

NOTES ON
POSSIBLE REORGANISATION
AND
DEFINITION
OF
ACTIVITIES OF ISRO
CENTRES

22 Jun 1976

In my forest there's a path where always,
Be it morning,
 afternoon,
 or night,
Someone looks at me attentively and closely
.....
I recall my life from the beginning,
And I pause my heart to search.
What have I accomplished?
 Nothing really
What have I created?
 Nothing much
Always I am struggling on as best I can
I am always hoping that there's lots of time.
Will I not be sorry when I find there's none?
Won't it be too late for me to realise
That I had more problems still to fight.
 "..... just give me one more try.
I will somehow manage yet",
 I whisper
"..... I believe you. You will try. I'll wait.
Are you sure of yourself?"
 - "I do not know" -
"Still, do try to make it, don't succumb."
All my life, along that forest path I'll go,
Following a light that bids me come

- Margarita Aligher
(A Soviet poetess)

* * * * *

CERTAIN OBSERVATIONS

- * Better definition of activities of ISRO Units/ Centres is a desirable thing. But one should bear in mind that excessive definition would lead to technical bureaucracy and would kill intuition and innovation.
- * Just as excessive mobility could lead to "drifting", excessively prolonged duration in one activity could lead to "fossilisation".
- * However, there are certain activities in technology which require slogging by individuals for a long time - to acquire the skills and learn the "black magic". MIT Instrumentation lab, where inertial systems are done, is one such example. There can be no leap-frogging in such activities.
- * Just as formal education gets obsolete during the course of profession of an individual, even the skills acquired or exhibited by an individual during the course of growth of an organisation become obsolete. This dynamic flux of events demands constant change in priorities, skills, ideas etc.
- * The persons who contribute greatly to an organisation at one stage could become obsolete or counterproductive to the organisation due to variety of reasons such as age, change in the direction of organisation etc. He, in a sense, becomes a "toxic product" of the "system".

....more

- * I am making the above observations, which are probably well known in a certain sequence to stress the complexity of the relationship between the individuals and the organisation.

Organisation is in a constant state of flux, just as many individuals are; but there are important tasks which are accomplished only by (essentially) unchanging individuals.

Too fast a change in individuals could lead to poor foundation in the new field of activity whereas very slow change may lead to obsolescence.

- * The skill of organiser lies in striking a "judicious" (easy word to say!) balance.

NATURE OF ISRO

P r e a m b l e :

- * From generalities let us come to the specifics:

ISRO's job is doing Space Research. That means:

Doing Research in Space Sciences

Making rockets and launchers

Making propellants

Making motor cases and nozzles

Making guidance system

Making electronics

Making Ground Check-out

Making Launch Complex

Making Tracking Stations

Making Satellites

Making Satellite subsystems

Making Satellite Application Payloads

Making experiments in Space Applications

Making hardware for experiments in Space

Applications

Plan for future systems in the above areas

Develop various user interfaces.

- * In Sciences, in making hardware etc the role is fairly clear. When one marches on towards applications which is the ultimate goal, things get difficult.

- * If one just talks of applications nothing will be done as there is always some resistance to change in human activities. So one has to

hardware to prove the new. So one "pushes" the "national system" into new ideas. Is this done in the national interest, or just to push something new or just to keep one's job intact?

- * In reality, things are a mixture of the three interests. ISRO's interest vis-a-vis national interest will get distorted when "job security" pushes the applications and therefore other programmes. Then one can say ISRO has become a technology tiger.
- * Are we one now? Far from it, in our national context. But do individuals think in national perspective - I mean, the ISRO powers-that-be? Not always. But at the same time there are tendencies to think in terms of available hardware and not from the requirements. This thinking which is many times pragmatic, has in it, the nucleus of a technology tiger.
- * The reason I have dwelled on this is that the direction of ISRO's programmes should not be left to any ISRO centre or unit or Headquarters; it should be more and more widely debated to remove such elements of job security and key persons in ISRO should be moved around to guard against vested interests developing. (Retrenchment etc are not practical in the Indian context)

N a t u r e o f T a s k s :

- * With the above preamble, ISRO has the following categories of tasks:

<u>Tasks</u>	<u>Nature of work</u>
1 Formulation of concepts in Science & Applications. (used in general)	Thinking and analysis.
2 Reduction of the concepts to experimental programmes and projects.	Systems analysis and Systems Engineering.
3 Execution of the Projects.	Management and Systems Engineering.
4 Development of Hardware for many of the above projects and R&D for future activities.	Engineering.
5 Production of limited or sophisticated hardware.	Engineering. Routine work.
* NASA & ESA have primarily the tasks 1, 2 & 3 and only very limited 4 & 5 <u>in house</u> .	
* Tasks 1, 2 and 3 are thinking jobs and people <u>can orient</u> themselves <u>fast</u> to other jobs. They are mostly "software" or "paper boys".	
* Tasks 4 and 5 are the <u>basic building blocks</u> for 1, 2 & 3. Due to lack of industrial infrastructure ISRO has to take up these. Most of the persons doing these by virtue of the nature of their work	

....more

tend to be inward drawn, narrow and slow changers. They have to concentrate to tackle the hardware. It is only in rare instances where the same persons are capable of 1, 2, 3, 4 & 5.

- * The functional heirarchy of the job starts from 1, - the "big" bosses; then to the Systems Group which does task 2, thus wielding prestige and power, normally due to their proximity to the big bosses and their role of orienting concepts towards execution.

Then the Projects come, which do the task 3, thus wielding considerable executive and financial powers.

- * So persons doing tasks 4 & 5 are fairly low down functionally - in the sense their involvement in policy making, deciding on programmes and projects, allocating budget etc are minimal.
- * This "caste system" is greatly the resultant of large system management and the division of labour.
- * If tasks 4 & 5 are done outside ISRO, the organisation will be fairly homogeneous because persons doing 1, 2 & 3 are fairly homogeneous.
- * But about 60-70% of ISRO is doing tasks 4 & 5, i.e. "hardware" and will continue to do so in the coming decade, in spite of our attempts at subcontracting which will convert 4 & 5, as far as ISRO personnel is concerned, into task 3 - i.e. Project Management.

- * Persons doing 4 & 5 in ISRO wish to be considered for higher salary, prestige, power and the rest - a ^{national} aspiration. Without these persons being happy, ISRO cannot deliver goods.
- * So how to reconcile functional hierarchial needs of a big system to keep 1, 2 & 3 at the top and the human (aspirational) hierarchied needs - i.e. keeping those who do 4 & 5, with a feeling of involvement in ISRO programmes, keeping them from alienated?
- * This can be done by the following:
 - Not to discriminate in salaries. Presently we do not discriminate. But there are pressures building up to keep some of the "narrow" "hardware" persons from being promoted.
 - Keep the systems group at Headquarters, Centres, Units etc at a salary-wise junior levels. This will make those doing 3, 4 & 5 that they are closer to those doing task 1. Presently HQ and PPEG/VSSC are examples. But they may have to be maintained the same way. (This has the disadvantage of high load on big bosses).
 - Do most of the planning by Inter-Centre Study groups, as is done now.
 - Define the roles of Centres with some overlapping and increase inter-Centre projects so that there is some confusion in the role of 3, 4 & 5, thus making one look like a "boss" at some instances, some instances a worker - "temporal confusion".

- * Of the above, the first three practices already exist in ISRO. It is the fourth which is used as the theme for the following organisation structure or definitions.

- * If HQ and Chairman, ISRO are on guard, this will not lead to duplication in hardware, but there is a built in duplication in thinking and planning.

VIKRAM SARABHAI SPACE CENTRE

The primary tasks of the Centre will be:

- 1 All activities related to rockets and launchers right from studies, planning, development and execution.
- 2 Application studies related to missiles and execution of work related to these.
- 3 Studies and plans related to future transport systems such as shuttle.

Note: The above three can be kept as regular full time activities. The following three are meant for harnessing VSSC skills and energies to other programmes.

Secondary tasks:

- 4 Have a Satellite Systems Cell which will, in coordination with the ISRO Satellite Centre, conduct studies in possible utilisation of VSSC for doing satellite sub-systems and components. The actual works however will be done by taking sub-contracts from the ISRO Satellite Centre. (The job of development and delivery would be through the Satellite Systems Cell but will be done by VSSC Divisions).
- 5 Have a Science & Application Technology Cell which will, in coordination with the Space Applications Centre and Physical Research Laboratory, conduct studies in possible utilisation of VSSC skills for doing application-oriented

hardware - be it earth station antennas, radiometers, scanners, digital hardware, lasers etc, either as subsystems or components. The actual work will be done by the VSSC divisions through this Cell.

- 6 Do studies and works related to launch vehicle and satellite mission control in coordination with SHAR Centre. Examples of hardware development are for S-Band telemetry, Radars, etc. These works will be done as subcontracts to SHAR and as decided by SHAR. For coordination of these activities identify a Launch & Mission Control Cell.

Note: The above mode will help utilise VSSC talents without VSSC engulfing others. The specific formation of the three cells within VSSC will provide an interface with others and also ensure that others do not by-pass VSSC. These Cells could be under VSSC/PPEG or independent. These Cells could also act as catalysts and inject fresh thoughts into programmes of other centres.

.....more

ISRO SATELLITE CENTRE

P r i m a r y t a s k s :

- Responsibility for execution of ISRO's Satellite Projects, the subsystems of which could be done by various ISRO Centres or outside agencies.

- Responsibility for the development of technology elements related to satellite main-frame area either within the Centre or by subcontracting to other ISRO Centres or outside institutions.

- Responsibility for development of fabrication and test facilities related to Satellites. This may be done within the Centre or by coordinating with other ISRO Centres or coordinating with outside institutions.

- Responsibility for conducting planning studies related to satellite main-frames and payload technologies that may be used in shuttle.

- Responsible for developing standards, practices and qualification of ISRO/DOS payloads that will be flown in ISRO satellites or foreign satellites (Supervisory function).

S e c o n d a r y t a s k s :

- There should be a satellite user interface development cell within this Centre to think, analyse,

.....more

and plan for future payloads (application, science and technology) in coordination with respective ISRO Centres and PRL. This is with a view to understand their impact on satellite mainframe activities and plan for advance action.

- Similarly a mission control cell should be formed within the Centre to analyse and plan for the interaction needed with the future TTC systems, in coordination with SHAR.

.....more

SHAR CENTREPrimary tasks:

- Responsible for all the activities related to Telemetry, Tracking, Command and Data acquisition network of relevance to ISRO/DOS balloon, rocket, launcher and satellite programmes, and responsible for the management of mission control for the above programmes.
- As a manager for ISRO TTC Network & Mission Control Operations, will subcontract all the development activities to relevant ISRO Centres. No R&D will be done within the Centre itself.
- Similarly, SHAR Centre will be responsible for all the activities concerning the Ground testing of Launch Vehicles and rockets and also for activities related to the launch of rockets and launch vehicles.
- TERLS will be under the managerial control of SHAR Centre; also the overall coordination of PRL telemetry facilities should be done through SHAR Centre.
- Responsible for operational coordination with international TTC networks as per the existing ISRO policies from time to time.

.....more

SPACE APPLICATIONS CENTREPrimary tasks :

- Responsible for conducting feasibility studies and experiments for application of Space Research to the national needs such as Communications, remote sensing and meteorology. The actual experiments would be done by utilising various skills and technologies available with ISRO Centres.
- Responsible for transferring ISRO applications programme experience in Communications, broadcasting and remote sensing to the national operational agencies like Communications Ministry, I.Met.D, NRSA etc.
- Develop operational contacts with the users for executing pilot experiments in applications area in consonance with the existing ISRO policies from time to time.

Secondary tasks :

- Have a space vehicle cell (rockets, balloons and satellites) to analyse various possible Space Applications in coordination with respective ISRO Centres.

ISRO HEADQUARTERS

- Coordination of ISRO programmes by presenting the analysis of status of various activities/projects to Chairman, ISRO/ISRO Council.

- Analysis of planning elements related to ISRO's future programmes in coordination with ISRO Centres and PRL.

Note: No change in the "staff" role of HQ is envisaged. It is better for ISRO that this "Systems Group" fulfils such an "analysis cum advice" role as otherwise it may become a DRDO HQ.

.....more

PHYSICAL RESEARCH LABORATORY

- * Responsible for the activities relating to the research in Space Sciences. The actual hardware may be done through ISRO Centres or in house in PRL.

- * Responsible for coordination with other national laboratories doing the Space Sciences; such a coordination should be done in consultation with the ISRO Headquarters.

.....more

I M P L E M E N T A T I O N

- * Chairman, ISRO may consider the above package of definitions and issue them in some form to the Centres. There are some activities which need to be done not too late if the general philosophy contained in these are not to be distorted severely.

- * Action points are as under:
 - Formation of a nucleus for ISRO Satellite Centre. Even an order with some staff to the chosen person will do to keep things moving.

 - The Satellite Design aspects of APPLE, INSAT and facilities and technology development for these need a unified look through this Centre.

 - VSSC may have to clearly indicated through the above step that their role in Satellite making is essentially as subcontractors as otherwise there are many pressures within VSSC to take over all the Satellite work.

 - Some form of satellite coordination cell and Science & Applications Technology Cell need to be formed within VSSC to deploy its talents and skills in a channelised way for ISRO projects. Today, for example, the transfer of digital technology to SAC is messy because SAC is generally reluctant to

give the job to VSSC and VSSC does not have a focal point to force the issue.

- Growth of VSSC manpower to be restricted fully (± 100).
- SAC manpower to be curtailed (± 200). The hardware orientation of SAC to be stemmed by inducting more of scientific and planning type persons.
- SHAR Centre reorganisation to be announced soon and its role as the Manager, TTC & Mission Control to be clarified by an Office Order. Working modes can be developed by constant follow up (By P N Jayaraman of ISRO HQ)
- Some key inter-Centre transfers have to take place urgently to make the above organisation plans to work:

i) A few (2 or 3) satellite (hardware) systems engineers from ISSP need to be placed in SAC in-charge of the Satellite planning activities.

ii) ISRO Satellite Centre needs some induction of persons from VSSC in propulsion & mechanical area or one or two electronics (senior level).

Two or three persons from SAC, good in Remote Sensing & Communications to be transferred to Bangalore Centre for User interface development activities.

iii) SHAR needs to be strengthened with some electronics engineers under Venkatachary.

NOTES ON

ROLE

OF

ISRO COUNCIL

22 June '76

They had a quarrel in the tram again.
Oblivious of the crowd, they let off steam.
But I, I frankly envied them
As, deeply stirred, I watched the scene.

It's best that they have no misgivings
And do not know how fortunate they are.
To think that both of them are living
And can still work their troubles out!

- - Margarita Aligher
(A Soviet poetess)

ROLE OF ISRO COUNCIL

- * Chairman posed this question recently. Some frank analysis is given below.
- * The current functioning of ISRO Council is for:

Time

- 70% - Administrative matters like norms, overtime, promotion etc.
- 15% - Clearance of Annual Budget, mid-term reviews etc.
- 15% - Clearance of Project Reports for Space Commission etc.

- * So far ISRO Council has not been the initiator of any Programme Analysis, Major reviews etc.

Reasons:

- i) Fire-fighting mode.
- ii) HQ Inputs being dominated by Messrs Vellodi & Seshan.
- iii) Chairman, ISRO is much more activist in the programmatic sense and he uses other forums for action/decision.

.....more

IS ISRO COUNCIL NEEDED?

This is rather answered by the table below:

ADVANTAGES	DISADVANTAGES
<p>1 Reinforces the <u>participative</u> management system of ISRO, by bringing Centre Directors (and views) to the "top" policy body of ISRO. <u>Even if it were empty of content the form is reassuring to the Centres.</u></p>	<p>1 Unnecessary paper work and wastage of time for <u>at least 50%</u> of ISRO Council activities.</p>
<p>2 If ISRO Council is <u>abolished</u> there is no top level body in ISRO which Chairman can consult.</p>	<p>2 If in reality, it <u>does not</u> give programmatic direction for <u>ISRO programmes</u>, then slowly <u>cynicism and ridicule</u> may build up (about the Council <u>and</u> against it)</p>
<p>3 ISRO Council acts as a sufficient <u>brake mechanism</u> ^{preventing} for Chairman, ISRO and HQ <u>rushing into decisions</u>. Such brakes <u>sometimes</u> have positive elements.</p>	<p>3 The proliferation of Satellite Programme Council, etc <u>may erode the programmatic content</u> of ISRO Council.</p>

.....more

* From the above Chairman can get a picture of ISRO Council. As it stands today, it does very little for Programme Direction or overview. If by formation of Programme Office, the Programme Direction forces are strengthened, then it is essential that ISRO Council gets feedback and feed-forward from these offices for programme elements. Otherwise ISRO Council will really become a rubber stamp forum (for programme elements.).

* Please see the chart of possible HQ structure (in the last page of this write-up).

One would see that in such a structure, ISRO Council still has an integrative role of the three major elements:

- Programme content;
- Budget & Management Matters; and
- Governmental and International implications.

But will it do the integration? OR is it still left to Chairman, ISRO more so as the Head of the Programme Directorate.

Earlier at least one could hypothesize that Scientific Secretary was the Head of Programme Directorate. But in reality (more so with Chairman, ISRO in the same building), this will not take place (with any Scientific Secretary). The fact to be borne in mind is that ISRO HQ will remain a staff to Chairman, ISRO and in this sense SPAG, Programme Directorate etc raise a question mark on the role of ISRO Council and Chairman, ISRO in all meetings with HQ staff and Mr Y S Das happens to take an integrated look and do the work of ISRO Council.

D O U B T S

Another thing not clear is Chairman's idea about Programme Directorate. If it is thought as a Board with all the "Chiefs" and Managers, then it will be a dog-and-pony show because formal meetings once a month do not achieve much and can do some post-mortem. This means the real actions will be taken by the "Chiefs" by consulting Chairman directly, when necessary on day-to-day basis. So, do we need to proliferate a Board of Programme Directorate? We may first call it an office and Prof Dhawan can be the Head of the office. (Period)

.....more

OPTIONS FOR ISRO COUNCIL

The form of ISRO Council is very important conceptually for participative management though its content is not substantial. Form cannot survive long without contents. Therefore my recommendation is not to destroy the form but to enhance the content sufficiently (just) to maintain the form. Even with possible reorganisation of ISRO HQ into offices the integrated overview of three elements:

- Programme direction,
- Budgetary & Management elements,
- International and Interagencies affaires

are to be done by ISRO Council.

.....more

OPTION 1

- * In view of possible reorganisation give SPAG, Convenor (or Chief) the role of integration of the three components to periodically report to ISRO Council. (Abolish Scientific Secretary's post; in fact, even Member Secy, (Finance)). Mr Y S Das can still hold a position in ISRO as the Head of Management and Budget, and International and Interagencies Affairs. (See the chart in the last page).

- * To strengthen formation such integrated view form a small standing committee of SPAG, Convenor, Head of PPEG of each Centre (SHAR and ISSP should not be forgotten), which chews the material sent by SPAG Convenor, 15 days in advance to report to ISRO Council. This will form a participation by Centres de facto through Directors de jure are supposed to do the homework.

.....more

OPTION 2

- * Since SPAG Convenor, normally working out much greater details, this overview element can still be left to Scientific Secretary and Member Secretary (Finance), who can work on a higher level of aggregation.

- * Still a formal meeting of Scientific Secretary, Member Secy (Finance) + Centre PPEGs is strongly advocated.

- * The "lower" committee work and views would be reported to ISRO Council by the Scientific Secretary and Member Secretary (Finance) respectively. Really the renaming of these persons can be:

Secretary (Programmes), ISRO

Secretary (Finance & Administration), ISRO

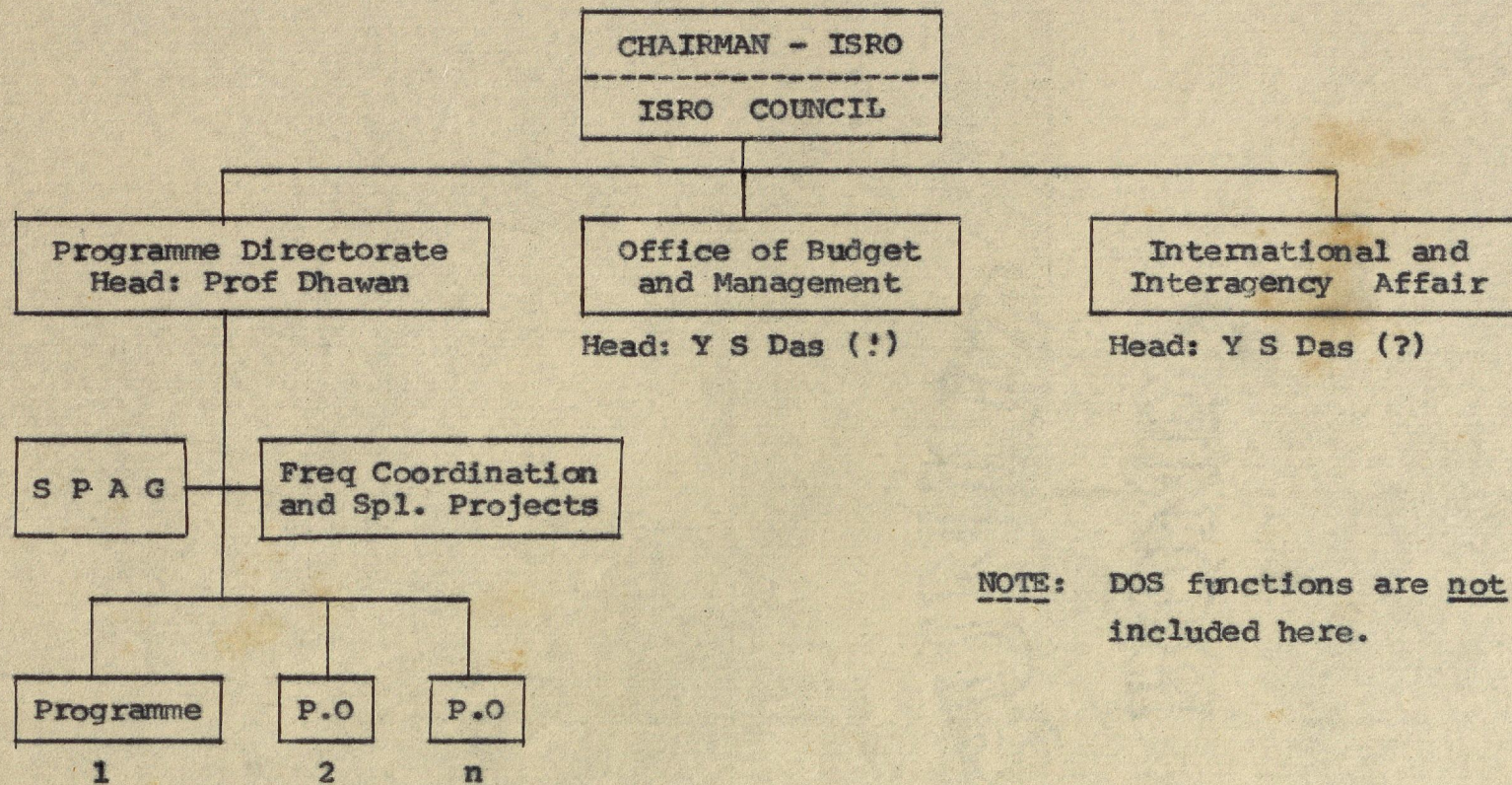
.....more

C O N C L U S I O N

Chairman can do something in between the two options or something entirely new.

But the essential point to be stressed is the importance of ISRO Council, which in its very form ensures psychological aspects of participative management (from Centres). The only need is to provide some content to it so that the form can be maintained for long.

.....more



NOTE: DOS functions are not included here.

POSSIBLE ORGANISATION CHART OF ISRO HEADQUARTERS.