CREATING WORLD CLASS R & D ORGANISATIONS IN INDIA

Strategic Design Concepts

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This paper has been written by the Strategic Design team at X36 Falcon

We have an an agenda to provide thought leadership in the areas of Business, Finance, Infrastructure, Research , Education, Healthcare, Urban Infrastructure, Energy and Defence as well as a number of other matters of commercial and national interest. We seek to bring totally new ideas to our chosen verticals of interest and specifically " capacity creation " related issues within these verticals.

Our papers and project designs are based on a rigorous study of the subject at hand and their objective is to provide a unique perspective on meeting large social and economic challenges. For this reason our work is followed by Business leaders, Govt officials, civil society groups in India and thinkers around the world.

The projects X36 Falcon promotes are in the business and public interest for people in India and around the world. We therefore would like to share our ideas with like minded individuals and organizations globally for the service of the public with the caveat that the source of information (this strategic design note) be mentioned in each case while referring to the information and unique ideas contained herein to avoid legal action.

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Former US Secretary of State, Henry A Kissinger has said " *If you are going to do something ultimately you might as well do it immediately* ".

This " Here and Now " attitude is something that R & D Organisations in India need to inject right into their DNA if they are to successfully Fast-track new product / technology development.

From a strategic designers perspective, it does not matter whether the research being done is in Artificial Intelligence (AI) , Genetic Engineering or Armaments (e.g a Next Generation Rifle) .The Macro policy remains the same.

There are however certain Do's and Don'ts that organisation managements should keep in mind while setting themselves up for success.

By success, I mean starting right from scratch ... to create a Patent portfolio with a market value of US $ 300 – 500 Million in 5 – 7 years.

In the following discussion I will focus on the **Do's** with the caveat that the **Don'ts** are equally important.

Design Issues in Creating World Class R & D Organisations in India :

1. Leadership :

It is better to have a leader who has great people skills and who can get brilliant minds from different disciplines to work together … than to have a leader who is technically brilliant herself / himself but cannot get five people to agree on anything OR work together.

2. Alignment with Business :

Right at the beginning you need to have a good understanding of (1) Who your Target customers are (2) What are the economics of the existing Product / Technology in the market that you are seeking to replace ? (3) What are the margins which you expect after successful development ?

In the case of Breakthrough Technologies, it is OK , NOT to have a complete understanding of business potential at the beginning, but you should at least " Have a plan to … develop a proper plan " within a reasonable timeframe.

Secondly, all research projects must have a Business Owner who drives the project and has responsibility for its delivery.

In some projects Top Management has a vision about a technology and its possibilities (For instance Henry Ford was convinced of the possibility of the Multi – Cylinder IC Engine in the same engine block. It was his vision and he funded it for a long time till it achieved results). Such projects (which do not originate from the Business Team but from the promoter) should then be part of a Management book with a defined stop loss level where the promoter will take a call.

But for most research projects, the need identification and business case should come from the Business group.

3. Start With An End Objective in Mind :

" Well Begun is half done" is how the expression goes.

Once Alignment with business objectives has been achieved through Business - R & D Meetings, a Project Charter is written and the hard work of Estimating and Calculating various variables starts. (1) What are the Markets you are targeting ? (2) What are your competitors economics ? (3) What are the cutoff " economic thresholds " below which you will NOT take up a particular research project ?

Most projects FAIL because these issues are not handled at the beginning itself. Therefore we do all the numbers and for this certain templates are required.

There are certain standard templates and tools that are used by research teams so that they stay focused from the start. I have personally developed such templates and have found them to be very useful in helping the team become more financially aware while simultaneously pushing the Technology Innovation envelope.

4. Fix Responsibility with a RACI Matrix :

You need to be very clear about who owns the Research project and who is responsible for delivery. A RACI Matrix can help fix responsibility within the New Product / Service development ecosystem and fast-track the process.

5. Inter –Disciplinary Teams :

This is perhaps the most important of all in an R & D organisation that is working on the development of New Products / Technologies.

Companies such as **3M** and **Google** have organised themselves to work in Inter-disciplinary teams and it has been one of the primary reasons for their immense success.

The critical thing here is diversity. Your team must have the right mix of Subject matter experts, Scientists, Engineers, Tinkerers and Design Thinkers as well as people from the IP team and Business who will constitute the core team.

Project leaders should also bring in line function experts from Finance, Legal, Procurement etc … to give critical inputs from various angles so that costly mistakes are avoided in the product / technology development effort ... at the beginning itself.

This has not been happening In India for a long time and as a result today we have a situation where money is often spent on useless projects with no business or strategic case because different technology verticals do not talk to each other … or to the business group.

This needs to change and the best way to do this is to have inter-disciplinary teams working on all New product / technology development projects.

In fact a Project leaders performance appraisal / grading should be clearly linked to the seriousness with which she / he brings in people from other disciplines into the project team.

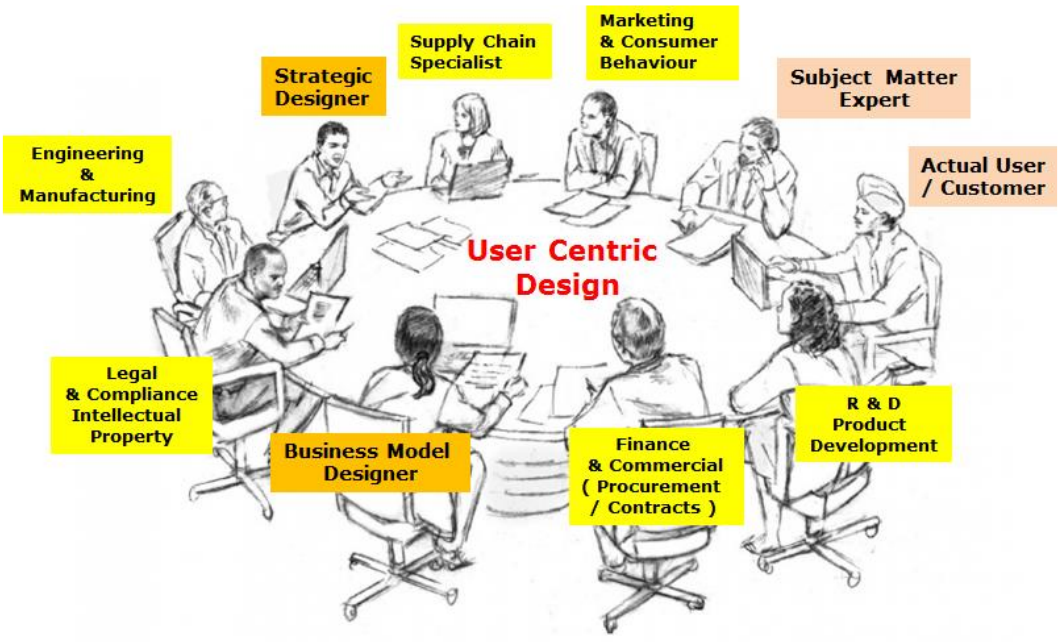
There are ways to break up Knowledge silos within an organisation and this is best done by rewarding senior managers who do this. Similarly those who resist breaking up organisational silos need to be suitably educated so that they see a personal interest in the creation of Inter-disciplinary groups to fast track innovation.

6. Design Thinking and Fast Prototyping :

It is now well established that Design Thinkers and Strategic Designers bring huge value to New Product and Technology development and it is worth paying for their services as these are people who look for Possibilities … not problems.

Designers think very differently. They are able to effortlessly synthesise their vast knowledge with the varied experiences of Team members (from across Industry verticals), to see things that most people with a more limited exposure would miss.

This is a very significant point, because the difference is between obtaining a Unique insight ... or missing it entirely.



Designers working as part of a team in a Design Thinking workshop, help a team develop a larger number of options than they otherwise would ... and then help them to quickly develop prototypes and test them instantly.

Design also allows you to achieve a deep reduction is costs at the very beginning.

Once you have brainstormed the design options and have brought in all the ideas including Customer Feedback and Cost Reducing Concepts ... you should immediately develop your first Prototype (This could sometimes be just a Drawing) ... and Test it immediately with select customers who have been Co-opted into the New product development effort.

All of this greatly reduces the time to product / technology launch and could potentially save the organisation tens of millions of US Dollars in each project.

7. Fail Fast :

Our experience is that researchers are prone to get emotionally attached to their work. While this is natural and very human, it starts hurting the organization financially if a project is unable to go beyond bench scale and subsequently beyond pilot scale ... due to scale up issues at these stages.

Sometimes the idea itself is flawed, but whatever the reason, it is important to test all assumptions as soon as possible and to kill the project if it stalls for any reason.

To avoid any conflict of interest, the Business group that usually finances R & D projects should have final kiss – kill authority and their word on this should be final.

Financial discipline requires that R & D should not be allowed to bypass the business head and get independent approval from management. If this happens too often, it undermines financial discipline and could become a Major governance issue.

The main problem is that Failing has negative connotations in India and therefore most people just do not like to openly accept failure.

This needs to be changed. The best way to do this is to have a **Special Prize** for the research team which has killed the maximum number of projects. By openly rewarding people in the Scientific community who believe in Financial discipline ... we can successfully overcome the Stigma attached with failure.

8. Reduce Bureaucracy :

For the CEO, it is a choice she / he has to make between continuing with the same old bureaucratic control over the R & D function ... or shifting totally to a New Ideas driven system.

This is a Key decision for the CEO because in the Knowledge Economy, Intellectual property and Patents that come from a well managed R & D function have the same financial significance and impact on corporate valuation as PROVEN RESERVES do in the Upstream Oil & Gas business.

There is a need for a Transparent and Accelerated Process ... without the bureaucracy and information secrecy. Experience in India (mostly in Government funded R& D) shows that the scientific community and its bureaucrats has often worked to ensure that senior management never comes to know that a Project has failed. They do this by creating an " Information Black Hole " which is essentially a strategy which ensures that No information about the project ever goes beyond the core project team.

The result has been huge losses of Public and Private capital and R & D will languish as long as business leaders do not take a firm view on this matter.

To make things happen the CEO has to do the following :

1. Ensure that the Innovation Committee is staffed by IDEAS People only ... Even if you have just one genuine innovator to start with.

2. Ensure that your Intellectual Property (IP) Committee has Genuine Innovators and Lawyers besides the technology vertical heads ... and NO one else

The bureaucrat has No Business being on any of these committees. These are individuals who have never done any real innovation in their lives and yet they have been able to ensure their presence by introducing some New process OR a New set of Rules now and then … to remain relevant

To neutralise the bureaucrat , Organisations need to realise that they need the bureaucrat a Lot Less than they need the IDEAS person and as long as the CEO understands this, the research team will deliver and Make Money over the medium term.

9. Respect Contracts & Knowledge Sharing Agreements :

Respect for Contracts and Knowledge Sharing Agreements ... is Extremely important.

In today's world with " Technology velocity " being what it is, it is counter productive to dis-respect contracts and knowledge sharing agreements.

A well crafted Collaborative Technology Development Agreement will create Hundreds of Millions of dollars worth of wealth. It is therefore well worth the effort to spend time on this. The same can be said of a robust Corporate Design Thinking Standard which must be a written document and disseminated throughout the organisation.

A Properly written Design Thinking Standard can bring in Huge Changes in the way your Organisation thinks. This is because Design Thinking will change your Annual Operating Plans in each department of the Company ... from the Treasury team, to Corporate Finance, to Sales and Marketing, Manufacturing and even the Construction Team , if you are into Construction. I have written a Design Thinking Standard and its my personal experience that is talking here.

As far as the Collaborative Technology Development Agreement is concerned, it's observed need to Fast-Track R & D has its origins in … the Changing Nature Of Work itself.

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McKinsey has written an entire report on the Subject of " The Changing Nature Of Work ". It is a seminal work and we encourage everyone to read it.

The truth is that Excellence and the people who possess expert level skill sets are no longer interested in working for one company. Instead they will typically work for **5 – 6** different companies at the same time.

The question Business heads therefore need to ask themselves is this :

" Are we better off hiring an Expert who comes in for a few weeks and Changes the way **300** people think about a problem … or are we better off spending US $ **20 - 30 Million** each year on staff salaries in the hope that one of our scientists will some day change the way he / she thinks ... to come up with some breakthrough idea.

Therefore a sound collaborative agreement framework makes things much easier for everyone.

Let the innovator come in, give her ideas … and move on to her next assignment immediately with Another Company. To ensure that your IP is protected. you can have a well designed Non Disclosure Agreement (NDA) with a Non-compete clause that works for both parties. To make sure it works, craft an agreement that works for the Ideas person as well. Too restrictive a Non – compete clause will not work in todays environment where real innovators are a Rare and much sought after commodity. It is also true that genuine innovators hardly have the time or the inclination to go against a Non-Compete clause.

So ... Do Not listen to your Bureaucrats and your lawyers. Focus instead on what your Organisation wants out of a Collaborative Framework Agreement (In terms of Millions of US Dollars of additional revenue and a much better trained team of scientists who gain immensely by interacting with Design Specialists and Senior Technologists) .

By focusing on strategic objectives the organisation is able to Leapfrog technologies and acquire new capabilities. This may cost some money, but it is money very well spent.

Collaboration is now the New Normal even in India. If you are expecting a real Expert or an Innovator to dedicate all his or her time to your company and not work with others, it is time you did a reality check.

10. Maximize Video Conferencing :

An easy and convenient way to cut costs steeply in R & D is to Maximise Video conferencing. In this day and age, there is absolutely no need to travel halfway around the world to meet someone face to face.

In fact you could move close to **90 % - 95 %** of your initial Ideas generating and product development process online by extensively using Video Conferencing and Paypal.

In fact by using Video Conferencing and Payment gateways such as Paypal, R & D Organisations in India can cut their Idea generation costs by close to **75 %** and at the same time develop far superior products than has hitherto been possible. Nowadays, everyone uses Paypal and organisations can use the platform to pay Innovators and Technology experts with whom they are collaborating in a seamless and convenient manner. Paypal also ensures that you have access to Experts on demand at a very affordable cost.

Organisations can use the money saved from reduced foreign travel to set up relationships with leading universities and research institutions around the world.

Many universities like MIT and Stanford have well established collaborative research programs in a large variety of disciplines. They also have Industry partnership agreements that could be used to gain access to the best minds on literally any subject.

Today, all it needs to spark off a new product or service innovation is a discussion with a technical expert working in the same area. The discussions are also extremely interactive and interesting and Video has proved to be a very effective way to accelerate innovation.

11. Huge Shortage of End To End Technology Experts :

One of the Key Challenges in India, that is hampering our ability to develop Technology is the Huge Shortage of Senior Technical people with proven experience in End to End Technology development. These are people who have the skills necessary to take a Technology from Bench Scale ... To Pilot ... To full Commercial scale. We just do not have enough of these people in India and most of our scientists are currently not skilled in taking a technology beyond Bench Scale.

11.1 **Get Retired Scientists (From The US / EU/ Russia / Japan) ... To Train Young Scientists in India**

The idea here is to Get these people, Many of them , Retired scientists who have worked with the worlds largest technology companies ... to advise Indian Companies Via Video Conference from the comfort of their homes in the US, Europe, Japan , Russia or Where-ever.

This will greatly help bridge the Experience deficit in End to End Technology development that currently exists in India. This kind of strategy will speed up the Training of our young scientists and engineers and Fast-Track the development of indigenous technology within the next decade.

For instance, after the Collapse of the Soviet Union, the Chinese hired 5,000 Russian Military Scientists who had been laid off … and got them to develop Unique technology for China. This resulted in the development of State of the Art technologies in China, not just for the Military but also in the manufacturing and other industries. It was a Strategic Decision the Chinese took.

We need to adopt a similar approach in India by bringing in the best minds from around the world to engage with and train our young scientists. If this is done, it will transform Indian industry and our innovation landscape.

The Government of India needs to facilitate this access to Technology specialists from around the world by means of a forward looking policy.

If the Chinese could do it and get outstanding results, why can India not do it ?

12. Monetisation … Implementing the 90/10 rule

Ultimately the success of any business venture is critically dependent on People. Ninety Percent of the time, success depends on who you take on as your research partner or who you choose to do business with.

In the case of a Research / IP development project it is even more important.

No matter how good the idea and how sound your other decisions above are, if you choose the wrong partners you will have to pay a very heavy price. Therefore it is extremely important to be careful in matters concerning the selection of Business partners.

13. Need for a Strategic Patents Policy

Patents in the knowledge business (as has been stated before), are in the same Asset class as Reserves in the Upstream Oil & Gas Business.

The Gold standard in Patent efficiency belongs to companies like Siemens and others where approximately **55 %** of Patents are have some tangible value (i.e **45 %** of patents are worthless). It goes by this logic that in most organisations, the lack of a clear Patents strategy has led to a proliferation of Patents, most of which (85 % in some cases) are worthless.

Organisations therefore need to achieve an affordable balance between the Researchers craving for more and more patents against their names and the organisations need to prevent frivolous filings.

One solution therefore is a Platform / Flanking strategy where patents are filed in accordance with a strategic plan spelt out in advance. In addition to this organisations also need to develop templates to help them put a value to each patent in their portfolio.

So you need to have both (A robust strategy for your patent portfolio and a set of templates to help you determine the value of the technologies you are developing).

14. Does SIZE Matter ?

In India specifically, the Smaller you are , the better off you are. In fact, we would say that you are Very Lucky if you are small today (2018).

This is because in India, most of our Larger R & D outfits are struggling with Bureaucracy and Massive Internal Politics which has made it virtually impossible for them to deliver any innovation. This problem (i.e Politicians and Beltway Bandits in the guise of Scientists) within the Indian scientific community in India has become so huge and pervasive and so much of a drag on Innovation over the last 40 – 50 years, that it has become necessary to Specifically put it on the Agenda.

We are spending Tens of Thousands of Crores in National R & D Labs and Private sector Labs across the nation, yet there is no output. This is not normal and should not be accepted as such. There is a need therefore for leaders within Government and the private sector to solve the bureaucracy problem and lack of employee engagement issue … in creative ways.

It is for this reason that we am saying that if you are Small and Entrepreneurial , then you have Everything going for you ... as long as you hire very carefully. In fact small companies can considerably reduce risks by bringing most of their people in as consultants for Specific assignments on a temporary basis.

Developing collaborative relationships with Government institutions will allow small innovators to gain access to sophisticated R & D Labs that the Large Govt. establishments have and most importantly, it will help Un-Lock the massive creative energy of young scientists that lies comatose and buried within Politically frustrating environments that the larger organisations have become.

Theodore Roosevelt (US President 1901-1908) used to say " Do what you can, With what you have, Where you are ". This very sage advice should guide India's fledgling R & D Organisations and give them great hope within an Economy that is set to Triple in size from US $ **2.7** Trillion today … to US $ **7.5** Trillion by 2030.

15. What Will Success Look Like ?

Lewis Carroll has said " If you don't know where you are going, any road will get you there".

Success means different things to different Organisations and its best to leave it to them to define it for themselves.

As a general guide we had indicated that success for an R & D division could mean … starting right from scratch to create a Patent portfolio with a market value of US $ 300 – 500 Million within 5 – 7 years.

Different organisations will have different criteria, depending on what their object function is within the differential equation they are trying to solve. But whatever the criteria, all of them should attempt to specify in advance how success will look like for their organisation.

It is recommended that they spend quality time spelling this out in a written document or presentation and keep it where everyone can see it.

This can be just a single slide ...

Lastly, It can be said " Set your people free and they will surprise you with their ingenuity and their persistence."

- Concluded -