Indian multinationals: they are good for all firms operating in India. In this sense, they are fully aligned with the problem of re-igniting high GDP growth in India.

Beyond promotional events and fairs, the need today is to understand the difficulties faced by firms which may be considering investing in India and undertake policy reforms which address the constraints that they see. Most big international corporations already have a presence of one kind or other in India, have evaluated the difficulties of operating in India and have assigned a low weight to India in their global organisation of production. Increased engagement

from these firms will come from deeper policy reforms and not communication strategies. The new entrants are most likely to be small or medium sized firms, who are less able to justify expenses on lawyers, accountants and government liaison that is required to overcome the Indian regime of interventionist economic policy, administrative state and limited rule of law. The decisions of both classes of firms would be positively influenced if India undertook the requisite process of economic reforms.

It is tempting to leave the difficulties of capital controls, taxation, regulation and rule of law intact and instead offer fiscal subsidies to foreign firms to operate in India. This approach does not achieve the desired goal. For an analogy, exporting is attractive because it proves the presence of high productivity. When firms learn to compete in the world market, this generates productivity gains at home. When firms export on the back of export subsidies or exchange rate distortions, this constitutes export fetishism, a mixing up of the means and ends. Fiscal resources are also tiny compared with the size of the economy and the magnitude of the distortions imposed by poorly constructed policy frameworks. If bad policies generate a handicap of 10%, then exports of \$1 trillion will require subsidies of \$100 billion, which is fiscally infeasible. It is better to solve bad policies at the root cause and benefit not just exporting firms but all firms.

A new perspective which has to be brought into trade policy is the question of resiliency in the trade relationship with China. While most trade connections with China are appropriate and optimal for India, there is now a new level of business continuity risk associated with these. Private firms have ample incentive to deal with supply chain fragility. In addition, there is a case for some effort on the part of state organisations also, in laying the groundwork for increased resilience when faced with potential disruptions in the future. This is a novel dimension which trade policy in India needs to work on.

One important dimension of the India-China relationship is the emergence of cyber crime led by state actors. China is one of the countries which have created cyber crime and cyber warfare capabilities, which are termed 'advanced persistent threats' in the field of computer security.

India is exposed to this problem from two points of view. First, there is the danger of attacks by state actors upon systems in India -- government or private -- as vehicles for inflicting harm upon India. Second, there are linkages between this problem and the greatest Indian export: software and processing services. Attacks upon systems built by Indian firms and attacks upon work being done in India for the global value chain of services production, could adversely impact India's most important industry. India thus has an interest in global solutions on cyber warfare and cybercrime.

Indian diplomacy needs to engage itself with like-minded countries, to build towards: (a) Frameworks for attribution through which attackers are identified through respected multilateral forums, thus avoiding the lack of trust in claims about attacks made by any one government; (b) A system of sanctions and adverse consequences imposed by multiple countries upon any attacker regardless of the identity of the victim; (c) Establishment of treaties with countries where governments agree to not attack each other; (d) Build towards

international frameworks akin to the regime of nuclear control; and (e) Placing the behaviour of Chinese state actors on these questions as one element of the diplomatic relationship with China.

Cyber warfare and cybercrime is one element of a larger problem: India has an interest in the other aspects of making the global economy safe for trade in IT-related services, which includes the issues of protection of data, encryption and individuals from state surveillance, an open markets approach that is supportive of cross-border activities, where the global community exerts itself against economic nationalism that might periodically recur in some country or the other. As an example, the world has an interest in questioning Chinese methods of creating IT standards, protocols and platforms which work within China but directly or indirectly create barriers for global technology companies to operate in China.

Retreating from economic engagement with China

There is a search for levers to harm Chinese firms operating in India, or Chinese goods / services being sold in India. Many such moves are ultimately self-defeating for India.

The prime objective of economic policy strategy should be to think at a strategic level, to build India into an advanced economy. To the extent that India gets rushed into undertaking self-defeating actions, this actually amplifies the harm. Every immiserizing action that India takes is a victory for those who would like to see India stay weak.

What is important in such analysis is not the small analysis of the impact of a proposed move upon China, but a fuller analysis of the impact of a proposed move upon *Indian* growth and prosperity, particularly when we take into account longer timeframes and the counter-moves that China can undertake.

There are three areas where there is a case for a retreat from engagement with China:

1. There is a case for introducing restrictions against companies controlled by the Chinese state from having a controlling stake in a hotlist of sensitive infrastructure assets (e.g. the JNPT or Delhi Airport though not (say) a highway from Nagpur to Nashik).
2. There is a need to avoid locking into Chinese-controlled technological standards and instead work with global standards processes. In particular, India must go on a path for mobile telephony, on questions such as 5G, with global standards and avoid Chinese-controlled standards.
3. India must police against and block Chinese state surveillance of Indian persons, which appears to often be done through backdoors in network equipment. Indian advocacy in international circles, of computer networks and technological standards where privacy is protected, would be more persuasive if the Indian state rises up to the checks and balances of healthy liberal democracies when it comes to state surveillance of citizens.

While these are the three areas for work on retreating from engagement with China, there is a danger of hurried decisions and strident headlines. Sophisticated policy work is required in each

of these three areas, in order to devise nuanced and calibrated responses as opposed to hurried sweeping decisions and bellicose headlines. Such decisions require deliberation, analysis and intellectual capacity in the policy process.

Apart from these three areas, it is hard to envision useful strategies for retreating from trade and investment linkages with China.

Alternative sourcing networks and destinations for Indian exports need to be systematically developed, to compensate for the adverse impact of these calibrated policy responses upon India-China engagement. The de-globalisation that is implied in these three paths – the reduced cross-border engagement for India with China – needs to be compensated by a strong path of opening up to the world economy so as to avoid the adverse impact upon India's growth possibilities through inward looking policies.

Innovation policy

China is a difficult rival for India to face not just because the Chinese GDP is much larger than the Indian GDP. Chinese scientific, intellectual and technological capabilities have considerably outstripped those of India.

Chinese universities and intellectuals are now ahead of India. The top Chinese university (Tsinghua University) is at rank 23 in The Times Higher Education Supplement (THES) ranking, while the top Indian university (IISc) is at rank 301-350. Indian policy attempts and resourcing of universities are STEM-oriented. Not only has China built superior capabilities in STEM (science, technology, engineering and math), they have also built full-stack capabilities in the social sciences, the humanities and the fine arts; Tsinghua University has symmetry between its strengths in all the areas. It is likely that the best Chinese experts on India understand India better, when compared with the capabilities of the best Indian experts on China.

This is an unacceptable position for India on a strategic scale. In the scenario of India emerging as an equal of China within 20 years or so, a necessary condition is the institutional capacity of the intellectual sphere. This brings innovation policy to the fore.

Pulling together state spending in higher education, space, defence and nuclear, the sheer magnitude of the resource flows are not inconsiderable. The difficulties in India lie in the institutional capacity, the extent to which resources are translated into outcomes. The better institutions within India do not involve a great deal of enhanced expenditure per researcher when compared with the more flawed institutions.

Better public financial management ("PFM") approaches for state expenditure will make possible contracting-out and grant-and-review mechanisms through which public money will go to non-government actors (whether universities or firms) in a meritocratic way, generate a higher bang for the buck and induce higher spillovers into knowledge in the economy.

Alongside this, there is a great need to remove the barriers between academia and the industry. At present, commercialisation of research by academicians is hindered by rules and by culture. There are enormous gains to be had through a two-way street, where the industry

funds academics and academics are deeply connected into the industry. We need to support and applaud academics who build for-profit companies while being employed in research institutions.

This re-engineering of mechanisms through which government resourcing goes into universities and firms -- public and private -- lays the economic foundations for great universities. Alongside this lies the problem of governance of universities, which when reformed can lead to the emergence of elite universities in India, which will become serious competitors on a global scale.

Industry comparisons

The Indian economy has demonstrated stellar growth from 1991 to 2019 – 275 Billion to 2.9 Trillion US\$ GDP, 18 B to 330 B US\$ Exports, though Imports have also accelerated from 24 to 514 B US\$, foreign exchanges from less than a billion to 425 B US\$ and the most heartening data, that population below the poverty line has dipped from 45% to 22%. In 2019 an Enam Research study mentions that India was ranked globally 9th by market capitalisation and 5th in nominal GDP, on course to become the third largest economy in the world by 2030. India has also one of the top two agriculture bases in the world on all agricultural output parameters and is also the world's largest producer of farm equipment. India is also among the top five in coal and iron ore production, steel and cement and reached the top in terms of real estate construction in 2019.

In spite of these pluses, India needs to find structural answers on FDI inflows, exports and tourism to weather global liquidity shocks and cope with fluctuating energy prices. The trade deficit of 6% and a depreciating rupee losing 5% CAGR for ten years remain areas of concern and it is alarming that the growth rate of exports has stagnated at 2.5% per annum since 2014 and India has not benefited from the global shift of nearly a trillion dollars from oil exports to industrial exports. The study points to just two sectors where India has a huge asymmetry with China, apparel 37% to 3.8 % and footwear 39% to 2%. In this paper, we have considered three sectors for deeper analysis – areas where India is in danger of losing the race and becoming China dependent, areas where India has a real opportunity to be imports independent and select sectors which can be sectors where India can enjoy global dominance. We have considered the extent of asymmetry, the supply chain dependencies and a strategy of patience to move from “less China” to “China less” over the next ten years.

A deep analysis of China's economic prowess built over the last decade point to three key differentiators:

- A. Focus on attracting FDI, developing SEZs, Infrastructure Development – Physical, Digital and Social which have made it attractive for overseas investors in addition to attractive taxes and currency rates.
- B. The 13th Five Year Plan based on five key themes of innovation and conscious shift to higher value added manufacturing.

C. Made in China 2020 with its targeting of ten key sectors for additional government support. These sectors are:

- (1) new energy vehicles,
- (2) next-generation information technology (IT),
- (3) biotechnology,
- (4) new materials,
- (5) aerospace,
- (6) ocean engineering and high-tech ships,
- (7) railway,
- (8) robotics,
- (9) power equipment,
- (10) agricultural machinery.

India has recently launched Productivity Linked Initiatives and chosen sectors for deep investments. To succeed in the future, we have done an assessment of global opportunity and relative status of India and China to advocate industry specific strategies in three broad categories of industry sectors.

CATEGORY 1: Huge asymmetry areas where India must progressively reduce dependence.

CATEGORY 2: Opportunities to focus on “atmanirbhar” and meet all domestic demand.

CATEGORY 3: Global Industry building opportunities.

A summary of this is listed here.

CATEGORY 1: Huge asymmetry areas where India must progressively reduce dependence

Rare Earths – Having the largest natural availability of rare earths, China has a dominant position here, controlling 90 percent of global production. With many clean energy applications and high-tech industry products like electric and hybrid cars dependent on rare earths, the concern of the world at this huge dependence on China is the only factor going against Chinese dominance in future. Australia and the USA will chip away at China’s share. India has performed in this industry below potential in spite of significant beach sand mineral deposits.

The future game plan for India has to be to make the mining and production of rare earths more attractive for the private sector and become part of at least some global supply chains in this area.

CATEGORY 2: Opportunities to focus on “Atmanirbhar” with “Atmavishwas” and meet the domestic demand to gain technological leadership

Telecom – The global market in 2019 was 1.74 trillion US\$ and rising spending on wireless communication due to shifts to cloud technologies and mobile devices is changing the complexion of this industry. India’s revenues in this sector stood at 96 billion US\$ while China’s mobile ecosystem added 750 billion US\$ to the country’s economy in 2018. China’s success in deregulation has led to mega companies like China Mobile, China Tower, China Telecom and China Unicom and more recently, Huawei and ZTE.

India’s opportunities for the future lie in the move from traditional copper-based networks to dense optic fibre cable networks and the entry of major private sector players like Jio with focus on 5G. In 5G, India needs to be committed to block the entry of Chinese players for both self-reliance and security reasons. There is an imperative to stem the influx of imports of Optical Preform, Optical Fiber, and Optical Fiber Cable products through Safeguard and/ or higher Basic Custom Duty, to encourage local capacity development. Indian government should allocate 1% of annual GDP towards publicly funded fiber infrastructure and reduce dependency on private sector. Broadband connectivity itself has a correlation with GDP growth, so a sustained, structured program will enable further economic growth across sectors.

It is important to underline recent developments in India in this segment. While the entire start-up investment in India was less than 15 billion US dollars, Reliance Jio’s ability to raise over 20 billion US dollars at an equity valuation of 58 billion US dollars demonstrates the tremendous global tech majors and investors see in the potential of the telecom segment in India.

In the investment announcement made by Google, who came into Jio at the same valuation as fierce tech industry rival Facebook, CEO Sundar Pichai said their excitement stemmed from the potential for millions of users in India to become owners of smartphones. With the advent of 5G and the massive expansion and national push that Jio is expected to make, Google expects that new opportunities will be unlocked, powering the vibrant eco-system of applications and pushing innovation to drive growth for the Indian economy.

It may be worth emphasising that China must be barred from participating in India’s 5G revolution, both from security and self-reliance points of view.

CATEGORY 3: Global Industry building opportunities

Consumer Electronics – The global consumer electronics industry is expected to reach 838 billion US\$ in 2020 with over 151 B US\$ revenue generated by China. Investments in smart robotics and factory automation, extensive investments in AI and prosperity driving consumer appliances are all pluses for China. India needs to accelerate the roll out of 5G and IoT and leverage initiatives such as Digital India and the Smart Cities Mission to usher in a new era for electronics products.

Tremendous opportunity has been lost in hardware even while the software and business process industries have made great strides. While India has built an outstanding Information &

Communications Technology (ICT) industry with dominant market share in IT, Engineering, BPM and Product Engineering services in the world, India has missed the opportunity in core ICT. The core ICT layer includes base stations, routers, blade servers, phones, laptops, etc., that are built using semiconductors like semiconductor chips, hardware processors and other components like optoelectronics and sensors. A big frontier for core ICT systems is Cloud for 5G, which will need a new class of server blades with the capability to support wireless networks with multi-gigabit per second throughputs. Important thrust areas in semiconductors includes special purpose engines for deep neural networks capable of handling large modelling applications with large volumes of data and co-packaged optical transmissions with massive processing power bits per second and connectivity from a single chip. Through core ICT, the industry will move from just software to hardware along with embedded software and firmware and this will be the passport for India to be a true participant in the multi-trillion-dollar global core ICT industry.

ICT will be the key enabler of many high growth industries in India including biotech, pharmaceuticals, advanced materials and even energy. India's best bet to enter the core ICT eco-system is to grow new companies while expanding the existing industry efforts in this area. India requires entrepreneurial university researchers and engineers from industry within and outside the country. The initial opportunities for India will be in the design layer – systems and semiconductor design where the engineering skill sets are largely available and investments are relatively smaller. However, semiconductor and other component manufacturing is important too and careful planning will be needed to build this sector.

By focusing strongly on all three layers – domain, services and core ICT and building a new era of patents and inventions, India can truly lead the world in all aspects of ICT. A reasonable 10-year target for India in core ICT can be a 5% share of global revenue, which means a 200 billion dollar plus per annum value addition by 2030. Indian engineers have what it takes; there is now the ability to be part of a China-less supply chain, attract global venture capital and build the 200-million-dollar core ICT capability for the country.

Automobiles – The global markets have been dominated by US, European and Japanese manufacturers, though China is counted among the largest markets worldwide. China's early moves in the autonomous, electric and connected car segment and their dominance in the batteries production for electric cars have led to projections of market leadership by 2040, which India should watch, emulate and challenge.

Indian *Atmanirbhar* or self-reliant production of cars conforming to all emission standards have to be ramped up and an aggressive push for exports made. All major auto makers in Japan, Korea, USA and Europe should be incentivized to use India as the base for massive global production. Special automotive SEZs offering significant tax benefits and excellent infrastructure could be the way forward.

India should leverage its successful IT and auto component sectors to manage the complex systems of vehicle electronics and connected vehicles and use the accelerating investments of global players in Indian manufacturing plants to accelerate in this critical sector.

Initiatives like the Ministry of IT's STPI Centre of Excellence for Autonomous, Connected, Shared and Electric Vehicles need to be substantially supported through domestic R&D and investments to enable India to take a lead in the next generation of transportation.

Chemicals – The global revenues in this segment had reached 3.94 trillion US\$ in 2019. India's revenues of 150 billion US\$ places it far behind China, which became the world's largest producer in 2009 and today enjoys over 40% of global industry revenue. With 676 chemical parks and more than 60 million employed compared to India's 2 million, China is far ahead in this sector though given the context of oil prices moving to lower levels and Chinese labour costs rising, China's competitive advantage might be less in future.

India has opportunities to leverage a China Plus One objective of many global consumers to present a real alternative destination by creating special purpose SEZs, positioning the country as a leader in certain value chains and segments and showcasing the use of digital technologies and Industry 4.0 smart production systems as well as low-cost labour to be the destination of choice for the future.

Healthcare and Pharma- While India has done well in the pharma segment, a large percentage of inputs to any drug manufacturing comes from China. China also has one of the fastest growing healthcare markets in the world. Of the total 8.4 trillion US\$ global healthcare market, China's market size will cross 1.3 trillion in 2020, while India is in the region of 200 billion US\$. China's pharma market was valued at over 140 billion US\$ in 2019 while India's domestic market was just in excess of 20 billion US\$ in 2019 and an estimated export of 16 billion US\$ in FY 20.

With strong focus on healthcare in India and the extensive use of digital technology and services, India has an opportunity to substantially ramp up healthcare revenues and also make big impacts on the global pharmaceutical industry. There is an upside potential if Indian companies become major global producers of COVID vaccines and syringes. Tele-health and wellness tourism are also significant segments to be exploited.

On the pharmaceutical side, the Indian drugs industry is a heavy user of Active Pharma Ingredients (APIs) sourced from China. In an environment where China is seen as a bad actor in the global economy, where Chinese nationalism can harm counterparties abroad, this presents a problem. Solutions have been discussed in detail in this paper, including sourcing diversification, boosting API domestic production with committed offtakes by Government players.

Agriculture- While China has the highest agricultural output of any country with sixteen successive bumper food crops and over 800 billion US\$ value added in FY20, India remains somewhat monsoon dependent and has low farm productivity. Agricultural exports from India recorded over 38 billion US\$ in FY19. The opportunity is huge with the global food and agriculture technology and products market size projected to have crossed 500 billion US\$ in 2019 with food and beverage processing equipment having the highest segment share and aquaculture products growing fastest.

India has the potential to double farm income by 2022 and the growing use of genetically modified crops will improve yields. Agri exports should be a focus area for the country. The adoption of food safety and quality assurance mechanisms such as Total Quality Management (TQM) including ISO 9000, ISO 22000, Hazard Analysis and Critical Control Points (HACCP) and Good Hygienic Practices (GHP) by the food processing industry will offer several benefits which have to be exploited.

India's quest for success and self-sufficiency in agriculture has resulted in large farm lands being used for wheat and rice production. While this has been a relatively secure segment of GDP growth, there is an opportunity to move towards much higher productivity agriculture including grains, fruits and organic produce which would have higher farm productivity and free up land parcels for industrial and other productive uses.

Finally, it is an encouraging step that the Indian government has committed US\$ 26.6 billion to address the nation's manufacturing capabilities and enhance exports across 11 sectors through Production Linked Incentives. These include mobile handset and components, automobiles and auto components, solar photovoltaic (PV) modules, speciality-steel makers, man-made and technical textiles, food processing, specialised pharmaceutical products, advanced chemistry cell battery, and IT hardware. This scheme relies on identifying National and Global Champions in each sector to manufacture part of their needs and hence make India an integral part of the new supply chain. It is inherently WTO compliant and serves the need of those who would like to see their global value chains insulated from a possible trade war between India and China.

As India moves to become a five trillion US\$ economy, the one area of dominance that India has, the 190 B US\$ Software, Engineering and Business Process Management industries could propel the accelerated building of a trillion-dollar Digital India. Investments in the core ICT opportunity could add two hundred billion US\$ to a potential 300 billion US\$ that the domain and services led approach can become. And the vast sectors of financial services, agriculture, healthcare and e-commerce enabled through digital platforms could generate half a trillion dollars of value addition through digitally enabled services.

Conclusion

India is at the cross-roads. India can become the dominant alternative to the China-centric supply chains that have dominated Asian trade and larger parts of the world in the last twenty years.

The country and our policy planners will need strategic patience in abundance and a very nimble response system that acts on global cues and propels India to a platform of symmetry in the years to come. In the coming era of strategic globalisation, India must lead!

In 2047, we will be at 100 years of independence. At 5% GDP growth, China will be at a GDP of \$86 trillion by then in PPP terms. If India is able to produce sustained growth of 6% for these 26 years, GDP in PPP terms will be \$39 trillion, and if Indian growth manages to get to 8%, then the GDP in PPP terms will be \$64 trillion. Both scenarios require profound policy work in India, on building the institutions of a market economy located in a liberal democracy. But if the required

changes are put in place, both scenarios are much better than the present, where India has a GDP which is one-third of China's (in PPP terms).

China's attempts at military, economic and political hegemony could potentially precipitate a cold war between other developed economies and China, which changes the strategic possibilities for India. While China has retained private innovation and large enterprise as keys to its own growth, the crackdown on large Internet monopolies and the insistence on loyalty to the party from entrepreneurs such as Jack Ma provides a wedge that helps emphasise the importance of replacing China at the centre of many global supply chains, by India.

India needs to be aware that neither the USA nor Europe nor indeed large countries in Asia have talked about any Chinese boycott and indeed with the ASEAN countries which led RCEP and the new trade deal between the European Union, many elements of the China-centric world of globalisation continue to grow. India must present the political and domestic differences with China in public, make alliances with like-minded countries and build up our own industrial and economic muscle.

There is a fine line between the policies of Indian socialism, of self-reliance and import-substitution, as opposed to a spirit of Atmanirbhar which is grounded in Atmavishwas, where a confident India engages with the world without insecurity. This paper advocates a progressive "Less China" approach, by taking adequate security precautions and yet staying away from myopic jingoism and realising that China is a major source of new technologies, in areas like solar and battery technologies and many others including capital which will be necessary inputs to our growth in the short term.

India stands at a huge opportunity – to emulate and surpass China in terms of economic growth and take our successes as a democratic, English-fluent nation to rise fast and be at the centre of global value and supply chains of the future. Understanding China, its model and its present and future directions will be essential.

As researchers, writers and strong patriots, we the writers of this policy paper believe that ours cannot be a one-off effort. In 2021, the events of Doklam and Ladakh are fresh on the minds of Indian thinkers, which generates urgency for the work program that led up to a document such as this one. However, the China-India relationship is not a problem that is amenable to a one-off work program. It is likely that in the short term, a certain normalcy might be restored, and the problem will shift from urgent to important. However, the Indian policy community requires sustained long-range knowledge building activities on China. We need to know more about China. We need to continuously recalibrate the Indian strategy based on current developments. In an array of practical areas, ranging from electric vehicles to taxation of corporations, we need to constantly study China, compare-and-contrast with India and plan the economic, military and international relations aspects of the relationship. In order to achieve this, multiple long-range research programs need to be established, at multiple research institutions that will produce knowledge and expertise.

We believe this is a call to action and we have to deal with the issues and the opportunities that we have outlined here and in more detail in the full paper with urgency and alacrity. In the words of Swami Vivekananda, we must “Arise, Awake and Stop Not till the goal is reached.”
