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## Contents

Making DIGITAL INDIA .....	14
Article: Blockchain.....	<b>Error! Bookmark not defined.</b>
Sustainability of Built Environment and Mobility: Agenda for action .....	34
Making the Indian cities, Public Transit-Oriented, not automobile-oriented .....	37
Use of rural materials and crafts in cities .....	40
Serenity at ' Kechki' .....	44
বার্মা ছুয়ে আসা .....	48



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# Editorial

The BEC94 foundation, a collaboration of the BEC 94 students, is born with an intention to give back to the college as well as the society. The tech seminar was such an attempt to give back to the society, a place for bonhomie, an effort to bridge the gap between the institute's current students and the students of 94 batch.

The seminar's topics like Blockchain or Quantum computing are futuristic. Even though Blockchain is there for some time, it is still in the nascent stage and is expected to flourish soon, given the technological advancement of the world.

Quantum computing is futuristic technology. We got to hear from the representative from IBM, the company which made a considerable investment in the field.

However, the current buzzword is SUSTAINABILITY. At the time of this global pandemic, the need to cohabit with nature is realized. A discussion by the experts in the field of construction and building design enlightened the audience with the design philosophy and the usage of local materials, whereas the experts from Bentley were involved in showcasing the capability of the software for designing purposes.

The icing on the cake was the discussion with the entrepreneurs from the Batch of BEC94 to encourage the current batches to follow the path. They explained their journey as well gave the tips for success as experienced by them.

This souvenir is an attempt to capture the moments in written form and present it to you. We also present two travel stories by one of our batchmates Arnab Roy. I hope it will be an enjoyable reading.

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Figure 1: Registration



Figure 2: Expression of Gratitude



*Figure 3: Inauguration by Director, IEST*



*Figure 4: Address by Director, IEST, Sibpore*





Figure 5: An engaging Discussion on Blockchain

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Figure 8: Discussion on Sustainability



Figure 9: Discussion on Steel Structure

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Figure 10: Discussion extended beyond the Auditorium



Figure 11: Some of the members of the Batch 94



Figure 12: Digital India- Bentley



Figure 13: Making Digital India - Bentley

# Making DIGITAL INDIA

Swaraj Datta Gupta

Senior Academy Client Manager, Bentley Systems

(BEC94 Foundation, Indian Institute of Engineering Science and Technology, Shibpur, Kolkata, December 26, 2029)

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Infrastructure is the enabler and the main driving force of a nation's sustainability as well as its economic growth. In the last two decades, India's emergence as a powerful nation has been manifested in rapid infrastructural enhancement in all aspects of modern civilization, ranging from transportation (like Road, Rail, Aviation), Energy, Housing to Hospitality, and Healthcare facilities. A report suggested that India's infrastructure budget will increase by 3-4 folds from its current infrastructure budget (₹ 4.5 Trillion in FY 2019) with a focus on three core sectors; Energy, Road, and Rail. In the recent Budget presentation, the Union Finance Minister has proposed the outlay for Infrastructure as ₹ 100 Lakh Crore for the next five years (i.e., ₹ 20 Lakh Crore or ₹ 20 Trillion, i.e., ~5-fold increase).

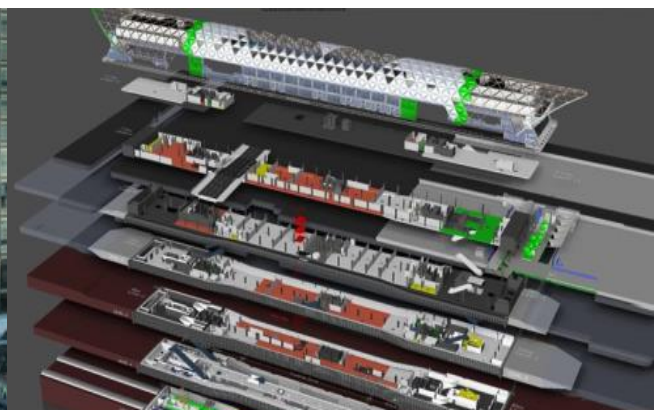
With the prevailing scenario of **Cost & Time Escalation** in Infrastructure projects (Railway Projects Account for ~60% of all central sector projects; 1.65 L Cr total original **Cost Overran** by 2.46 L Cr, i.e., ~150% and 65 out of 350 projects report **Time Overrun** of 3 to 374 months. Similar is in the case of Power projects. *Reports The TOI, Pune Edition, November 26, 2018*), imagine how much savings could have been possible over this outlay (at least 100% with the trend reported as above!!) had these colossal wastages been arrested.

**INFRASTRUCTURE - Digital Twin**: Imagine a scenario; all the infrastructures are also digitally or virtually available to each asset level details on a central database, through its developmental stages (e.g., Concept, Design, Construction & Commissioning) are accessed by each of the, down the line stakeholders (i.e., the user of these details, e.g., Owner/Operator, Owner's Engineer, Constructor, Maintainer, Statutory Authorities & User, etc.) and are able to visualize, monitor & communicate their observations or acceptance well before actual execution/construction.

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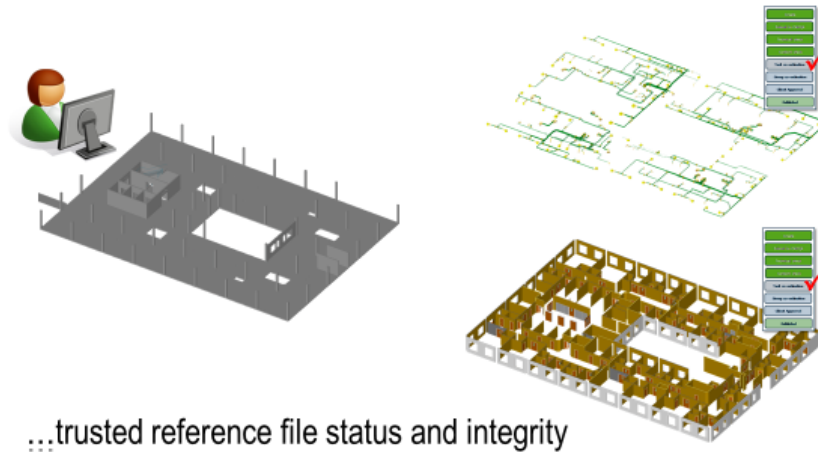




## Digital Twin

Also imagine, each of the stakeholders is also able to access the databases of related & contextual systems virtually for them to collaborate & federate with their system/s making sure those fit precisely as intended within the overall Infrastructure.

### Coordination

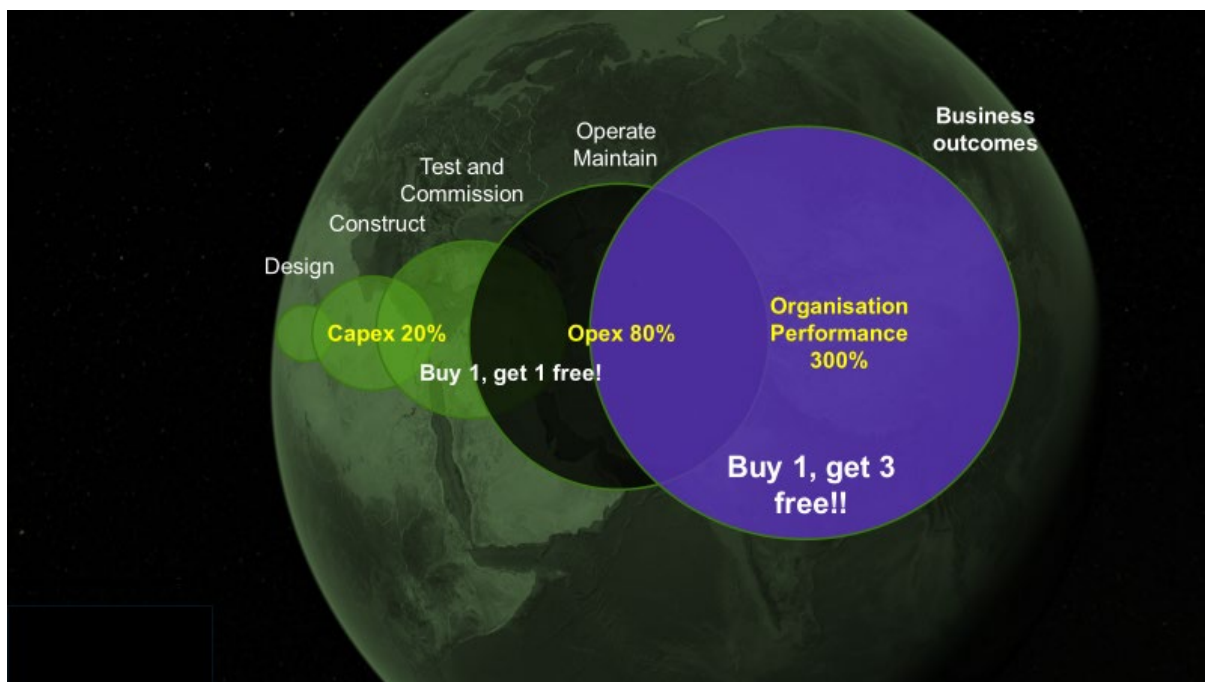


### Collaboration & Federation co-existing systems



### GIS Integration

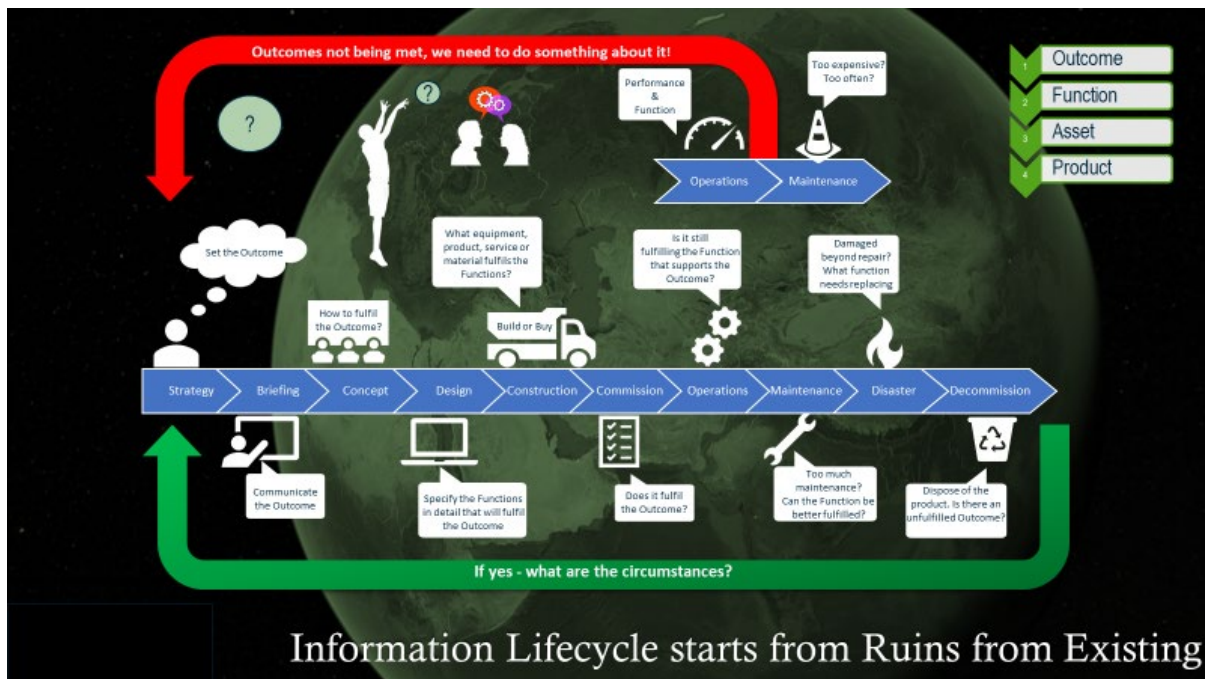
What would have been the overwhelming impact on the performance of the Infrastructure from every aspect, not only in Cost, Quality & Time but many intangible positive impacts including total satisfaction of all the stakeholders, increasing their efficiencies multi-fold! The study suggested that there may be an increase of 100% in performance (BUY 1; GET 1 FREE), considering just the CAPEX & OPEX savings. If all the intangible benefits & increase in organizational performance are considered, the overall performance may increase by 300% (BUY 1; GET 3 FREE), and if the long-term social impacts are considered, it may give 3000% increase in performance (BUY 1; GET 30 FREE)!!



### Operational & Organizational Performance

**Asset & its Function that delivers Outcome:** Let's start with the end in mind, i.e., look from the perspective of the infrastructural Asset that we are going to deliver that satisfies the functions, and that delivers the stated outcome of any proposed Infrastructure. For example, *a hospital project can be proposed to handle X no of patients in various areas, e.g., OP/Trauma/Inpatient, etc., for carefully identified ailments, which will cater for a village/town/city and so on, goals are clearly stated along with its Economical & Political intent' (Stated Outcome)*. This requires certain no of facilities, e.g., OT, beds & equipment, etc. and certain floor areas of various departments, i.e., OPD/Wards/Emergency/OT, etc. (**Assets; satisfying certain desired Function**). Each of these Assets is designed in such a way that it satisfies the functional requirement of respective areas and also complementary to each other and those individually & together fulfill the stated outcome. Based on the detail

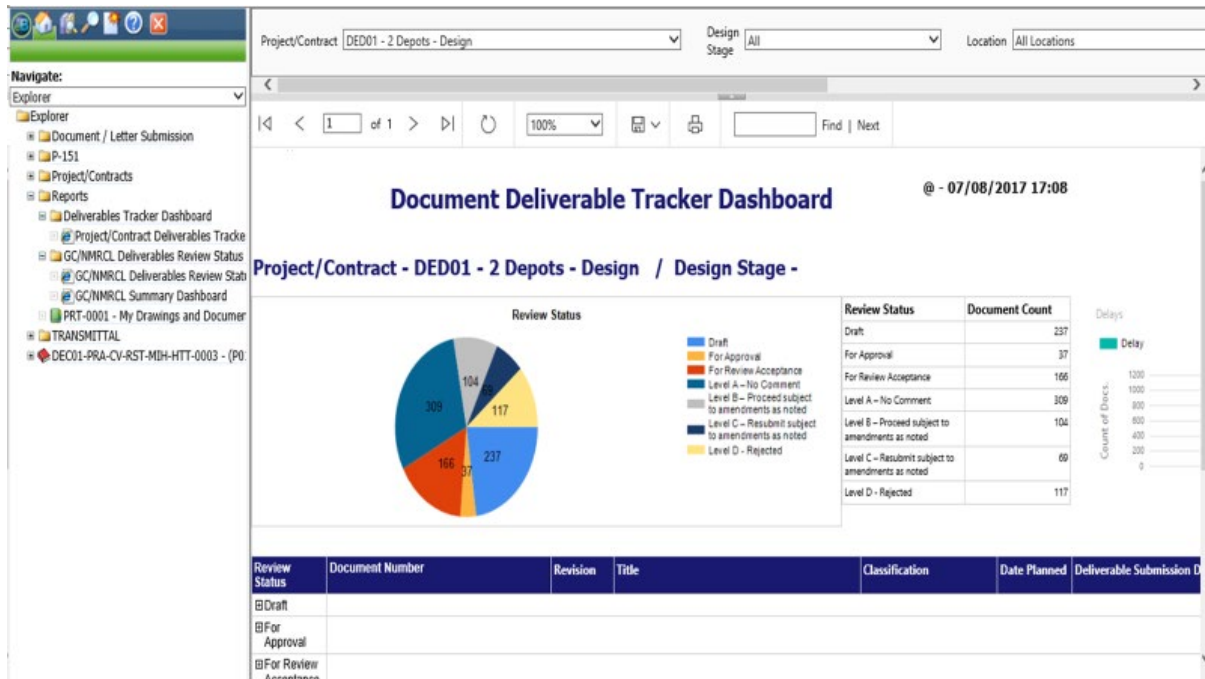
designs satisfying these functions, we procure/construct/deliver certain equipment/products/services (**Product**). In parallel to the progress of physical delivery, imagine that the digital prototype also progresses (rather precedes the physical delivery) as per the functional/detail designs after collaboration with all stakeholders & Authorization from the designated authority on a secured, centralized, digital, collaborative platform or **Common Data Environment (CDE)**, where each of the supply chains develops, collaborates, updates & delivers their respective systems with required & reliable details or information at each stage. These pieces of information, so matured in the process, are also thoroughly verified and commissioned alongside the commissioning of the physical delivery (i.e., Products & Services) for consuming/using this information for carrying out, not only the construction & commissioning the physical Infrastructure but also for Operation, Maintenance & so on.



Evaluate Existing Asset for setting **outcome** that drives **Function of Assets** delivered by **Products**

**Digital Project Information Management:** During all these processes, the owner/Operator or the Investor or the client have been having the complete visibility of the progress through real-time dashboards on various progress parameters as desired by them, eliminating the surprise of project, time and/or cost escalations, to a great extent and enabling immediate mitigative action on arresting such factors, if any. There can be many different dashboards as may be desired by the client, to monitor the information delivery status from multiple angles,

e.g., progress status of individual Information Delivery partner, Complete Project Information Delivery progress status, the Delivery status of any work package & even Status of Review & Approval including within & beyond the contractual lead time.



## Project Information Delivery Dashboard

With the possibility created for all the stakeholders working on a collaborative platform or **Common Data Environment (CDE)** having defined all collaborative work-flow process within the Information Delivery (Design Delivery) organization & for collaboration among various such

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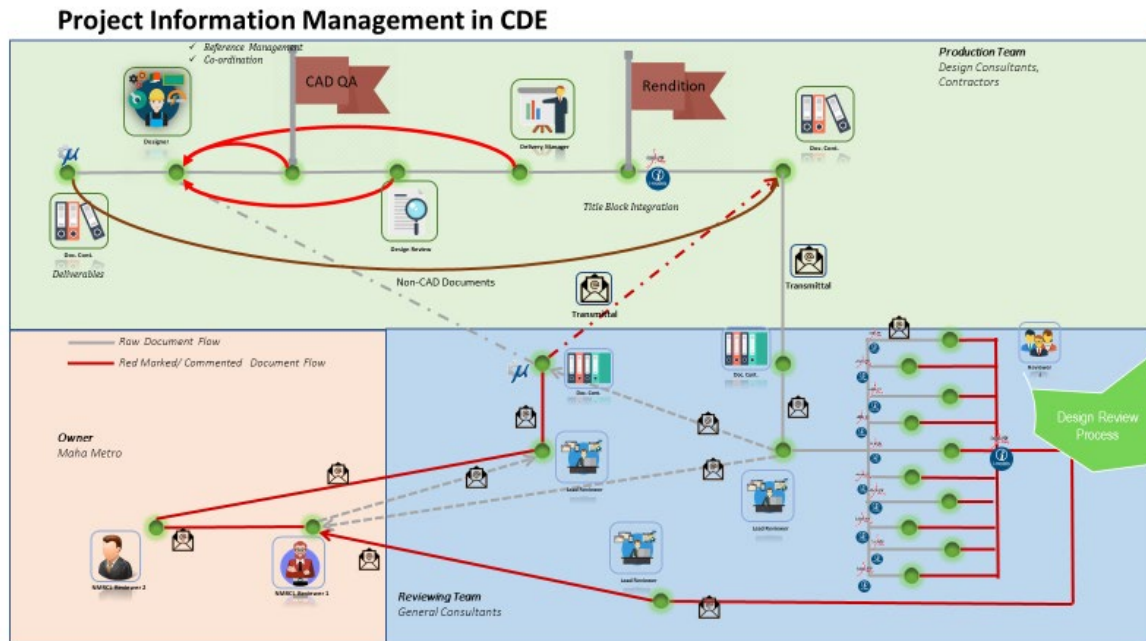
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### Document/Information flow process in CDE

organizations working for the same on different complementary systems and also among the entire eco-system including Client/Owner & their consultants, with a unified document numbering system, all hurdles for information mismatching, surprises on rework & revisions at the physical delivery level and delay in information/document/data movement may be removed to a great extent if not totally nullified.

**Common Data Environment (CDE):** Let all the stakeholders led by the Owner-Operators and/or Investors (both public & private) who are initiating & managing Infrastructure policies & spent, along with their project implementing Agencies/Departments, Consultants and O&M Organizations/Departments, supported by all the supply chain (the EPC & general Constructors, Fabricators, Erectors and Design Engineering Organizations/Consultants, etc.), work together for setting up a unified work process for working simultaneously on a Common/Collaborative Data Environment (CDE) to Design (Geospatial, Functional, Simulation, Analytical & Construction/Production/Fabrication), collaborate, federate, review & authorize, embracing BIM-enabled Technologies (software or tools or applications).

**Project & Asset Management:** Having built up all the Project Information digitally in this CDE, these pieces of information can be used for Project execution planning, cost planning, etc. and further managing the actual time and cost (**4 & 5 D**) using appropriate technologies or software. Further, the same information along with the product information, as may be built up by CAPEX delivery partner & OEM (who also shall use the same CDE), may be

used for operation & Maintenance and facility Management (6D). The key here is the 'Information' (CAD and mostly Non-CAD).

**Outcome Delivery:** Let us all inspire the thought leaders in the Infrastructure Sector Digital Twin and bring up all the people involved, with Digital awareness, with required training & handholding them to visualize the bigger picture and what & how each of them playing their roles, individually and collaboratively, in the jigsaw puzzle, towards building the **Making Digital India (Infrastructure)** together and make their life easy, while **delivering the stated outcome** from the Infrastructure to the fullest satisfaction of the users.

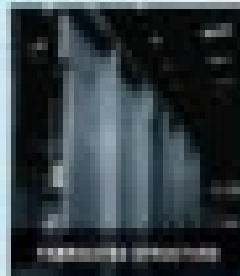
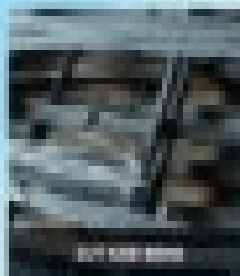
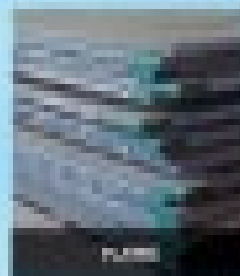
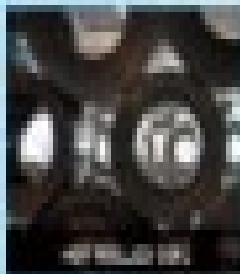
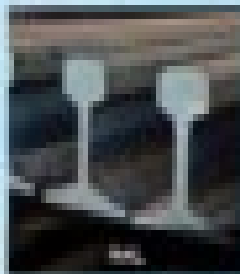
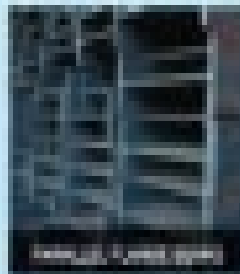


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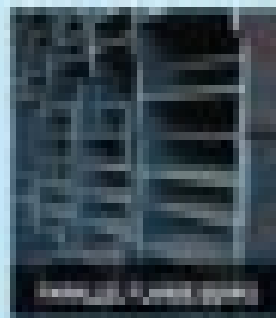
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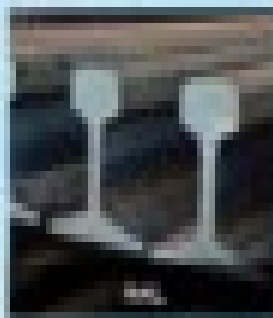
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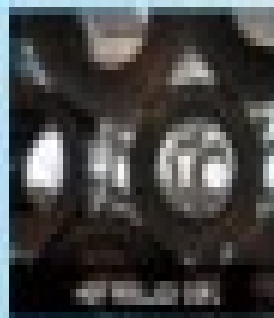
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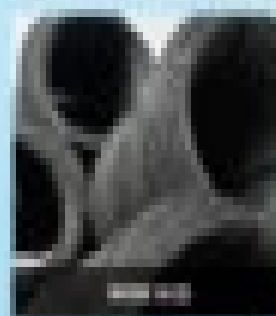
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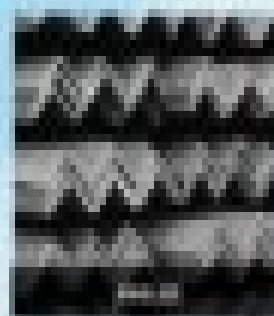
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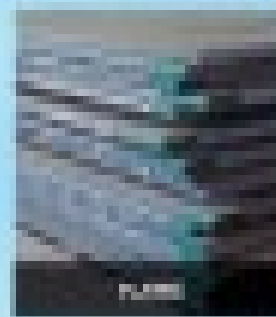
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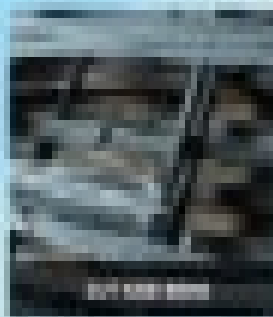
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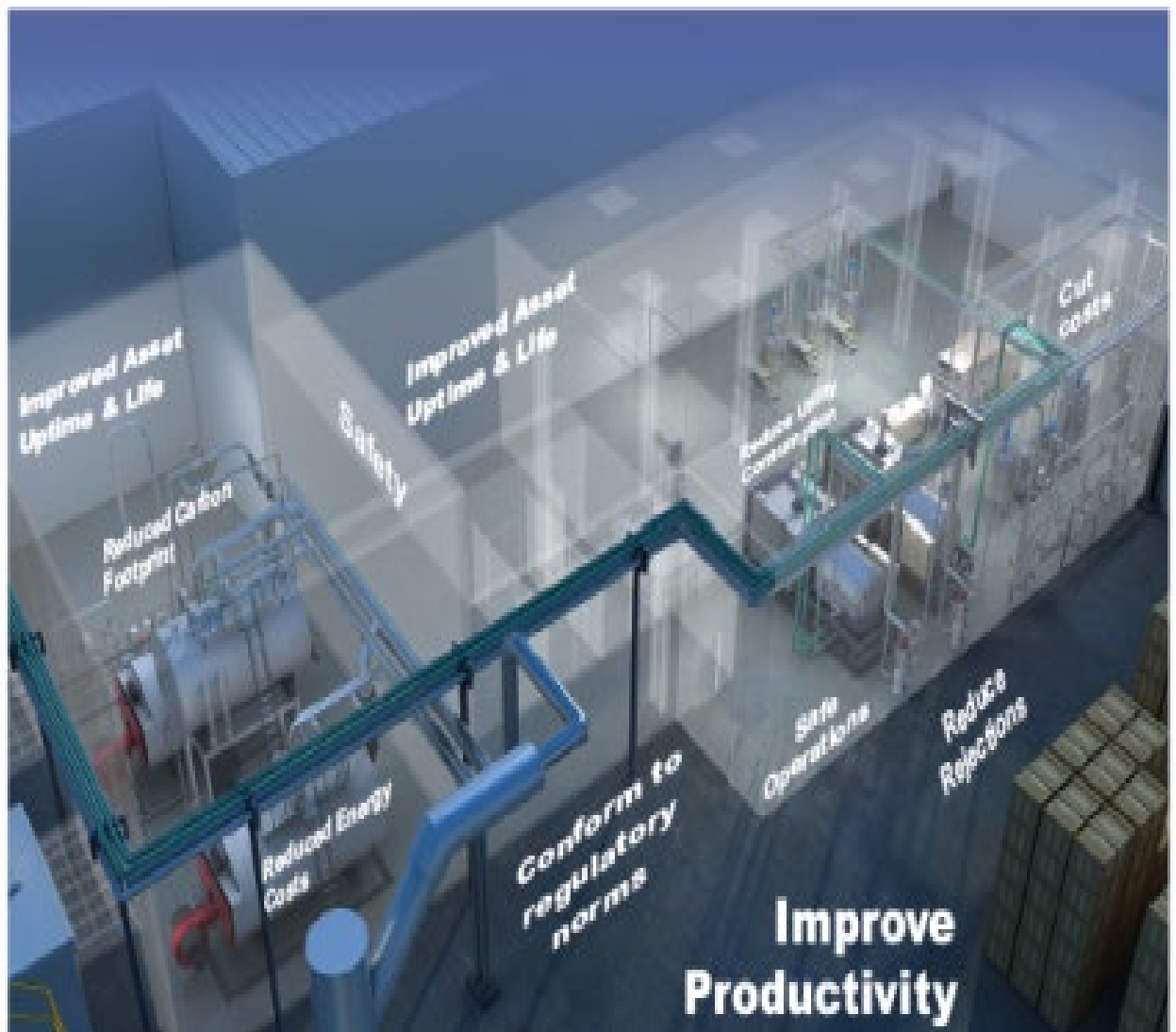
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# Sustainability of Built Environment and Mobility: Agenda for action

Anumita Roychowdhury

(BEC94 Foundation, Indian Institute of Engineering Science and Technology, Shibpur, Kolkata, December 26, 2029)

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India's emerging economy and its development trajectory have triggered several urban environmental challenges. Cities are in the grip of toxic air pollution and public health risk. Over 70 percent of cities that are monitored are officially classified as critically polluted. Growing energy-guzzling has increased carbon footprints and heat-trapping. The built environment is plagued with growing resource inefficiency. On the other hand, climate change and global warming have worsened the vulnerability of cities to extreme weather events leading to urban flooding, and urban heat island effects further magnifying health burden. This also reflects the global challenge that shows already two-third of the world's energy is consumed in cities – by half of the world's population. By 2030 cities are expected to consume 73 percent of world energy. Globally, cities account for 70 percent of carbon dioxide emissions. Cities collectively consume 75 percent of world natural resources, generate 50 percent of waste, and emits 70 percent of greenhouse gases. India is mirroring this challenge.

Urban environmental degradation of this magnitude erodes "developmental" gains.

Answers and solutions to these emerging urban environmental challenges, to a great extent to lies in the way the urban built environment is designed and planned within the larger policy framework. The manifestation of the unsustainable impact of the emerging new urban design and form is already evident in Indian cities.

This is particularly evident in the mobility and building sectors. Urban growth is increasing travel demand in cities. Mobility patterns and mode choices of people decide sustainability in the sector. But increasing dependence on personal vehicles is growing. This is locking in enormous carbon and toxic emissions. Personal vehicles utilize disproportionately high urban road space and public spaces for meeting very low travel demand in cities. But this trend is getting encouraged because of car-centric road and urban design. Increasingly, urban forms are moving away from the traditional compact urban form to sprawl with highly segregated land-uses without being integrated with transit systems and safe accessibility. This is increasing distances, average trip length, and dependence on personal vehicles. Roads are being designed for the convenience of vehicular movement and not people's movement. Even

though Indian cities have strong legacy strength in the current baseline of a very high modal share of public transport, intermediate transport, walking, and cycling, this is primarily because of captive use and not use by choice. People are still too poor to afford any other options. Overall lower-income profiles in cities and lack of appropriate options have contained a massive shift towards personal vehicles. But this may change dramatically in the future as in many cities per km operation cost of a two-wheeler is cheaper than the minimum bus fare. The challenge, therefore, is to strengthen multi-modal systems with efficient last-mile connectivity and compact urban forms to ensure that the current baseline of sustainable modes is protected and expanded. This will have to be combined with the technology roadmap to cut emissions from tailpipes as well as move towards zero emissions mandate and phase in electric mobility mainly linked with public transport and para-transit.

Similarly, in the larger built environment, buildings that use up nearly 70 percent of the urban land are being designed as carbon and heat trappers. This is upsetting the carbon budget in cities. With growing affluence, climate change, and urban heat island effect, the dependence on mechanical cooling is increasing steadily. The residential sector uses up nearly 40 percent of electricity in the country today. Studies by the Centre for Science and Environment in Delhi have shown that due to growing dependence on mechanical cooling electricity peak demand during midnight of summer can be higher than the afternoon peak.

India's Cooling Action Plan has provided for thermal comfort for all and recommends Thermal comfort standards. But this is still not well understood and has not been operationalized. The current focus is on energy efficiency and the promotion of material, insulation, and equipment that are energy efficient for energy savings. But this approach without adequate integration with passive architecture to reduce the overall heat load on buildings may not be able to deliver on thermal comfort that utilizes the daylighting, ventilation, and wind flows optimally to improve comfort conditions and reduce dependence on mechanical cooling that locks in the enormous carbon budget.

The current affordable housing policies are primarily focused on the speed of construction and choice of new generation material, which disregard the heat load on buildings. This, if not addressed, can potentially lead to huge dependence on mechanical cooling. It has now become necessary to ensure uptake of design interventions and choice of material to improve the overall thermal comfort of structures. More explicit provisions are needed on wall window ratio, orientation, shading of buildings, passive design for daylighting and material to

allow better bioclimatic controls, improve thermal comforts, and reduce air-conditioned hours.

To address these challenges, India has already adopted Sustainable development Goals (SDGs) to inform policies and to stimulate, align, and accomplish the action by 2030. All policies need to be aligned with sustainable development goals. Several policies have emerged that have a strong bearing on the sustainability of the built environment. These include Environment management plans, environmental impact assessment, National Habitat Standards, Transit-Oriented Development Policy, National Urban Transport Policy, Energy Conservation policies and codes, Indian Cooling Action Plan, Water, and Waste management rules and regulations, Zero emissions mandate and electric vehicle policy, Clean air and climate action plans and many more. Aligning all of them in an integrated framework is critical to accelerating the transition towards a sustainable built environment.

Currently, city-level planning is fragmented and is not cohesive enough to align with all these policies to allow resource-efficient, inclusive, and sustainable urban growth. India is likely to keep struggling against the challenges in the absence of a cross-cutting and comprehensive urban strategy. The country needs a guidance framework that integrates and aligns a wide gamut of central and state-level policies and action for improved liveability, health security, and climate responsiveness in cities.

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# Making the Indian cities, Public Transit-Oriented, not automobile-oriented

Ratul

(BEC94 Foundation, Indian Institute of Engineering Science and Technology, Shibpur, Kolkata, December 26, 2029)

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As cities grapple with problems of rapid motorization, deteriorating quality of life, and climate change; Transit-oriented development (TOD) comes across as the magical elixir that could cure them. Transit-oriented development looks at the creation of compact, high density, mixed-use development that are pedestrian and cycle-friendly along with mass transit. As for Indian cities, it is only in the early 2000s that significant investments were made in mass transit projects like Bus Rapid Transit and Metro rail projects that TOD has finally been recognized and adopted by Indian cities. With 300 km of metro lines already in operation in seven cities and another 600 km of metro line projects under construction in twelve cities, the Ministry of Urban development formulated the National Transit-oriented development (NTOD) policy to regulate and implement TOD in Indian cities.

TOD provides an opportunity to retrofit our existing auto-oriented cities- riddled with problems of sprawl, road congestion, air pollution – and create cities that are pedestrian and cycle-friendly; cities that provide more choices in terms of housing, modes of transport to choose from. The very idea behind transit-oriented development is a choice, and the very presence of choice is a positive contribution to this development type—Indian cities with their existing mixed land use and density. However, with a recent rise in the number of cars

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Today, several cities in India are working on TOD proposals developed around significant debt-financed investments in mass transit projects. The concept of TOD provides ample opportunity to mainstream the urban planning reforms in the Indian cities by implementing state-of-the-art methods of local area plans (LAPs) as prepared in the Ahmedabad TOD zones. Given the transformative opportunities TOD provides, it is essential to understand the difference in context for which TOD was created elsewhere in the world, and how it needs to be applied in Indian cities. There is an ever-growing need for a planning and design handbook that can help Indian cities plan and Implement TOD along the mass transit routes.

Dr. Rutul Joshi presented the ideas which are incorporated in the illustrated Handbook for Indian cities to make local area plans around transit. The Handbook demonstrates the planning framework, regulations, and urban design principles for making TOD work for Indian cities. The Handbook also describes the methods and principles of making TOD plans by taking real-life examples from Indian cities of various size-class. i.e., 10 million-plus, 5 million-plus and 1 million-plus. In each of the cities, the presentation covered planning/design interventions at three different scales – Network, Area, and Station. Across each scale, a set of tools will be utilized, e.g., 3V framework as proposed by the World Bank (Network), Local Area Plan (LAP), and Station Area Plan (SAP). While discussing the plans at various levels, built-form based regulations are also discussed along with street design, landscape design, and urban utilities.

It is evident that merely drafting policies or developing handbooks is somewhat redundant without the right support mechanisms in place. This prolonged disconnect has only proved costly, with a massive amount of resources being squandered, which is highly unsustainable considering the scarce nature of both economic and natural resources. In finality, the Indian Transit Quagmire possesses a unique situation for cities if it has to incorporate TOD, as the success is mostly dependent on an integrated approach, which ensures a continued flow of financial capital along with the political mileage. Hence making it imperative for the state and all others involved to ensure the functioning of support systems.

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## Use of rural materials and crafts in cities

Laurent Fournier

(BEC94 Foundation, Indian Institute of Engineering Science and Technology, Shibpur, Kolkata, December 26, 2029)

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At the outset of the colonial period, India was producing 30% of the world's industrial output and was the first economic power, but it was reduced to 4% in 1948. Today India has partly recovered, and it has possibly the world's highest "technical diversity" (trades, crafts, and skills). As biodiversity is an indicator of the resilience of an ecosystem, technical diversity is essential to the creativity and economic resilience of society.

But skills are undervalued, not appropriately paid, and under a deliberate attack, called "deskilling": Reorganising an industry for achieving the same output with less skill, resulting in more centralisation and higher profits.

However, deskilling has a cost, pictured by the famous saying: "smartphones, dumb people"...

Pollution has exploded. There is 300kg of plastic in every sq.km of the ocean - more than fish! Plastic microparticles are everywhere, even in our blood. The air is more polluted indoor than outdoor, and newly made building interiors smell for months like a new car.

Firefighters complain that today, due to the proliferation of plastic in interiors, "flashover" (the moment a room is engulfed in flames) happens within 5 minutes, often before they can reach the site, as opposed to 1/2h just 30 years ago, and fire retardant is so toxic they, in fact, increase the casualties.

These are not fringe phenomena but measurable facts. The economist Nichola Georgescu-Roegen has shown how machines essentially produce waste, and their end product is, in quantitative terms, just a "by-product."

The naïve notion that materials can be divided between "eco-friendly" and "polluting" has to be dispelled. No material is "green" in itself. Even mud can be polluting, for example, when we use the topsoil for construction when deeper layers do not have enough clay.

On the other hand, skills are never polluting. Improved skill always improves accuracy and reduces waste.

Therefore, in any project, for a given result and budget, giving more attention to, and spending more on skills and less on materials, always reduce pollution.

India is experiencing a severe economic recession. In the last six years, rural India's monthly spending on food has reduced by 10%, the daily wages have reduced, and hunger is coming back.

Instead of always considering rural India as a "soft belly" rich in natural resources and deficient in human skills, the need of the hour is harnessing rural India's non-polluting skills for solving urban India's unprecedented pollution problems.

Rural skills are not necessarily "ethnic" or "traditional," and the naïve romanticism is not in utilising them but in ignoring them.

Bamboo has the strength of steel for the same weight. Mud is a phase-change material, regulating the temperature with very little mass. Shallow brick domes are cheaper, quicker, and stronger than any concrete slab except cantilever. ecosanitation is the only non-polluting toilet and the only way to eliminate manual scavenging today. This knowledge and innovations did not exist 30 years ago! They come from rural India, and they can provide

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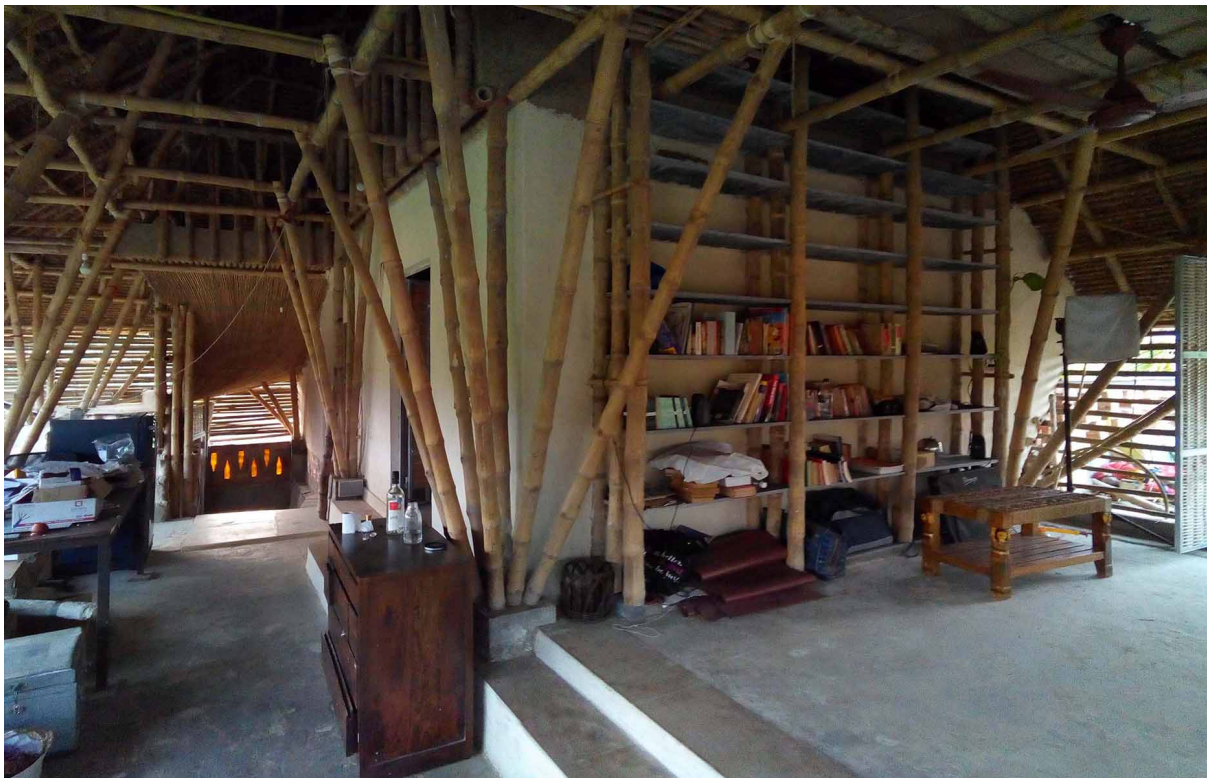
***WELL Wisher***

Forget "deskilling," let's "reskill" ourselves!

Laurent Fournier, Kolkata

Two recent examples of rural techniques used in modern-looking, low-cost urban interiors with almost no plastic except electricity and plumbing, no plywood, no toxic materials, and 70% of the cost spent on labour:

1. Multi-story house in Baruipur: Reinforced concrete frame, brick domes and staircase, bamboo and mud walls, mud floor, bamboo and mud staircase, lime-gobar paint, thatch roof, galvanised steel + bamboo doors and windows, black stone and bamboo shelves.



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2. Alliance Française in Kolkata (Park Street): Cement floor, bamboo-mud-gobar thermal insulation, bamboo and mud acoustic panels, galvanised steel + bamboo sliding panels, MS and glass sliding acoustic partitions.



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## Serenity at ' Kechki'

Arnab Roy

(BEC94, Civil Engineering)

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The very thinking of night travel by Shaktipunj Express triggers anxiety among the collective Bengali mindset. Somehow, they feel they will be subject to rail decoity or other harassment. I found that the same is no less accurate for my family also when on one beautiful Sunday morning, I proposed the tour plan to ' Kechki ' at Jharkhand, wherein we have to reach Daltongunj in the early morning by Shaktipunj Express and travel by road for the balance. 'Kechki' is quite a less known location, beside ' Koel ' river and near Betla forest range. As an overall result, I had to cajole my family for the tour. We never knew what a calm and divine place are going to while boarding the B2 coach of Shaktipunj Express at Howrah station, the September evening.

The train reached Daltongunj at 4-30 in the morning. On putting my steps to the platform, my reminiscence surged up and went back to days when reading Buddhadev Guha's short stories and novels, on the backdrop of Daltongunj and areas, was a real joy. The characters got embedded into the intellect. I could feel Rijuda standing outside the station with a hoodless jeep, the hunting gun being kept inclined on the backseat and Rhivu in a village somewhere near Koel river. I got cheered up.

Driver Dasarath Soren, a middle-aged man with a dark complexion, came to pick us up with a Mahindra Bolero. Somnath da of my Club is an errant type of personality but has a subtle liking for me. He owns a small Bungalow at ' Kechki ' for a reason, may not be even known to him. Rarely did he visit the property but have the arrangement to maintain. One Saturday evening, he only offered the tour and confirmed that he would arrange all the basics for us. I remember jovially poking him ' Hope there is no ghost in the Bungalow, and you are not sending us to tackle them. ' He gave a sarcastic smile, pat on my shoulder and uttered ' Come back and then tell me ' The pick - up was as per his arrangement. Later I came to know that there is only two public accommodation at ' Kechki. ' The first one is a Forest Department-owned Bungalow, where Satyajit Ray shot the film ' Arannyer Din Ratri ' and the second one a Holiday Home of Calcutta Electric Supply Company ( CESC ), strangely though.

The Bolero speed up towards ' Kechki ' through a reasonably good surfaced road under the last spell of darkness before dawn. We reached the Bungalow in around half an hour and was welcomed by Umanath Tripathy. Umanath stays close to the Bungalow, with his family and

has been entrusted to take care of the property. In the fading light of dawn, we could see a single-storied Bungalow of very simple Architecture, surrounded by a pretty big and well-maintained garden.

The Kechki rail station was very close to the Bungalow. The station is on Daltongunj - Barkakhana link rail route. Only four passenger trains are halting at this station, over the day, although few more goods and express train through by. The Koel river flows just beside and along the rail route. The river was full to the brim. I was spellbound, standing on the bank of the river, recollecting the day when I first read Buddhadev Guha's ' Koeler Kache. ' Far behind, along the horizon, were a set of hillocks, fully green. In between, there was a stretch of paddy cultivated plotted fields. Both the rail route and the Koel river were well visible from the terrace of the Bungalow along with the paddy fields and green hillocks, as if coming out from the canvas of an ace painter. Umanath is an old resident of this area. His father came to work for a Forest contractor and settled down. He has two daughters, both studying at college at Daltongunj. They go to Daltongunj by the morning passenger train and come back by the evening one. He runs some small business and also works as the caretaker of this property. His attitude was gentle and attentive, communication straight forward.

The Bungalow, with its own simplicity, was very cozy. At the very entry on the ground floor, there was a big semi-circular drawing-room, which was fully open at the front side, to the garden with steps along the front edges. The circulation to all the other rooms was from the said room. A cane sofa set was nicely placed, with a centre table, in the middle of the room. The two ceiling fans hanging are four-bladed vintage ones. I used to relax on the sofa, for long, with rounds of tea, to enjoy the drawing-room cum verandah, overflowing on to the garden. My son used to hop in the garden without any such purpose and my wife to sit on the low parapet wall of the terrace and sing her favourite numbers, with flowing Koel river as the kaleidoscope. At night we three used to enjoy the moonlit Bungalow, mild fragrance of Mahuya flowers, and continuous sound of Jhi Jhi poka. We were lucky in the sense that the day next, we reached was a full moon day.

Umanath attended us daily and spent time over some casual discourse. He told us that the forest area was much nearer earlier and around ten years back, dears and some other small animals can be seen grazing nearby. On his guidance and arrangement, one day, we visited Betla Reserve Forest and another day to a Shiva temple on a hilltop where we had to climb up around 120 steps to reach the temple. The panoramic view of the area was available from that

hilltop. While visiting Betla forest, I dropped at Hotel Naihar, opposite to entry gate, where Buddhadev Guha used to stay and has referred in many situations of his stories. Umanath added one more edge to our stay. Twice he brought delicious quality country chicken, and we had excellent dinner on tawa roti and chicken curry. The water quality was also conducive to appetite.

My pre-teen, aged son, now has a friend. 'Megrai' was a tribal boy of the age of my son. He often used to come to the Bungalow, with his mother, who was engaged by Umanath for cooking and other domestic work, during our stay. My wife told me that they stay in the village, on the other side of the rail station. Her husband runs a small tea and snacks stall outside the station. 'Megrai' and my son used to roam around the garden or sit on the platforms around the trees. They do not understand each other's language much, but I realised that they are communicating through the silent language of sincere friendship. One day, I found both sitting on the steps, down from the drawing-room to the front garden, and enjoying 'Singara.' I could guess that 'Megrai' must have brought the same, for his urban friend, from his father's shop. Later, my wife wanted to pay him some amount, but I refrained her. The token treat of unconditional friendship helps to melt the boundaries of cultural and economic differences.

'Megrai' gave my son a local sapling, having small yellow flowers, the day before we left 'Kechki.' My son got it planted in a small earthen pot, through the Mali, who maintains the garden of the Bungalow, to carry it to his home. He took genuine care, during the way back, to ensure that the plant reaches our house, undamaged. The pot has been placed at the balcony garden of our apartment. The serenity and simplicity of 'Kechki' might have given some temporary solace on the burning of our hectic urban life, but to my son, the potted plant symbolizes eternal friendship and is a real deposition in his Happiness Index card.

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## বার্মা ছুয়ে আসা

অর্ণব রায়

EC94, Civil Engineering)

কর্মসূত্রে তখন প্রায়ই মিজোরাম রাজ্যে যাচ্ছি। কলকাতা থেকে বিমানে মিজোরামের রাজধানী আইজলের ষাট কিলোমিটার দূরে লেংগপুই বিমান বন্দরে নেমে, গাড়িতে পাহাড়ি রাস্তায় আইজল। আইজলকে কেন্দ্র করে আবার কয়েকটা জায়গায় যাওয়া। আইজল ভারী সুন্দর পাহাড়ি শহর। থাকলাঙ থেকে শহরের নৈশ দৃশ্য অতুলনীয়। তবে সে বর্ণনা এখন করছি না।

আইজল থেকে, পাহাড়ি রাস্তায় প্রায় দশ ঘন্টা দূরে, বার্মা সীমানায়, চম্পাই নামে একটা ছোট জনপদে, একটা সরকারি হাসপাতাল তৈরির প্রজেক্ট ম্যানেজমেন্ট এর অর্ডার পেলে আমার সংস্থা। সেই সুবাদে আমারও চম্পাই যাওয়ার প্রয়োজন হল। চম্পাই মিজোরামের একটা জেলার সদর আর হাসপাতালটা জেলা হাসপাতাল। খুব ছোট আকারে ছিল। বিশ্বব্যাপ্ত এর অর্থ সাহায্যে বড় করা হবে।

মিজোরামের পাহাড়ি রাস্তায়, গাড়িতে ভ্রমণে, প্রাকৃতিক শোভায় মন ভরে উঠলেও অন্যান্য পাহাড়ি জায়গায় ভ্রমণের মত খাওয়ার ও বিশ্রামের তেমন ব্যবস্থা নেই। মিজোরামের মানুষ বা মিজোরা সাধারণত বহিরাগতদের তেমন পছন্দ করে না। যার ফলে অন্যান্য পাহাড়ি রাস্তার মত, জায়গায় জায়গায় রেস্টোরা বা হোটেল নেই। স্থানীয় মানুষের জন্য অল্প কিছু আছে কিন্তু তার খাদ্য আমাদের কাছে একেবারেই গ্রহণযোগ্য নয়। সাধারণ ভাবে মিজোদের রান্নার উপাদান ও পদ্ধতি এমন যে তা আমাদের কাছে সুস্বাদু নয়। তাই শুধু ফল ও বিস্কুটের উপর ভরসা করে পাহাড়ি পথে চলতে হয়। ফলে দশ ঘন্টার সেই গাড়িতে পথ চলা বেশ ক্লান্তিকর। গাড়ি ও চালক বেশ ভালো পাওয়ায় মোটামুটি পার হয়ে গেল। সকাল আটটায় আইজল থেকে রওনা হয়ে প্রায় সন্ধ্যা ছটায় চম্পাই পৌঁছলাম। মিজোরাম টুরিসিম দপ্তরের একটা মনরম অতিথিশালায় আমার থাকার ব্যবস্থা ছিল। একটা পাহাড়ের মাথায় , ছোট ছোট কটেজ নিয়ে অতিথিশালার চত্বর। সন্ধ্যার আধো আলোয় সেখানে ঢুকলাম। নৈশআহারে নেপালী রাঁধুনির হাতের তৈরি সুখাদ্য খেয়ে প্রাণ জুড়ালো।

পরদিন সকালে আমার কটেজ থেকে বের হতেই এক অনিন্দসুন্দর দৃশ্যে - এক কথায় হতবাক হয়ে গেলাম। অতিথিশালাটি পাহাড়ের মাথায় বলেছিলাম আগেই। তার একদিকের ঢাল ধরে নেমে গেছে এক দিগন্ত বিস্তৃত ভ্যালি। বহু দূর অবধি দেখা যাওয়া সেই ভ্যালিতে হয়েছে ধান চাষ, ছোট ছোট প্লটে বিভক্ত করে, যা দেখে মনে হচ্ছে যেন বহু ছোট ছোট কার্পেট বিছিয়ে রাখা হয়েছে। টোকা মাথায় কিছু মিজো চাষীকে কাজ করতে দেখা যাচ্ছে। রেশটা অনেক ঝঞ্জন ছিল।

সারা দিন কাজের ব্যস্ততায় কাটলো। ভারতের ঔ দুর্গম সীমান্তবর্তী একটি জনপদে, পরিষ্কার, পরিচ্ছন্ন, ছোট, সুন্দর একটা সরকারি হাসপাতাল দেখার যে নিবিড় অভিজ্ঞতা হল, সে কথা এখন তোলা থাক। বিকেলে অতিথিশালায় ফেরার পর আমার, হাতে ট্যুটু আকা ও চোখে বাহারি

সানগ্লাস পড়া, মিজো ড্রাইভার 'লালমা' জানাল যে এখান থেকে মাত্র দশ কিলোমিটার দূরে বার্মা সীমান্ত। সেখানে সীমান্ত পার করে বার্মা ঢোকাও যায়। আমি চাইলে সে সানন্দে নিয়ে যেতে পারে। তার কথামত, পরদিন বেলা বারোটা অবধি কাজ করে, চললাম বার্মার উদ্দেশ্যে।

চম্পাই থেকে সীমান্ত অবধি রাস্তা বেশ খাঁড়া ও সরু। রাস্তায় রয়েছে আসাম রাইফেলস এর ক্যাম্প ও নজরদাড়ি। আসাম রাইফেলসই ভারতের উত্তর পূর্বের সব সীমানা রক্ষা করে। ঠিক সীমানার বরাবর রয়েছে একটা নদী। নদীর উপর একটা লোহার ব্রিজ। ব্রিজের অর্ধেক অবধি খুব ভালো পরিচর্যা ও রঙ করা কিন্তু বাকি অর্ধেক খুব অবহেলীত। লালমা জানাল ওটা অর্ধেক ভারতের আর তারপর বার্মার। বুললাম দুই দেশের অর্থনৈতিক তারোতম্যের প্রতিফলন ঘটেছে। ব্রিজের আগে বেশ বড় ও সাজানো ভারতীয় চেক পোস্ট অফিস। সেখানে আমার শুধু ভোটার কার্ড দেখে (পাসপোর্ট তো আমার সঙ্গে ছিল না) জন প্রতি কুড়ি টাকা ও গাড়ির জন্য একশো টাকা নিয়ে আমাদের একটা একদিনের ইমিগ্রেশন স্লিপ করে দিলো। ব্রিজ পার হয়ে আমরা ঢুকলাম বার্মায়, যার অধুনা নাম মিয়ানমার।

মন আমার উদ্বিগ্ন। এভাবেও যে অন্য দেশে যাওয়া যায়, জানা ছিল না। পরে জেনেছিলাম বার্মা ও ভুটানের সঙ্গে ভারতের এমন চুক্তি আছে। ঠিকমত দেশে ফিরতে পারব কিনা চিন্তা রইলই। ব্রিজের ওপারে বার্মা চেক পোস্ট অতি নগণ্য। একটা ছোট কার্ঠের ঘরে সেনা পোশাক পড়া দুজন বসে। তারা জন প্রতি দশ টাকা ও গাড়ির জন্য ষাট টাকা নিল, ভারতীয় টাকাতেই। কাগজ হয়ে যাওয়ার পর, আমি সবে ঘর থেকে বের হতে যাচ্ছি -- একজন সেনা পিছন থেকে চেঁচিয়ে উগ্রভাবে আমায় কিছু বলল। লালমা দৌড়ে এসে আমায় বুঝিয়ে বলল যে বেরোনোর আগে, ঘরে ওদের সেনাধ্যেকের ছবির সামনে মাথা নিচু করে সন্মান জানিয়ে যেতে হবে। মনে পড়ল বার্মা তখন সেনা শাসিত। আন সান সুইকি জেলে।

এখানে যে জনপদটা তার নাম টুরুংগ। মানুষজনকে দেখে বোঝা গেল বেশির ভাগই অর্থনৈতিক ভাবে বেশ দুর্বল। পুরুষরা অনেকে বার্মিজ লুঙ্গি পড়া। অনেকগুলো কার্ঠের দোতলা বাড়ি ও কিছু ছোট দোকানপত্র আছে। তবে একটাও পাকা বাড়ি দেখলাম না। কিছু গাড়ি চলছে আর তা লেফট হ্যান্ড ড্রাইভ। শুনলাম এখান থেকে আট ঘন্টায় রেংগুণ পৌঁছানো যায়। রেংগুনের অধুনা নাম য়ানগান। সপ্তাহে তিন দিন বাস যায়। মন চলে গেল শরত চাটুর্জ্যের গল্পে, রেংগুনের পটভূমিকায়, শ্রীকান্ত চরিত্রে।

টুরুংগের ঠিক পাশে, পাহাড়ের উপরে, হ্যাপি ভ্যালি বলে একটা টুরিস্ট স্পট আছে। লালমা দেখাতে নিয়ে গেল। ঠিক আমাদের মীরীকের মত, পাহাড়ের উপর একটা লেক কে কেন্দ্র করে কিছুটা সাজানো যায়গা। প্যাডেল বোট চালাচ্ছে কিছু যুবক যুবতী। একটা রেস্টোরা আছে, তাতে কিছু খাবার খাওয়া গেল, বার্মিজ রুটি ও নুডুলস। ফেরার পথে, টুরুংগে, এক তামিল ডাক্তারের সাথে পরিচয় হল। তিনি সেখানে গত দশ বছর ধরে নিজের চেম্বার করে চিকিত্সা করছেন ও এক বার্মিজ মহিলাকে বিয়ে করে থিতু হয়েছেন। কাছাকাছি কোনো হাসপাতাল নেই। তার কাছে সেনা শাসনের অনেক ভালো ও খারাপ দিক জানা গেল। তিনি মাসে একবার রেংগুনে যান, অসুখ পত্র আনতে। দুবছর আগে শেষ বার তামিল নাড়ুর বাড়িতে গিয়েছিলেন। বর্তমানে তিনি কোন দেশের নাগরিক তা উহ্য রাখলেন।

লালমার দায়িত্বে সেদিন সীমানা পার করে নির্বিঘ্নে চম্পাই এর অতিথিশালায় ফেরত এসেছিলাম সন্ধ্য সাতটার মধ্যে। তবে সেই অর্ধেক ভালো থাকা আর অর্ধেক খারাপ থাকা ব্রিজ আমার মনকে বড় ব্যথিত করেছিলো। সত্যিই কি একটা নদীর মাঝে একটা দেশ বদলে যেতে পারে?

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