



---

4 JANUARY 2024

## Designing for a billion!

Good evening, everyone! I am delighted to be here today at the convocation ceremony of the National Institute of Design, one of the leading institutions in the country. I would like to congratulate all the graduates who have successfully completed the programs in various disciplines of design. You have worked hard, learned a lot, and grown as designers and as individuals. You should be proud of your achievements and celebrate this momentous occasion with your family, friends, and faculty.

I have always been fascinated by design, ever since I was a child. Coming from the famous artist Raja Ravi Varma's family, I loved to draw, paint, and create things. I was curious about how things worked, why they were made the way they were. I was deeply interested in mathematics, logic, and problem-solving. I always wanted to combine my artistic and analytical skills to create solutions that were not only functional, but also beautiful and meaningful.

My studies eventually led me to computer science, which I believe is a form of design. Computer science is not just about coding, but about designing systems and interfaces that solve real-world problems and enhance human capabilities. Computer science is also a creative and collaborative discipline, where you have to think out of the box, experiment with different ideas, and work with other people from diverse backgrounds and domains.

As a computer scientist and a systems designer, I have had the privilege of working on some of the most challenging, complex and impactful projects in India and abroad. One of them is Aadhaar, which today covers 1.38 billion people, enabling them to access various services and products. Aadhaar is not just a technological project, but a social and political one, that requires a deep understanding of the needs, aspirations, and realities of the people it serves. Success of Aadhaar is its extreme design simplicity and is a testament to the power of a well-designed system to transform lives and societies.

Another effort that I am passionate about is what we do at EkStep Foundation to create a more equitable and inclusive society through quality education, skilling, and livelihood. DIKSHA, national school education infrastructure that EkStep Foundation helped create in 2017, has successfully leveraged 600 million textbooks having topic level QR codes that is allowing 200 million students and 10 million teachers to safely access relevant content in more than 35 plus languages.

A third project that I have had the opportunity to design is the Unified Payment Interface (UPI), that I am sure every one of you have used. UPI is a system that exemplifies the power of design to create a common digital rail that allows a multitude of solutions and innovations to be built by the ecosystem around it. Today, in a short span of 7 years, UPI does more than 11.5 Billion transactions a month, which is roughly the same as one of the largest card networks in the world! Interestingly, a lesser known fact is that the same UPI is also used by about 150 million people every month who have no phones using their fingerprints to send and receive money! From an irrelevant player in the digital payment space in 2016, India today leads the world!

These are just three examples of some of the population scale projects that I have had the privilege and have been involved in as an architect. I have learned a lot from designing and scaling these projects. Today I hope to share four key lessons, especially when designing for a billion plus people, that I think are relevant and useful for you as you embark on your own design journey.

**1. DESIGN IS AN ESSENTIAL ELEMENT TO SUCCESS:** People often ask me the secret of the success of Aadhaar or UPI. For me, these projects are classic case studies for how the two key ingredients for success come together - design and execution. Some may even argue that it is all about execution, although I beg to differ. When I look back on these immensely impactful projects, it comes down to the one thing that was critical to them - **getting the design right**. One may argue that just design is not enough if the team cannot execute it. While that is true, if you get the design wrong, projects of this magnitude are bound to fail.

While most of you know the high level details of Aadhaar and UPI, design nuances of these projects may not be obvious to you. It is those nuances that really matter to understand why those projects really succeeded at a billion people scale. There is a significant difference between designing a specific solution for a specific context, for a specific use case compared to designing a generalized infrastructure that can cater to many different use cases and in different contexts even beyond the originally anticipated ones. The Internet and GPS are classic examples of such global infrastructure that is designed in a way that is general, universal, and supports many solutions to continue to emerge even today. Creators of those systems had never imagined that GPS would be used to book a taxi or stream movies on the internet on a powerful device that is in your hand! Design of Aadhaar and UPI were inspired by GPS and Internet and allows many many solutions and use cases to be created using those as underlying building blocks.

**Minimalism, universalization, and plurality** have been the three key principles at the core of all these projects. Being minimalistic allowed inclusion and rapid scaling, in addition to addressing

privacy. Universalization allowed a common system that is catering to everyone, thus addressing massive diversity. Plurality allowed designing a system to allow many actors, solutions, systems and innovations to co-exist on top of this universal design thus creating choice.

**2. DESIGNING FOR SCALE AND DIVERSITY:** When we were building these projects, one thing that threw almost everything we knew out the window, is the sheer scale and diversity of India. How does one design anything that caters to rich and the poor, connected and disconnected, educated and uneducated, people across gender and age groups, people across urban to rural, across dozens of languages, across religious and cultural boundaries, and all that at a scale of the world's most populous country in the world?

Addressing this scale and diversity into the design meant applying the same three principles again - minimalism, universalization, and plurality. For example, have you noticed the name field of Aadhaar? During the early days, we deeply thought about and have had several hours of discussions and debates about that field. Eventually we came to the conclusion that to cater to a billion people with large diversity, it is better that we simply allow their names to be written however they way they wish instead of forcing any structure! We debated about gender and decided to adopt a three-gender system, then first of its kind. We decided not to capture any additional fields including father/husband, then a common field in Government systems, so that orphans and homeless can be included. Similarly, in UPI, we generalized the store of value, channels by which payments are done, authentication method etc allowing UPI to support bank account to mobile wallets, smartphones to no phones, and self service to assisted models to all co-exist on the same common universal design.

Then comes the question of scale. How does one design the system in such a way that it can be accessible by a billion plus people across six hundred thousand villages in their own local context in their own language? How can any one central team, however large, try to achieve the scale and speed? Designing for plurality that allows many touch points, many agencies, many solutions, many choices and then incentivising an ecosystem to deliver the service or innovate solutions was the approach Aadhaar and UPI took.

In the case of Aadhaar, this allowed a small organization of about 150 people to work with a diverse external ecosystem of about 5000 /institutions who operated about 40000 stations daily using more than 200000 certified operators, thus managing to enroll 1 million people every day, reaching a billion in just less than 7 years, even faster than WhatsApp! Using this model, Aadhaar authority enabled a large local ecosystem and touch points with people who can speak local languages and dialects.

**3. DESIGNING FOR FUTURE WHILE IMPLEMENTING TODAY:** We did not have smartphones fifteen years ago, did not have generative AI five years ago, did not have chatGPT one year ago! So, how does one design something that can last for decades when we have no idea what will happen in the next few years?

When we were designing UPI, we were asking ourselves questions such as “*what kind of devices may exist in the future that could enable payments*”, “*what kind of currencies that we may have to deal with*”, “*what kind of newer authentication methods may come about*”, “*what kind of accounts beyond bank accounts that may participate in payments*”. We used these as stress tests to ensure UPI design can evolve with minimal or no changes to the core universal design. Once again, the idea of universal design and minimalism came to our rescue.

What I love about UPI is its design that is wonderfully minimal and generic. It was designed to be device agnostic - which is why UPI works on smartphones to feature phones to kiosks to fastags on your car; it is currency agnostic - can exchange any form of currency including crypto and loyalty points; it is account agnostic - why it works across banks to wallets to credit card accounts; and it is authentication factor agnostic - while PIN is most common that you see, it also supports face and fingerprint authentication. The speaker-box that is commonly seen at merchants announcing UPI payment receipts, is another such wonderful innovation, especially in the Indian context. It is definitely worth studying the design nuances of UPI to understand how one can design something that was implemented in 2015, but allows amazing future innovations and adaptations without having to redesign the core.

**4. NAVIGATING THE DESIGN JOURNEY:** During my journey as a designer and architect of some of these really large scale systems, I have learned three key principles that help me navigate.

One, **design is not a solo activity**, but a team sport. You are never going to be an expert in every field. That means for you to get the design right, you must depend on others. Hence, you cannot design in isolation, but in collaboration with others who have different skills, perspectives, and experiences. You have to deeply listen to and care for your partners, users, opponents and colleagues, and understand their true needs, fears, and preferences. You have to be open-minded, flexible, and willing to compromise and negotiate. To succeed, you have to be a leader and a follower, a teacher and a student, a mentor and a mentee, and most importantly a deep listener and collaborator.

Second, **design is not a linear process**, it’s an iterative one. You cannot design in a fixed and predetermined way, but in a dynamic and responsive way. You have to start with a problem or an opportunity, you have to research and analyze the context and the constraints, you have to ideate and generate multiple possibilities, you have to prototype and test, and evaluate their desirability and feasibility along with a mechanism to observe, measure, learn, and repeat this cycle.

Third, **design is not a static skill**, but a dynamic one. You cannot design with the same tools, techniques, and trends, but with the new ones that emerge and evolve. You have to keep exploring new domains, technologies, methods, and paradigms. Today, generative AI is used to create content, images, text, music, code, soon full storyboards, movies, and games all from prompts. You have to embrace that, not fear it. Impact of AI in design cannot be stressed enough. AI can be used to augment or replace humans, can be a powerful and useful tool for design, but it can also pose ethical and social challenges. To succeed in this ever changing world, you have to be

a lifelong learner, have the humility to unlearn, be open to embrace change, and most importantly, have deep empathy and humanity inside you.

Climate and sustainability technologies, the impact of AI, most importantly convergence of technologies across domains, are all accelerating at a faster pace than ever, creating exponential possibilities. At the same time, nothing about the future is predictable or obvious, making it even more challenging. How does one design solutions for an unknown future? As India's de facto CTO and my mentor Nandan Nilekani recently said, which I am paraphrasing, "*for an unknown and rapidly evolving future, there is no single right answer, hence the strategy should be to **design for optionality!***" If you really distill, this has been at the core of India's digital transformation story, giving the society all the necessary building blocks to allow it to reassemble, evolve, and deal with uncertainties as the future beckons.

OK, let me not bore you with a long lecture on this special evening. Today is your day! I truly believe design is a wonderful and rewarding profession, and you have made a wise and brave decision to pursue it. You have a great opportunity and responsibility to use your design skills and talents to make a difference in the world.

I would like to thank the National Institute of Design for inviting me to speak to you today. I would like to thank your family and friends for their support and encouragement, and for celebrating your achievements and milestones. And I would like to thank you, the graduates, for your hard work and perseverance, and for inspiring me and others with your enthusiasm and optimism.

I wish you all the best for your future endeavors, and hope you will continue to learn and grow as designers and as individuals. You will, no doubt, have your own share of successes and failures. But, I am sure your teachers, friends, and most importantly your family have given you the skills and tools to help you navigate. You are very privileged to be part of this new bold India, blessed with plenty of opportunities, and graduating from the top institute in the country.

Neither technology nor AI will change the world. You will!

So, go out, dream big, stay perpetually optimistic, surround yourself with smarter people and wellwishers, listen and care deeply, and make an impact! India and the world need you!

Congratulations once again! All the very best!

+-----+-----+