# *Design Narrative 6*

*a g rao*

## Simple Phone for C-Dot

C-Dot was an R &D company initiated by Dr. Sam Petroda! He had an ambitious plan for ‘Telecom revolution in India'. He was well established as a technologist and entrepreneur in U.S.A, with many patents to his credit in telecom sector! After several attempts, he got through to the then Prime Minister Smt. Indira Gandhi. His proposal was telecom technology development in 36 months witha budget of 36Crores. He said, 'Give me this budget and in 3years, I will transform telecom sector with Indian Talent’. The project was sanctioned. Later Rajiv Gandhi also fully supported the venture. C.DOT was a R & D company with innovative ideas in telephone exchange specially suitable to rural sector in India.

One of IDC alumni, Kishore Babu joined C.Dot and he became instrumental in bringing ‘telephone-project' to IDC. We were to develop 3 telephones: Simple phone, STD phone (or Panwala phone) and Executive phone. I became the project leader. We formed a group. Prof.Athavankar and Prof Bhandari joined the project. We were briefed by Kishore Babu. A fee was worked out. Preliminary meeting was arranged with Dr.Pitke one of the directors. We did initial study before the meeting. We got little pre-occupied with how people were guarding the telephones at that time to prevent misuse for STD calls. Physical locks were put on telephones due to scarcity and non- availability of telephones. When we indicated solutions in that direction, Dr.Pitke simply ruled out such approach. He said, " We are looking at Future!Electronic locks can be usedwith ease,to prevent unauthorized calls."

He added,' Simple phone will be the simplest possible digital telephone which can be used for all purposes. Two more, a STD phone and an Executive phone also needs to be designed. STD phones will be used in pan-shops etc., as a service phone.Executive phones will have multiple functions like call forward, re-dial,tele-conference, etc.,"

C Dot was in a great hurry! They wanted a presentation in 6 weeks! This meant day and night commitment to the project! I started with design of simple phone. Bhandari worked on STD phone and Athavankar on executive phone. I went to Bangalore to see C-Dot and met their engineers. It was an impressive organization, Dr. Sam Petroda had built. Young engineers were motivated to work with a missionary zeal ! All the engineers were working late in the evening, when I visited them soon after landing at Bangalore. Many were fresh, bright IITians who opted for C-Dot, rejecting lucrative offers from U.S. The electronic group working on telephones were very friendly. They said,“ think freely, any size is ok, we can design for it". With my 17years experience of design practice, I did not believe them fully! This paid off! Soon I realized the perils of **undefined brief**! If the brief is too open it could mean that, 'enough home work' has not been done by the engineers on details like availability of components etc.,or they were unfamiliar with ground realities in India! The telephone team was very enthusiastic and bright but had little experience in product development. They were thinking that the main complexity in the design was developing electronic circuit. It turned out that the switch, connector plugs and speaker made in India became limiting factors in deciding the size of the telephone! There were two parts in the telephone a hand set and a base unit. I started working on the hand set. We got couple of models from the market to see. One of them was from U.S. Proportions were not refined! It was top heavy!

Feel of handling and ergonomics became my first lookout!.I made several sketches and then POP(Plaster of Paris) models, for checking the anthropometric dimensions. Working in 3D was crucial. Still computer modeling was not in the scene!

There were three main components to be housed:

- speaker to listen from,
- a small PCB and
- a microphone to speak into.

A dummy weight became necessary for the hand set to deactivate the operation of the base unit. A locally made speaker was used on the listening end.These were ‘bought out’ parts. Country was still short of foreign exchange!C Dot's mission was to develop indigenous technological capability!

I looked at telephone sets made in US and Europe. They were already using smaller piezoelectric speakers and were much lighter! When I asked the Company, they said, 'yes we can change the component the moment somebody makes it available in India!'.

This was a tricky situation for Design.

It is not easy to change the injection moulded hand set shells, due to high investment involved! It was also not advisable to change the design once optimized for ergonomic comfort. Roughly overall size was decided. There was already a popular model with both speaker end and listening end identical.

The new U.S design was different but too boxy in shape.

I started playing with 'form and radii' to differentiate both ends.

The speaker end was bulky as it had to house the Indian made speaker. I sliced off top portion to give defined, sharp feature. This was needed to express itself as a telephone with new electronic technology. Once the radii and flowing lines were achieved it stated looking attractive. Still parting lines were to be worked out. But the feel was good. POP also gave an advantage to feel the weight. I made a negative mould for the hand set. With this we cast several POP models. By cutting one length wise I could get the cross section, on which I could draw the speaker. I developed this method of working where I could mix 3D models and 2D sketch to scale! Working out exact fitting was not necessary at that stage.

What we needed was the overall feasibility!

The outer shape was finalized to fit in available speaker. But the possibility of a 'piezoelectric speaker of Indian make in Future' was still there! I was gripped with the problem for a while!

*Then I came with an '**Innovation**'!*

I avoided fixing the speaker directly on to the shell. Instead I introduced an intermediate moulded plate on to which the speaker is fitted. If needed this plate canbe replaced with another to suit the new speaker.A small detail like this can prevent number of 'head aches' for the Company in the later stages!

***This is an important element of Design Thinking!***
***To visualize and take a look into future problems!***

After the POP models, I decided to make a model of hand set in wood. With mixed slopes and radii, it was a complex geometric shape to translate.

The end view was drawn first. A print out of this was stuck on the wooden block. This gave one plane correctly. So I finished this part first. After this radii and form transitions have to be carved out without exact marking!! In our wood workshop, nobody had the skills to translate this part of the shape from POP model into wood! Fortunately for me, IIT had 3day holidays due to some festival! I could work alone peacefully. I got the half shaped Teak wood block .Then I carved and filed the shape myself! Making correct radii oneself was far easier than conveying to somebody else!

So the hand set got ready!

I had the great satisfaction of making the model myself!

We were working on the base unit simultaneously! I made a dummy of PCB in poly styrene sheet and asked the C DOT engineers to mount all the components to act as a dummy model. That is when we discovered the criticality of the size of connector housings which are to be mounted on the PCB at the edges! ! The slopes of the body with a smooth transition had to accommodate connector housing!

*Free thinking has to work with in these constraints!*

***Designers learn to imagine with Constraints!***
***This remains a major difference between ART and DESIGN!***

After working on couple of POP models I reached a satisfactory 'form' for the base ! Flow lines got resolved with the right radii. Getting lines correctly was the main task. *Clients seldom are aware of these fine problems. Only a trained eye is able to see any discrepancy! This is also the reason why POP models are used to learn form transitions*

*and radii manipulations! POP provides a neutral mat surface to see the form in correct non-diffusing light! Diffused light of 'Tube lights' is avoided for this reason!*

The models got ready in time for presentation.
I was to make the presentation to Dr. Sam Petroda. That was his first visit to IIT Bombay. Director at that time, Prof.Nag received him and offered lunch at the guest house after our presentation. He also took opportunity to invite Dr.Petroda for a general talk to IIT students!
Sam Petrodacame to IDC for the presentation.
It was a hot summer day. The presentation was in the cool conference room! We took care to serve cool drinks as soon as the C DOT team reached from hot surroundings. There was little time to be wasted! I started with a slide presentation.
'Quality in rush was our major challenge,' I said
and showed the slides of final model in the very beginning ! It looked like a real- working phone on the screen!.
Dr.Sam Petiode,was eager and little restless to see the models! But I finished the slide presentation before showing the models! I had learnt this trick hard way! It is more advantageous to show a 'slide' of your model before you show the 3D model. You can hold the attention of all on the screen to start with. Secondly you can choose the light and back ground to see the product. A telephone model held in one's hand in an ill light conference room, with messenger suddenly whispering something in the ear, would never get that advantage!
(thank God, the mobiles were not there yet).
A small video with sound would have been still better!
Sam Petroda held the phone in his hand and said, "I liked your presentation!. I like the feel of the telephone, though I don't exactly like the look of it.' May be he was comparing with the boxy, American telephone i didn't know! but he was frank and forth right!. He approved it and said' let us go ahead'.
We also showed the concept models of other phones in sketches and renderings. But he did not show much interest in them!C Dot had not finalized the technical design for the other two! There was no demand for a common 'Identity' either! All the three were seen as independent phones!(probably different companies making them!)

Any way it was a successful presentation. Sam Petroda was very friendly. He went through all the studios and labs of IDC, asked lot about where we were trained and how we started IDC. He had a reputation of keeping notes of every significant person he met. 15 years later when Satyendra Pakhale, one of our alumini, who was practicing design in Amsterdam met him, he recalled his visit to IDC for telephone project and even enquired about me!
When I raised a question recently in Design Deconstruction Workshop at Delhi where he had chaired the session, he acknowledged my reference to C-Dot telephone with a good smile!

After presentation came the arduous task of product development! Dealing with young electronic engineers was very invigorating. They were very friendly but new to industrial design. They were not able to fore see problems in component supply! An Indian made switch used inside the base unit was bigger than imported switches and needed more weight to operate!!We had to add weight in the hand set to operate the lever when the hand set was placed on the base unit. We had to change the details of inside often to accommodate the continuous changes in rubber key pad which was procured. Demand for wall mounting of phone came much later! This needed a recess in hand set as well as an additional part in the base unit!
We built a hallow model by vacuum forming, fabricating and hand finishing! We fitted the parts inside and made working prototypes. Base unit had a lever to operate the Indian made switch! With many trials, our developing team headed by MSG,Rajan made working models. It was a first experience for IDC to simulate models for Injection moulding. We also designed a base plate for Wall mounting. I developed a texure using c dot symbol.
It was the first time I was designing and developing for injection moulding. We came across a Mould engineer with 10 years experience in Brite plastics and made him as our consultant. C-Dot wanted the plastic parts of the telephone produced even as the electronic development and testing was going on. None of the established Plastic companies like Brite were ready to make the moulds in '3' months. C Dot offered mould development to us.
IDC politely declined as we did not have previous experience to get the moulds made in Taiwan or Korea. Finally C-Dot found a small

entrepreneur who had come from Hongkong who took the contract to make the moulds rather at low costs. We gained valuable experience as the mould maker's consultant was same person(Mr.Opte) from whom we took advice.
Mould making was rather inexpensive in small scale sector. But the reliability was low. Mould maker's knowledge was limited. Financial stability was an issue. Moment payments were not made or vigilance was not kept, they would stop the work halfway and took up other work! Cash flow was a problem for small production units! Procuring steel for Mould making was another problem as it was not readily available and was imported.
When the hand set mould was to be made we needed to add 0.25 percent shrinkage allowance. This became a complex task. We made several sectional drawings with increased dimensions. A copper master was to be made for spark erosion to make the cavity of the mould. The mould maker machined the copper block to initial size. But when radii were to be made he found his workers lacked the skills. They brought initial pieces to IDC. When MSG Rajan took out radii gauges for checking, one of them expressed, ' sir, where did you get them? We have never seen these gauges before in our life!; in Hindi. The radii were no where near what was required. So I took over the task to file and make the radii myself. It was 3 days hard work, but gave me the great satisfaction of a sculptor!

*I had made wooden sculptures before I joined NID as a student!*

During this time, one day I had call from Dr. Petroda. He wanted me to go to Delhi to present the telephone model to entrepreneurs. This was a meeting he had arranged to sell the technology for exchanges. He just showed the simple phone as a carrot! He told the entrepreneurs in the workshop, those who sign a contract for the exchange, will be given telephone as well! Many wanted to make the telephone rather than the 'exchange' ! They could see a huge consumer market for the telephone!

With all the hiccups in mould making and assembly, 100 initial pieces of simple phone were made as pilot production! We also designed a wall plate in plastic for wall mounting of the the telephone. This plate

was injection moulded.  I used C-Dot symbol to generate a unique textures on it.

Unfortunately, there came a change in the Govt. A new telephone committee was appointed by the new govt,. It found several faults with C-Dot. Dr. Sam Petroda  left C–Dot and went back to U.S to wait for better times.  Our telephones went into cold “Storage!”

The  simple phone design remains contemporary even today  after 20 years!

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