

(801)

was not just a bookish knowledge or
a result of ~~sitting~~ contemplation by
a single person (that is me).
I had the benefit of discussions
with some persons in ISRO especially
Chandra, Sudarshan; ~~and~~ and for
national S&T policies etc with VS (though
often we differed in the way things
had to be executed: he was for a
top-down - heavy - policy driven
approach; highly centralised)

P. N. Jayaraman, a new inductee
to ISRO headquarters but an
old hand of ISRO who had
joined TERLS when Kalam &
Aravamudan were taking care
of launches. Though not very
articulate & was an excellent
engineer with in-depth

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practical knowledge of all ~~late~~ tracking systems; he had worked with COTAC radar in TERLS.

Was helping KV Venkatachary of ISTRAC. ~~As~~ I had ~~not~~ a

strong practical experience in radar, telemetry, tracking etc.

After PNT's coming I could have many of those regular monitoring work for SHAR, tracking system etc to him.

In addition, I was given the opportunity to visit a number of European Space Organisations such as NIVR of Netherlands (where ANS — Astronomical Netherlands Satellite ~~is~~ was being built, an excellent Infra Red Astronomy Satellite

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of those years, revolutionising
infrared astronomy and contributing
to lot of knowledge to the birth
and death of ~~start~~ stars. Just
100kg, but packed with excellent
payloads, very good three axis
stabilisation and pointing systems.

On defence front ~~at~~ the
knowledge was mainly through
USA documents: NASA, GAO,
and US Congressional records.
Ariachon Week & Space Technology ^(AWST) plus
other ~~the~~ Space related newsletters
we received (some of them weekly),
not just journals, but lots of
current happenings.

In addition PPK was a member of
involved in a Defence Committee to
define Surveillance satellites (1975)

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I was a member of Defence
Communication Satellite Study team
headed by Dr E. Bhagiratha Rao
Director ITRPU (Himalayan ~~Range~~
Radio Propagation Unit — now
DEAL & — Defence Electronics
Applications Laboratory.). It was
an illuminating experience of
working back from ~~the~~ user
requirements. I could also see
how ignorant users were (though
some of them knew electronics
communication). They had
unusual expectations ~~just~~
from a Satellite — ~~a~~ Generals
being able to access all
Jawans directly and have
two way communications!

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We had to calculate the satellite transponder capacity required for it! It ~~the~~ would go to several thousands of transponders! Satellite weighing several tonnes! Then they realised their "folly". We had to ask: "Don't you have a hierarchy in terms of conversation even in normal times?" A number of such interactions to come to realistic sizing of a first generation communication satellite for army. Dr. Bhagiratha Rao piloted the study very well. I had good part to play, as I had the benefit of ~~the~~ ^{active} participation

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in ISRO-MIT studies, ATS-F satellite, many internal studies for INSAT, ~~etc~~ etc. I knew the state-of-art of available satellite systems, cost aspects etc.

None of these ~~studies~~ two studies took off beyond reports.

I was well aware of the emerging scenario of USA's and USSR's use of space for surveillance, communication, = how Israel won ^{the Six Day War (1967) and later Yom Kippur ~~war~~ War (1973)}

(~~1967 or 1969~~) with the data surveillance data or information given by USA to them, some thing the Arab Side did not have. And also the use of Space Communication for Vietnam war. I had seen

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during my NASA days how much
Phileo-Ford (the supplier of transponders
for ATS-F satellite) was involved
in active defence communication satellite.
Though we would not be allowed
inside, I could guess from the
size of the buildings, the magnitude
of operations.

As my inner desire
~~to~~ (triggered very early by
Bharathi & Vivekananda)
was to see India become great.
~~It~~ It needed these systems if
it was to be powerful among the
community of nations.

~~Similar~~ That is why
I integrated that requirements
into the space activities presented to

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SD. SD did not want get enmeshed into the Defence needs or even DRDO 'projects'. He was aware of the messiness of the system. Also he was concerned about the 'denial regime' which was operating. We were dependent on USA for many items starting from electronic components, to space materials, test equipment etc. ~~He was~~ He did not want to be caught in doing military related work: he emphasises in public forums (he actually spoke or wrote ~~the~~ very little) about the peaceful nature of ISRO's programme.

But he did give basic

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awareness, knowledge to defence forces, when asked for. More about it as ~~sp~~ separate items for corresponding decisions.

~~As~~ I am ^{@2010-omran's} sad that it had taken a long time for Defence Ministry ~~to get in~~ and the forces to get to use Space after China has mastered many of these as operational systems.

~~It~~ Worse still is that ISRO had neglected tracking systems, which were much easier to build. They were limited just to the needs of the satellite / launch vehicle projects. ~~Once~~ Once over, that ^{was} left out.

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I found it was so, even after 2010 when I started my work for ISRO Strategy Group (ISG).

The attitude of "Big Brothers" of VSSC, ISAC, and next level SAC, totally

~~was~~ ignored (still ignoring @ 2017)

the role of ISTRAC) I had recorded it in ISG report.

So when DRDO talks of BMD systems now starting ~~to~~ more actively in @ 2010 onwards, they ~~will do~~ concentrate on missile systems (supersonic, etc) — but how will they detect

(811)

when the missiles start from the enemy territory. The integrator look from Earth Observing Satellites and ground tracking systems is very much missing, even now! S. Chandrasekhar

(Chandra) who is now with NIAS in his seminal research book Space, War, Security @2015 identifies ~~our~~ lack of systems for "Space Situational Awareness" — simply put, tracking of space ~~at~~ objects through space and terrestrial means — as one of the crucial weakness of India.

As for the National SETI related work was concerned, SD did not want to lose himself

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in the power-games played by
omniscient "sweatist-administrators"
in Delhi — especially ^{then} the leader
of this para-centre was M.G.K. Menon.
More about it later.

But for initiation of indigenous
producing space-quality - hi-tech
components many efforts were done by
ISRO. SD raised it with MGK
who was Electronics Chief! Nothing
materialised! It is still a
weak point for ISRO, whereas
China has now ~~work a~~ capability
for many of them @ 2015 or even
earlier.

Well ~~at~~ in 1976 for
one to revise these points was
crucial. Only person I could

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raise and request action was SD.
But how much he alone do
in the national scene when all
those who ought to work on them
or towards them, were ~~the~~ busy
with their own immediate issues
and in parva games.

So out of all ¹¹ items
I had put in my note, SD
had moved on almost all
points which sharply focus
on ISRO and were under the
control of ISRO.

I don't claim that
it was because of my note!
I am happy that I could
see them and articulate them!

(814)

That note was just a drop in the might action-ground of ISRO, before me. Such notes give me a focus or relevance of my own work...

There were hundreds of other detailed work which immerses me in action; and gave me strength within ISRO also. But there were occasions in which I had to bring even some technical details to SD because of the inter-centre conflicts, inter-personal conflicts etc being escalated as big programme issues. But they would have long term effect on ISRO's future programmes.

(815)

One such item was piggy back payload for SEO (the satellite after Aryabhata) Data Collection Platforms (DCP) were being experimented around the world as ^{joint} supplements of Remote Sensing Satellites, Meteorology etc.

In fact much more for meteorology. Hence etc. There was a possibility of putting a small DCP transponder on board SEO. There were severe space and onboard power constraints.

Dr. T. A. Hariharan, ^(TAH) who was an excellent ~~meteorologist~~ meteorologist.

He was working in USA when he was invited by Prof. Pisharoty / Vikram Sarabhai to come to India to start remote sensing and meteorology work. He was too good a person and completely

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unfamiliar with the 'politics' of PRL, ISRO etc. When people talk nonsense in some reviews he won't know how to shut them up. Instead he would keep quiet.

With consolidation of SAE under YP, TAAH was sidelined, as YP wanted to bring up his former TIFR 'colleagues' D. S. Kamat and George Joseph and sidelined ~~the~~ ~~TAAH~~ TAAH to meteorology.

Since DCP was a good supplement for meteorology, TAAH was taking care of ~~the~~ possible DCP payload for ~~the~~ SAC para politics ~~made~~ took it away from him and PPK (who ~~did~~ was ~~not~~ ~~have~~ waiting for INSAT to come)

(817)

was given that responsibility. YP
was boosting him. ~~Also~~ Also he can
trouble URRas - recall my
earlier notes on the politics of SAC
to capture SEO project; ~~now~~ That did
not succeed. At least let URR
have some tough time! So PPK
was the man;

Another funny attempt
from ISRO HQ (JPS) was to
capture a DCP as it was "communication"
— he wanted to be communication
czar! So ~~he~~^{JPS} would encourage PPK
through ~~both~~ ~~DSK~~ them were fighting
for the terrain / turf for INSAT.

DS Kamdar was ~~elder~~ an
elder person — worked with
JBS Haldane. He was reasonable

(8/8)

and did not want to reduce
their issues as SAC vs ISAC!

SAMIR \Rightarrow (Satellite Microwave

Radio meter) was handle by

O.P.N. Calla who was not ~~ag~~ the
favourite of YP. TV Camera

& SAMIR were primary ~~for~~ payloads
and DCP etc were possible piggy-back
payload if space, weight and
power were available.

But PPK mode was that
if some thing is given to him ^{that}
becomes the primary!

~~It is~~ ISRO had gone
through such types of problems.
In VSSC, BP took care of them and
did not encourage prima donnas
nor ~~the~~ fights with other Centres.

(819)

YP was not that way. Also he wanted to take it easy and did not want to spend his time in understanding the details and direct activities/ aspirations for a common ISRO goal.

It is in this context my note to SD had to be viewed.

I had to ~~do~~ do several such items for ISRO through out my stay in ISRO HQ when SD was Chairman ISRO. It was also emerging ISRO with small number of projects, ~~to~~ tight budget and therefore "fish 5" was intense.

My note continues on next page.

D&L - 820-821

INDIAN SPACE RESEARCH ORGANISATION

HEADQUARTERS

MEMORANDUM

STRICTLY CONFIDENTIAL

For : Prof. S. Dhawan,
Chairman, ISRO.

File / Ref: II.9 (76)

From : Y.S. Rajan,
ISRO HQ.

Date: 25 Sept 1976

Subject: Data Collection Platforms - Piggyback experiment for SEO.

- 1.0 I wish to bring to your notice, some information on this subject while the skirmishes are being tackled presently at the working level. But, however, it is sufficiently important that you should know the background about this so that bush fires do not spread into forest fires.
- 2.0 Since the transition of handling this piggyback experiment from Dr T A Hariharan to Mr Kale took place, there are many confusions which are being generated in this piggyback experiment. Mr Kale is thinking in terms of transmission of data once in 15 minutes, which is possible only with a geosynchronous data reception system. All orbiting satellite systems have to depend upon the data transmission for about 10-15 minutes spaced 5 to 6 hours in a day and nothing more. Hence the parameters to be measured should be appropriately chosen so that they will have relevance. This is something which happens with any orbiting data collection satellite.
- 3.0 As I have earlier passed on notes to you, from the minutes of SAC meeting with IMD or from the Project report, it is not clear, as to which parameters of relevance are going to be measured - say, with a limitation of measurement once in six hours etc. Without this in mind, Mr Kale seems to be thinking of adding memories into the ground system, which will enhance the cost and also most importantly, will make the system non-standard. After all, our understanding is that the DCP system on SEO is a piggyback and it will just experimentally prove the system. The present "mission definition for DCP" in the sense of utilisation does not seem to be tied up with the mission of SEO and tends to become an independent mission in itself. Mr Kamat has spoken on this at the SEO Management Board meeting in clear cut terms, stating that there should be no compromise in the existing TV payload SAMIR combinations from any piggyback or otherwise.

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: 2 :

- 4.0 Besides the above confusions unleashed, there are other problems, in terms of hardware management for SEO. Though the power budget is well under control, in view of the margins various subsystem engineers keep for themselves including the TV camera engineer, the Spacecraft Management would like to play safe about committing the operational hours for DCP at least till the engineering model is actually integrated and the total power profile realistically verified. (This is the normal practice of NASA also). Though DCP-specific-receiver itself consumes only 300 milliwatts, the total transponder specifically dedicated for the DCP and tracking would consume about 6 watts which means about 1 watt continuous because of the duty cycle (i.e. if DCP works only over India then the time of operation is only 1/6 of the orbital time; so the duty cycle is about 1/6). If the current margins built in into the actual systems prove to be real in the engineering model, then one could easily accommodate the peak power for DCP during all the passes over India. For example: Telemetry which will be about 1.4 watts nominal specified, consumes only 1.2 watts now and so on. This is something on which the spacecraft team has to be conservative now in terms of mission planning. They are giving utmost priority to the TV and microwave radiometer and only secondary importance to others. Hence the DCP may not have, all the four passes over India; may be one or two initially. Also, chances are that once the TV camera starts taking many pictures because of data handling or because of non-interesting phenomenon one may have to switch off the TV camera during the day also. Hence the DCP could be very easily on during that time. These are the various options which would be kept open for some time.
- 5.0 The reason for my bringing out all these points in way of explanation is to briefly appraise you of some of the skirmishes. (I have discussed with Ravi some details but I am not sure whether he would approach or tackle the problem realistically). Normally I would not have brought this to your notice because these things should have to be solved at the working level. Also the question of funding the ground system exists. Since the propensities of the persons involved will tend to escalate the problem, I am just briefing you on the above so that you could have appropriate background to take decisions whenever needed.

Regards.

820

(822)

821
DCP
25 Sep 1976
MFE

Politics in ISRO HQ starts peaking mainly because of JPS. He would have been jealous because SD made me ASS. ~~It would~~ It would have been impossible for him to take up the role: ~~due~~ firstly because acceptance in ISRO Centre ~~was~~ would be difficult; only two years ago SAC had a major ~~stroke~~ due to his induction at a higher level (breaking ISRO norms). He tries to get SAC acceptance by joining SAC to siding with SAC to back up URR's satellite projects.

Within ISRO HQ he tries to use key words like Communications to capture APPLE, then ESA because there was an ESA interface etc etc. He wanted to chalk out an independent

(823)

unit within HQ where he wants
to be the admin/program head.

Without mentioning his name
I had written a note in
26/9/76, ~~I~~ handwritten, titled
"Problems of working within ISRO HQ"

Starts as: "There are some
problems of human interface,
some jealousies etc which
occasionally ~~surf~~ surface
~~within~~ within the Headquarters..."

It is about three pages. In
the end I ~~wrote~~ have written:

"Unlike my usual
notes, this note to you is in
a couched language and is
roundabout. I have personally

(824)

been pained to see one or two
incidents within HR's hence
I wanted to write to you.. But
I did not want to quote
instances or interpret events...

" My main intent is to
draw your attention to the problem,
so that in some form you can
solve it "

This was a pain which
remained within HR not just
for me but some other younger
scientists too: why SD tolerates
such a bad behaviour of JPS

Remained a mystery! (My handwritten
note dt 26/9/76 appear in next pages 824(a) & b
as summary ~~Almost on the~~

⊕ ~~see next pgs~~ On the same day
I had also sent a note 26/9/76

To: Prof. S. Dhawan

824(a)

From: Y. S. Rajan

26/9/76 → (X)

Sub: Problems of working within ISRO HQ

There are some problems of human interface, some jealousies etc which occasionally surface within the Headquarters. One cannot shy away from this, but I had only wished these would not arise at this stage of development, because the only strength of HQ is the cohesiveness, (something like a laser beam).

Not that there are immediate dangers of collapse, but I feel it is time Chairman knows that problems do occasionally surface. [You may know already; I wish to say this to you, though with a bit of heavy heart.]

Even information handling, which is what the main job of HQ is, needs some organisation, — some line function. But it is very difficult to express them in a few key words, which is what a formal organisation chart does. These

(3)

824(b)

Unlike ~~the~~ ~~my~~ my usual notes, this note to you is in a couched language and is roundabout. I have personally been pained to ~~see~~ see one or two incidents within HR; hence I wanted to write to you. But I did not want to quote instances or interpret events.

My main intent is to draw your attention to the problem, so that in some form you can solve it. Whereas it is important to define some focal points, let tolerance prevail; also the interpretations of key words should be reasonable and not all encompassing.

Probably some discussions on this may be needed.

Rajan.

25/9/76

(825)

to SD reminding actions on
"Some important action items
for Oct - Nov 76".

It was a pick up from my
earlier notes.

Highlights are Finalising
APPLE Management, future
of ISSP which was not just a
single project but not a Centre,

Again this is an
important paper highlighting
programmatic & organisational
issues. Tells about specific persons.
~~At~~ Potential problems for SLV-3
in QA front etc

This is attached as
a running text to this.

(826)

YSR / 26.9.76

To : Prof. S. Dhawan

From : Y. S. Rajan

STRICTLY CONFIDENTIAL

Sub : Some important action items for
Oct - Nov 76

From the knowledge of items (as I ~~have~~ know), and from my own perception of priorities I am listing below some action points which Chairman, ISRO may consider completing.

(1) I understand that you have already initiated action to extend Dr. BP's term; hence that pressure is lower now. Still it is better to complete any follow up that is needed. This is the most important item.

(2) Finalising APPLE Management, Satellite related activities management, (whether to move ISSP to a Centre), definition of its role etc. If things are delayed further it will distort relations between various persons who in any way will be involved in final execution like (P.T.O)

(8272) Rangan,
Prof URR, RMV, / Seniors in ISSP, VSSC,
SSD, ^{SAC} etc. And ISRO does not have
maturity to defuse these issues. In
case Chairman decides to make P. J. U. R.
a Centre Director, it is better and
useful, if Chairman spends has a
few sessions with him and give fairly
^{detailed} guidelines as to how he should
function.

(3) Tied up with the above, is
the decision on the location of Thermovac
(3 m), some other satellite-related
facilities for APPLE. If Chairman
decides that Bangalore should be the
main focal point of Satellite Fabrication
& Integration, it may be better to
locate them at Bangalore — to minimise
future management problems.

(4) Now coming to SLV-3, which
is the most important ISRO project now,
and for another 2-3 years, the Test & Evaluation
and QAD activities for this project and in
a sense for whole of VSSC need tightening up

(Contd)

(3) (Q 28)

Presently QAD of VSSC is a social and intellectual scum of VSSC — sorry to use such a strong word. Without moving out the persons working in QAD presently or neutralising them, ~~it~~ nothing concrete can be done. This is a human problem of Mr. Mathur and his staff. (many of them senior engineers — but rejects from the mainstream of ISRO.)

But this is a problem from which Chairman & Dr. B.P. cannot ^{afford to} shy away any more.

It is very essential to find some strong man for QAD and a few lieutenants for Aravamudan to handle SLV-3 & Kalam, towards the good of ISRO.

(5) The above task and also the task of strengthening ISTRAC (K.V. Venkatachary) there have to be some large scale redeployment of middle-managerial level people (senior SD and above) within ISRO. For ISTRAC Jayaraman has worked out a list in consultation with K.V. Venkatachary. I feel Chairman, ISRO should effect such deployment

P.T.O

(829) (4)

within next three months for ISTRAC
and QAD, VSSE.

(6) Strengthening of PPEG, VSSE which
is tending to be docile: An alternate
would be to have a full-time
Dy. Director, VSSE. Probably easier
solution is to make PPEG strong.

But this action is ^{needed} urgently for the
sake of SLV-3. I am convinced
that SLV-3 ^{Project} cannot control or systematise
its actions, from within. Only external
systeming seems to work for ISRO.

(7) On the SAC side, if microwave
remote sensing program does not
start now ^{ISRO} ~~the~~ will have a dip in
our programmes in two years from now.
— a danger of programmatic recession.
Despite SAC's "personnel and personal"
problems, action has to be started, if
necessary by high level intervention
of Chairman, ISRO. One prudent
method would be not to put all

(5) (830)

eggs in the SAC basket. To start with, VSSC (Kulkarni & Dan) and SAC, can start on slightly overlapping microwave sensor development / programmes (with System management from SAC) and slowly spread to TIFR or DLRL.

But whatever be the fine microwave sensor development structure, the / programme has to be started within the next 3 months.

Can we? Yes, we can.

(8) NRSA- ISRO interface. We are soon taking action.

(9) Service Chiefs — we will do on return.

(10) Since ISRO needs its present Chairman more and more, it is important that Chairman starts identifying (if necessary inducting) better ^(senior) / line executives at the Centres. Some exemplary punishments for certain persons are needed; so also selective boosting. Chairman should be thinking of these clearly to take some action within the next six months.

Raj

26/9/76

826

827

828

829

830

(831)

YSR/27
26/9/76
same prob

I found in the small collection returned by Pgs D a remarkable paper marked SECRET dated 26/9/76 and three page handwritten. It is about "Establishment of a viable science and technological base in India". It is a deep concern about the ~~ad~~ ad hocism ~~pre~~ prevalent in programmes of Atomic energy etc. ... I am raising the question of how these are enmeshed into country's infrastructure and which are strategic. ... The technology denial had been noticed & addressed.

Solution for Secretary DOS. etc
I have raised it at Govt level; not Chairman ISRO... As I note SD & I had discussed ^{the issues} ~~it~~ couple of times...
Hence my note...
Action not clear... I understand SD would not have succeeded either! Note is attached next as running text.

SECRET

YSR/26.9.76

(832)

Sub: Establishment of a viable science,
and technological base in India

Without getting into the questions of relevance or appropriate technology, let us, for the moment, assume that all the science and technology plans — Atomic energy, electronics, Space etc — are relevant for the country. But, today, on a departmental basis, they are more run in a cost- and schedule- optimum mode of private companies, despite Planning Commission etc.

To elaborate, each department optimises its programmes in terms of cost of and schedules, (assuming relevance is clearly established, which is a secondary matter for the greater question I ~~am~~ ^{am addressing} ~~not~~ ~~addressing~~).

Then (i) how these ~~or~~ various programmes are enmeshed into country's infrastructure, (ii) which are strategic (either in terms of

P.T.O

(Contd)

System criticality, or large scale consumption) etc are not established ~~and~~ ^{nor} identified as a Plan. Skirmishes about Fluorolabe, IR Films, or Vibration table are the symptoms we cannot afford to neglect.

Our profiles for ~~the~~ SLV-variants, INSAT-2, remote sensing satellites etc could become paper-dreams due to system critical items being blocked. ~~or~~ ^{without} For example, fine photographic films, computers etc a Remote Sensing Satellite System is useless for the country & so on.

We have spoken on this matter once or twice. But it is no longer something that should be thought about.

Urgent, immediate actions are called for — to preserve the future of the country.

After having set a consumption pattern — be it a satellite use, or a computer — it is difficult for a country to go back. Hence steps are to be taken simultaneously or well in advance to protect the

Country's science & technology base from outside pressures.

I strongly recommend that Secretary, DOS gets with him Secretary, DAE, Chairman, Electronics Commission, and Secretary, DST and approach P.M. A small high level scientific body under a good scientist (manager) is to be set up with a good analysis group. One should keep, paranoids away from these analysis or decision making; so also over-enthusiasts who want everything indigenous should be avoided.

Could this Group be headed by Prof. Narasimha? Within ISRO I am not able to look ^{spot} for a person.

Within about six months such a high level committee should be set up, with a clear mandate for co-ordination. Let it not be in a DOE mode. Prima donnas or paranoids will defeat the purpose by making it another License Office.

Prof. S. Dhawan

Rajan

26/9/76

832
833
834
Secret
2/19/76

~~83~~ (835)

There is a handwritten dated
25/11/76 sub: SHAR Centre — a solution
for.

Before addressing it, it
is good to note what had happened
for SHAR right from the time of
VAS.

launch
Sriharikota as a range
was identified when VAS was alive. A
huge island about 36,000 acres of
land. Some ~~to~~ forest tribes were
there called Bradi. They were resettled
and the State Govt fully paid and they
were given land near Sulummeta
(nearby town) to till and live. ~~with~~
~~the~~ ISRO did not have to do
legally nothing thereafter. As was
the pattern in rest of India, State ~~Govt~~
Govts wash off their hands after
that; legally right. So is Centre. But the
rapacious elements, often rich or

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powerful or both together and with their hangers - on entice the tribal leaders and ~~to~~ use the very same legal / constitutional processes through the so-called "neutral" administrative system (District Collector, tahshildar etc) to grab the land from them. The tribal leaders are given the loans at very high rates - often the tribes don't understand the meaning of the whole process ~~of~~ of monetary transactions. Then ~~the~~ in the context of their inability to pay back, the collateral lands are purchased and loans written off! They become landless labour, on jobs they are unfamiliar. The State never bothered to skill them.

~~Then~~ It was much later SD found a solution for Yenadi tribes - making them forest labourers

Thank you very much sir.

With Regards,
B. Vijaya Lakshmi
Asst Prof, Department of IT
BVRIT Hyderabad.
Mobile : 08008001943
[Quoted text hidden]

(837)
within SHAR; there was a school; they had some health facilities. Over a period they transformed themselves. A young Yevadi girl holding her sibling on her hip, was a sought after photo in ISRO - I find now photos they have disappeared @ 2010.

This is a miniscule side story. I was also partly involved in Yevadi tribe rehabilitation, some social science research by Binod Agarwal et. SD was the main person with ~~FAS~~ ~~Dept~~ Dept of Space officers helping to find administrative/financial solutions.

Coming now to the main ISRO drama there, as was the practice of VAS each of the important projects to be located

(838)

in Sriharikota, ~~SHAR~~ were

SHAR Projects:

SPROB: Solid Propellant

Rocket Booster Plant

Project Mgr: Dr. V.R. Gowarikar

STEX: Static Test ~~Facility~~ ^{Experimental}

Facilities

Dr. A. E. Muthunayagan

SLED: Rocket SLED facilities

~~(SLED?)~~

A special rail track
to achieve rocket level
accelerations

Dr. Y. J. Rao

~~SCF: Sriharikota Common F~~

SLC: SHAR Launch Complex
Dr. Y. J. Rao

SCF: Sriharikota Common
Facilities

Dr. Y. J. Rao

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9. Prof. M. H. Dhananjaya, Director (Technical), JSS Technical Institutions Campus, Manasagangothri, Mysore-570 006.
10. Prof. S. P. Manjunath, Secretary, General Management Division JSS Mahavidyapeetha, Mysore.
11. Dr. B. Nandlal, Principal, JSS Dental College and Hospital, Mysore.
12. Office copy.

✓ Maybe the titling of the division may have some variations. But essentially the three named persons were ruling the roost in bringing up the facilities — I should add very well. R. D. John the Chief Engineer of ISRO/DOS had a great role in civil construction needed for that place with many technical challenges.

YJR naturally had a greater role as he controlled the common facilities including administration & finance. He spent more time in the Island & Madras (got a ~~non~~ simple and wonderful Guest House in Poes Garden in Madras) It was a class! VRR & AEM were mostly in Trivandrum and coming to the Island for reviews; their

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able lieutenant was resident in Sriharikota, which had good guest houses and an emerging good hospital and school.

The usual para - control conflicts entered more vehemently from the "ISRO culture"! The conflicts were well known in the ISRO community. Our joke was that the trio in Sriharikota were Chera, Chola & Pandiya kings from early Tamil Nadu, constantly fighting each other, but building some great monuments.

Over a period YJR, ~~since~~ ^{since} he had to ^[the responsibility] bring up the white of Sriharikota & with SCF, ~~had~~ ^{to} became more powerful.

Since the other two would gang up to give YJR trouble and blockages

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he had also become autocratic,
If he were not one, ~~it~~ most probably
SHAR Range would not have developed
that fast to support launch vehicle
projects of ISRO & tracking. He
also had ^{Jan} efficient coterie around
him. One such person was a lady.
That also made ~~it~~ the ISRO fellows
wag their tongues! ...

~~The~~ The whole of Sriharikota
projects came under VSSC after
& VAS's death, and was overseen
by a Board called SHAR Board
BSP was the Chairman.

VRG very cleverly hooked
VS (Sid) ~~to~~ as he was the focal
point in ISRO for L/V programmes and
used to attend SHAR Board meetings

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to form a Committee to ~~eg~~ enquire into the allegations against Dr. Y. J. Rao. ~~He~~ VS ~~cannot~~ go could not go along with AEM well. VRA used his British ~~and~~ style to charm VS.

* Finally a Committee was formed with Wg. Cdr. K. R. Rao (retd) as the Chair. VS was a member.

~~He~~ Wg. Cdr. was a strict and austere man ^{— a person who had achieved for ISRO.} Thrown out of SAC para politics, he was in ISRO HR languishing without any work. He had gone into meticulous details, with info from VRA, AEM and other camps.

Only thing I know about that report (I was not inquisitive — if I wanted I could have got a

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copy and read) is what BP told me. For one of SHAR Board ~~an~~ meetings, he told me to come though I was not a member. ~~He~~ I did not go attend the meeting.

After the meeting was over BP wanted me to come out for a walk; during the walk BP told me: "I wish I had not agreed to ~~form~~ form this gutter committee!" Strong word from him. That report was considered in the meety.

Then we walked, talked about other meetings matter.

I did not want to ask what happened. SD & BP

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could have taken a decision on YJR, future of SHAR without Board etc. The Committee report, which I am sure, would have been ^{seen} ~~many~~ ~~per~~ persons properly, and through rumour and exaggeration did not leave good taste, any where. That is what BP would have meant by the word "gutter committee".

As follow up action Mr. Kanwal (who was Dy Secretary DOS in Delhi) was brought as Controller SHAR to deal with Admin/financial/personnel matters. It was as if to remove the "fangs"

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YJR — make him like
VRG, or AEM dealing
mainly technical matter.

It would become them a
rule by a junior ^{level} Administrator
using divide-and-rule
techniques.

My note to SD was
in that interim period.

Which is attached in the
next page, as a continuous
text.

See attached next
page

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849

26/11/76

To be opened by the
addressee

(846)

To: Prof. S. Dhawan

From: Y. S. Rajan.

Sub: SHAR Centre — a solution for

While I am thrilled seeing ⁽ⁱ⁾APPLE getting projectised, ⁽ⁱⁱ⁾INSAT round the corner, and ⁽ⁱⁱⁱ⁾SLV - variants getting some clarity [all leading in the right direction of achieving our dreams], there are some problems about ISRO that gnaw my mind: One such immediate problem is SHAR Centre.

To be frank, the reorganisation of SHAR Centre has failed to achieve the goals. Mr. Kanwal (to a great extent pumped by the new minions Gopalakrishnan and IFA), the not-so-mature Jeyamani, Mazumdar etc have complicated the situation. Dr. Y. J. Rao is perhaps not capable of raising above pettiness. Today SHAR stinks!

So what do we do? SHAR is very important for entire ISRO's

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Page 2

launch support, tracking etc. NO LONGER ANY INTERIM ARRANGEMENTS WILL WORK FOR SHAR. IT NEEDS A FULL-TIME DIRECTOR WHO CAN TAKE CHARGE.

For a change, I think I have a solution, after a good deal of thinking. Mr. Aravamudan cannot make a Director now as he is slow and adopts laissez-faire approach. What we need for SHAR is an active, ^{yet} mature person. Since Col. PANT will be needed for SAC, I think the next best choice is: DR. S. C. GUPTA. He can be moved as Director, SHAR Centre.

I should caution against the damage that will be done if a person is ~~to~~ tried in a 'Trishanku' mode as a Project Director, with double reportings.

Salient features about Dr. Gupta for this job are :-

- (i) Good knowledge of electronics

- (ii) Good knowledge of launch vehicles and satellites — in an overall sense.
- (iii) Interest in details of civil construction etc which SHAR needs a lot.
- (iv) Not being a 'local man', could be far off from local politics.
- (v) Reasonably good administrative capability
- and (vi) To best of my knowledge above petty parochialism.

If he is moved what to do with Dr. Y.J. Rao etc are the question. Here are some suggestions:

- (i) Move Dr. Gupta as Director, SHAR
 - (ii) " Dr. Y.J. Rao as Director, System Reliability Group in VSSC
- Not much is happening there anyway!
- (iii) Move Mr. Aravamudan as Director, Avionics Group, VSSC in place of Dr. Gupta. (Dr. Kulkarni is junior to him anyway)

Page 4 (849)

(iv) Make Sudakar Range Director TERLS in addition to RSR Program Mgr. [National Combination room]

(iv) Move SPROB into the control of Mr. Kurup immediately to make the relationship of SPROB to SHAR healthy and not separatist.

(vi) If Jeyamani is not happy with Dr. Gupta, let him ^{be} moved to Propulsion Group sending some lesser individual to handle STEX.

In any case Variants will require a person. This is not an urgent

move, if Dr. Gupta is named as Director, SHAR. & He can tackle the situation.

(vi) Move out, M/s Gopalaratnam and Venkata Krishnan, of SHAR so that they don't pump the new Controller.

URGENT ACTIONS ARE REQUESTED
IF CHAIRMAN THINKS THESE WILL WORK.
I FEEL, CHAIRMAN SHOULD SETTLE
SHAR'S PROBLEMS BEFORE NEW YEAR'S
DAY (1977).

Rajan

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 25/11/76

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* * *

A ~~nat~~ Nature break about
 Sriharikota. One night at
 Sriharikota when walking post-dinner,
 a rare luxury as we get locked
 up in reviews etc, it was also
 I think a Amavasya day. ~~The~~

Normally electric supply in the Island
 was good. On that day while
 walking, the power failed. Total
 pitch dark. You look up!

What a gradeure of the southern
 sky. When I joined PRL

I had an opportunity to read
 about Astronomy. At one point

I had a desire to go to

Australia ~~to join the~~ to do PhD

and join the Australian

~~Nash~~ Astronomy Lab —

one that was famous then because

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because it could see the southern sky which had much more stars. (I forget the name of the Centre N.R. ... ?) But I myself was suffering from Asthma though it had started tapering ~~from~~ after I joined PRL and came to Ahmedabad. Another issue was how to take care of Periapappa & Peramma whom I had just managed to bring from Bombay. I should not leave them away to village or some where else.

From India it is not easy from Indian cities and towns it is difficult to see the southern skies. I had been in B'bay, Ahmedabad, Trivandrum and at 1976 in B'lore. All have diffused light at night, made worse by dust. Also Bombay, A'hd were up in Lahore.

Sriharikota had a vast land with little of dust & light pollution. I enjoyed that grandeur (only because the street lights had gone off and it was Amavasya day). It also instills a fear of due to its hugeness...

With the current advances in Space technology, ~~the~~ scientists do not necessarily need the spatial preferences.

Data all of over the world to pour in and huge computing machines, reconstruct them! All within 50 years of advent of Space Era. (P.T.O.)

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Still seeing Nature in its raw form without instruments of telescope etc with ordinary human eyes — be it a galaxy at pitch dark night, or a forest or ocean or mountains etc ~~is~~ causes in the human being (at least for me!) a great feeling ~~— all~~ — also a humbling feeling.

* * *

Then again my note — regular on actions by chairman. I think it had a frequency of a quarter of a year. This note is dated 26/11/76 — marked to be marked by the addressee.

It addresses a number of projects which were coming up and suffering due to lack of managerial decision. I had given a deadline of a month to complete —
(Copy Note attached in next 4 pages)
as continuous text of the same

(853)

To be opened by the addressee

To : Prof. S. Dhawan

From : Y. S. Rajan

Sub : Important tasks ahead

(1) Solve SHAR Centre problems.

Best solution is to name a Director. Separate note on the subject has been submitted to Chairman.

Suggested Date for Action : Before New Year's day
1977

(2) Support Engineers for Project Manager, ISTRAC. This is most immediate.

It is unfair to burden Venkatachary, so much. He has given a list to you. ISTRAC is crucial for SLV, SEO, Apple & INSAT.

Action : Immediate.

(3) Though Prof. U. R. Rao is going ahead with APPLE Project Report and procurement, the management plan cannot wait for long. The roles of Spacecraft Team, Application Team

(854) (2)

and SHAR (ISTRAC) team are to be defined soon and Key personnel identified. Will there be overall Project Director ~~and~~ or three different Proj. Directors for individual elements.

Action: Immediate

(4) Three weeks have past since ISAC has been formed. No management structure has emerged except ^{the} naming of the Chief Executive. You wanted to name SEO Proj. Director, RS-1 Project Director; and some Group Directors / Chairmen of Area etc. I think decisions on this should move fast. Please note that the action is on Chairman as per the Standing Order formulating ISAC. ~~Q~~ If actions are not taken fast, things may tend to move towards a single point and ~~some~~ there will be a general demoralisation of the

(3)

(855)

second level. Better to do it soon, though it has unpleasant elements like decision on Dr. Kosta etc

Action: By 15 Dec 1976.

(5) The meetings you arranged on SLV- variants were very informative, and productive. What next? The tempo of rational analysis you set up will now be lost, with one fellow worrying about site, etc.

I feel this is time to set up a standing Study Manager ^{with a small team} without any other major responsibility. Please note that this is not a Study Group where people meet once ~~or~~ a month & so on.

May be after pulling out Dr. Y. J. Rao from SHAR you can assign him the task. (Two ~~or~~ birds in a single shot). But formation of such a team is a must.

Action: January end (77)

[P.T.O]

(556) (4)

(6) Nearer home, Chairman ~~to~~ to settle the tasks of Ravi Sharma. Not only that he is unhappy, he introduces many perturbations in the system (in HQ and SAC). To focus him into an activity is important.

Action : By mid-January 77
(though sooner the better)

(7) Now that INSAT is picking ^{up}, let us keep the momentum. Chairman should form a standing team for this, dedicated. I see no way of decoupling ISAC completely from this. How to form a composite (and yet homogeneous) team from SAC and ISAC is the question. Who will be team leader(s)? How they will interact? Decision and formation of the team most urgent.

Action: Before end of Dec 1976.

← * →

Ravi
26/11/76

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26/11/76
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mtk

(857)

two

I found ~~a~~ notes dated
dated 22 June 1976 neatly
typed, with lots of spacing for
easy reading.

(1) Notes on possible reorganisation
and (2) Definition of activities of
ISRO Centres.

These notes would have been the culmination
of a large number discussions, I had with
Pras. Dhanwan; some of my thoughts told to
him, his answers which were rarely
direct. He would elaborate various issues
and sometimes "globalise" issues.

Was he afraid of opening up
as one has to be always lonely at the top?
Or that if he opened up told some
stark facts of ISRO, or ISRO persons or
about me itself, it might affect my
life, my ~~my~~ view of life or myself. He
may ~~have~~ have left things to
me to feel, think and live through life,
learn, unlearn etc. In any case
one remarkable freedom I had (I
was it? and I don't know whether
others had and was it) was to take on
bigger issues of ~~issues~~ ISRO, country
etc. I used to write poems, philosophy etc.

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* In these set of notes copying which would also be attached as running notes with the write-up I had touched upon some of the aspirational issues of ISRO engineers/scientists; and the functional hierarchies which were developing. I had compared them with NASA/ESA. One ~~big~~ problem facing ISRO was that all the work upto ~~pro~~ routine production and highly specialised "technician" type of work are all under one roof. ~~Other~~ The egalitarian slogan used in ISRO was that all engineers/scientists were equal. There is no junior or senior in ISRO. Only other divisions were Technical Staff (not qualified engineers ITI, Diploma ~~etc~~) or B.Sc for analysis ~~job~~ support etc) and Administrative Staff. For the last category, there was a review promotion without ~~country~~ considering vacancies. ~~But~~ After ISRO became govt also it was continues, all within the govt specified scales. But it was struck down by the Min of Finance. ISRO Admn. Staff had to follow the usual vacancy based promotion. Better

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performers can be partly recognised with Seniority - cum - Merit formulas, interviews etc. In 1976 the ISRO Admn Staff had just started accepting it. Since ISRO was going, along with the projects, we were building in ~~the~~ requirements of Admn. Staff also so that more vacancies ~~are~~ were created. So amongst the Admn. Staff, the seniority and strong functional pyramid was an accepted norm.

For the ~~the~~ Technical staff, there was a non-vacancy type, review promotion, with some fixed years between the grade ^{with tests being conducted for performance assessment} for consideration of promotion with ~~There used to be lots of fights between~~ Management & ~~The~~ Unions; negotiations etc. Some of them had been difficult too.

Coming now to Engineers/Scientists there were fixed norms for promotions, induction, ~~from~~ senior promotion etc. There were Screening Committees (based on Annual Confidential Reports - ACR's and recommendations of Heads of Division) and Promotion Committees (called Departmental PC - DPC's). Around 1976 total of ISRO staff ~~at~~ strength would have

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been about 1500 of which about 500 would have been in VSSC. Though ISRO held Chairman, ISRO as the highest, tallest, infallible leader, Centre Directors were also equally respected especially within the Centres (and also feared). These, other hierarchies, like Section Heads, Dist Head of Divisions, Group Directors etc. SAC was terminology like ~~Area~~ Area Chairman (it was Group Director); then these Project Directors, Proj Managers, Project Engrs, ^{Manage of facilities etc} Whatever be the title, ^{power} the hierarchical pyramid was determined by the Admin. ~~Prof~~ Financial Powers delegated to that position. These delegations take place first by the Department of Space (Govt order) with a proviso that they may be delegated downwards by those persons in that position. Some powers were not delegatable and those ~~would be~~ would be determined by the DOS (Govt) which had the usual powers of the Dept of Govt with Secy, Addl, Joint Secy rank most of the powers. In addition DOS

~~86~~ (861)

could derive more powers through Space Commission. All these Admin/Financial powers were clear-cut. Those who ~~are~~ were having it, were clearly the bosses.

No Scientist / Engineer can purchase, or travel ~~or~~ etc without the approval of the competent authority. Sometimes for the person at the "bottom" there may be three or more such approvals.

- e.g. from the Section Head, Divisional Head, Group Director and further on from ~~the~~ Director or Controller of the Centre (who was the Head of Admin/Finance) often ~~as~~ a senior officer ~~to~~ deputed from All India Services. Later some senior I SRO Scientists had held those positions.

Next important item which determines "power" of the person holding the position ~~to~~ was the filling up of the ACR's. - Again Section Head, upwards of ~~of~~ one is Head of Division, Group Director upwards. Those staff directly reporting to big bosses - staff to a Group Director,

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Project Director, Chairman ISRO etc would be cutting down some of these steps, ~~then~~ and have their ACR's submitted to big bosses. For example, I was Scientist/Engineer SF during 1976 (promoted in 1 Jan 1976). My ACR would be directly submitted to Chairman ISRO, who would be Assessing Officer, Reviewing Officer & Accepting Officer. Many SF's in VSSC ~~may~~ might go through 3 layers or more HoD, AD, Director & then coming to Chairman ISRO. So all these layers are "parental centres" or bosses to be taken care of by the junior & "persons" - even those in higher grades but not having the functional Hierarchical Designations. Those who are with "big bosses" or "visible" due to their roles ~~may~~ might get a better ACR i.e. "pleasing the bosses!" Whatever may be the

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checks and balances of built-in through the ACR process and in the Dept. DPE's the power hierarchies were clear. One had to be in good books of a GD of even other Centre as they may come in the DPE or Chair it! For junior persons in Centres, I even Section Heads, HoD within their own Centres but in different areas were ~~very~~ important. You can't just rest with doing good work for ^{the} Section Head (or pleasing him - I think in 1976 there were no woman Section Heads!)

Therefore the visibility in addition to good work done was important. ~~This~~ This is where the job assigned to a person ~~become~~ became important. If one was in regular production or test and evaluation, they are often not visible to the upper echelons ~~within~~ even within the Centre.

Only after getting into the "power hierarchy" points like Section Head etc

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one ~~to~~ gets admin para, ACR with para etc. Gets into DPC's. Becoming Section Heads, Project Mgrs etc ~~was not~~ (is not even now @ 2017) based on performance/delivery alone. Seniority also comes in; visibility; being in "good books" of many seniors in the system, & a little "pushiness" etc.

~~It was~~ I started sensing these elements in the lives professional lives of people. & Due to my position which was got at a very young age, I had access to upper hierarchies as well as the lower levels of engineers/scientists. I was also as ASS (de facto SS) in very close touch with the Additional Secretary (AS) & Joint Secy (JS) and also well with Dy Secy, Under Secy and all other assistants etc.

This access of mine with all echelons within ISRO (HQ, DOS, VSSC, SAC, ISAC, SHAR, ~~etc~~ CED etc) is well described by Dr. A.P.J. Kalam in his book "Wings of Fire". I have put that in the next page.

(865)

"

Wings of Fire quite by Dr Kalam.

He never told me about it, ~~I saw it~~

Though I had seen the earlier draft, the final one in which he had put was ^{not} shown to me. I saw it in print & was happy. That was his assessment of me after several years ~~of~~ had lapsed from ISRO life. About ~~to~~ 16 years for him; 10 years ^{after my} ~~was~~ leaving ISRO.

" I had the fortune of having Y.S. Rajan from ISRO headquarters as my friend in those times. Rajan was (and is) a universal friend. His ~~fr~~ friendship embraced with equal warmth turners, fitters, electricians and drivers as well as scientists, engineers, contractors and bureaucrats. Today when ~~of~~ the press calls me 'a welder of people', I attribute this to Rajan. His close interaction with different work centres created such a harmony in SLV affairs that the five threads of individual efforts were ~~not~~ woven into a mighty fabric of great strength"

- A.P.J. Abdul Kalam in Wings of Fire (1998)

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Such an access to all of ISRO personnel gave me the opportunity to understand some of their aspirations, fears etc. There was an empathy for all of them, in me. On the other hand there was also a fairly good understanding of the needs of ISRO as an organisation, which ~~to~~ ^{was} often a ~~totally~~ impersonal assessment.

I also knew that the interests of the organisation had to be above all the personal considerations (of mine, and other people); ~~that~~ that may require some ruthless actions too, some of them ~~not~~ which could not be fully justified, but would be the resultants of several competing factors (It is a Chakravya world of ^{the} Ruler!)

It is with all these in mind I had written the notes. ~~Looking~~ Reading it now (@ 2017) I am ~~not~~ surprised at the classification I had done of the functional hierarchies. — When I was the Mentor of ISG during 2010-12, many of the young persons met me; some of them did not meet me too. A number of them shared with me

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their aspirations, frustrations etc. They All these elements ~~was~~ were classified and put to vote anonymously. Results very much match the fears I had expressed as early as 1976. Since ISRO did not go into ~~prod~~ creation of a separate company where all production will be done independently. Tasks (4) & people who do ~~task~~ Tasks (4) & (5) in the functional hierarchy are large in number, many with higher grades of salary due to ISRO ~~short~~ promotion scheme (in situ without waiting for vacancy). Skill those in ^{Task} (1) performing Tasks (1), (2) & (3) are small in number out of 5000-odd Scientists/engineers in @2010, those performing (1) & (2) & (3) may just be about 100. Thus one big frustration most engineers/scientists had (all those in ISG group were creme de la creme - those who got merit promotions; had/did some "good" functional hierarchical positions!) a common complaint: "Though we have gone to the higher grades, we are not

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able make decisions. Those who make decisions in ISRO are very small in number. We are just high paid workers who do more or less the same thing ~~where~~ what we did at the entry levels of ISRO as SC Eng/Exec."

Also the mobility within & outside centres had been ~~very~~ extremely less. I had, in 1976 mtg, identified the importance of the role. But SD ~~at~~ who talked about it did not take any action. Reasons then would have been the same as I found in ISG survey @ 2011.

There is a general reluctance to move out of The Centre and also allow persons from purely supportive role like SHAR, ISTRAC to move into "mainstream" Core Centres, ~~at~~ VSSC/LPSC, ISAC and SAC. Even NRSC is resisted! Uptill now only those who had been Directors of VSSC, ISAC or SAC were able

~~869~~ (869)

to make it to Chairman ISRO and also for their Centres only those who had been in that Centre ~~and who~~ are able to go up as Directors of the Centre.

I am attaching these notes as a part of continuous text of this note. write up.

One interesting thing to be found in the ^{two} note ~~is~~ would be the two poems - both by ~~the~~ a Soviet poetess Margarita Aligher. I find them remarkable even now. The first one about the existential dilemma for all those who want to do something ~~and~~ remarkable / tangible in life, assess themselves periodically and look at the future paths "ahead" of them - which give glimpses but still ~~elude~~ elude! For me that state had come ~~about~~ when I was 32 years only. I was intertwining with my expectations the future of ISRO as well, ~~for~~ also to

(870)

future of India and its people.

The second point when discussing ISRO Council and especially its role as a Conflict Resolution place, ~~is~~ ISRO had lots of conflicts - organisational and personal. However instead of resolving them directly ~~and~~ openly in the Apex forums like ISRO Council, still lots of shadow ~~to~~ 'boxing was' going on. Therefore in day-to-day work even at higher levels, ^{minimal} trust was getting eroded ~~in mass~~ between many persons. Naturally these were reflected in ISRO HQ too and the interfaces with Dept of Space - Govt. ISRO HQ at that time was unorganised; there was SPAG - more a name rather than having functional effectiveness. ~~Four~~ Four persons VS, JPS, KSP & YSR being identified as Staff Officer to Chairn ISRO / Secretary DOS with loosely defined roles & subjects. I had addressed the confusion & pain in

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NOTES ON
POSSIBLE REORGANISATION
AND
DEFINITION
OF
ACTIVITIES OF ISRO
CENTRES

22 Jun 1976

(873)

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)

* * * * *

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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 ISROP 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 themselves 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	

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 ^{or} 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. Present 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".

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- * 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.

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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

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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.

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ISRO SATELLITE CENTREPrimary tasks :

- 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).

Secondary tasks :

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

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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.

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SHAR CENTRE

Primary 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.

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SPACE APPLICATIONS CENTRE

Primary 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.

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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.

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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.

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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

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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.

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NOTES ON

ROLE

OF

ISRO COUNCIL

22 June '76

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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)

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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.

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IS ISRO COUNCIL NEEDED?

This is rather answered by the table below:

ADVANTAGES	DISADVANTAGES
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>	1 Unnecessary paper work and wastage of time for <u>at least 50%</u> of ISRO Council activities.
2 If ISRO Council is <u>abolished</u> there is no top level body in ISRO which Chairman can consult.	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)
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.	3 The proliferation of Satellite Programme Council, etc <u>may erode the programmatic content</u> of ISRO Council.

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* 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.

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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)

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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 affairs

are to be done by ISRO Council.

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OPTION 1

- * In view of possible reorganisation give SPAG, Convener (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, Convener, Head of PPEG of each Centre (SHAR and ISSP should not be forgotten), which chews the material sent by SPAG Convener, 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.

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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

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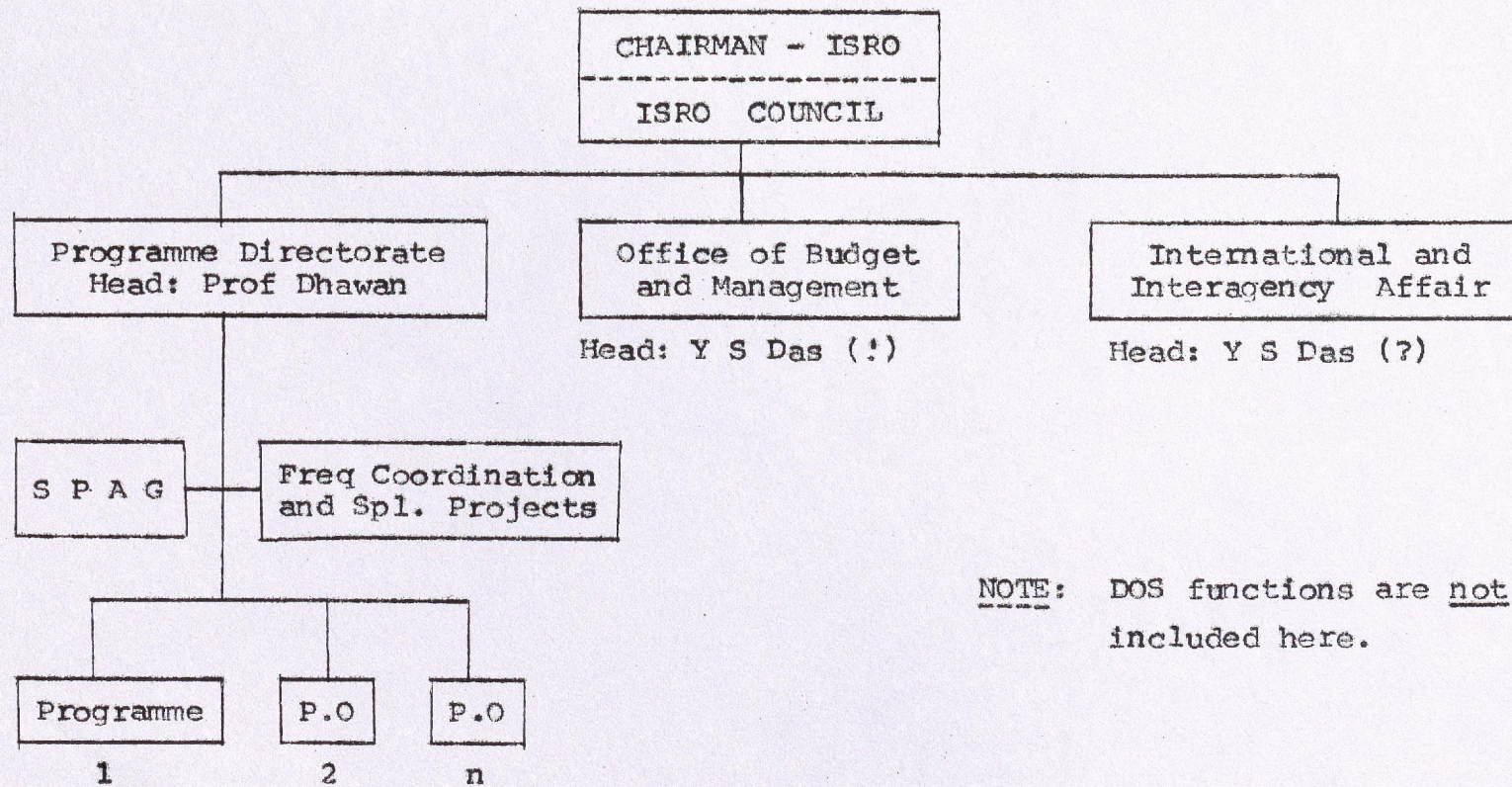
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C O N C L U S I O N

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.

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NOTE: DOS functions are not included here.

POSSIBLE ORGANISATION CHART OF ISRO HEADQUARTERS.

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under notes
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 891
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 22 June 1976
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~~from 1952 to 1958~~
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Coming back to YS Das.
 He was meticulous about what recording what issues were involved, and what ~~are~~ were rules governing them, what could be the best option without breaking Govt rules; without leaving room for possible future audit questions. He did not mind long notes. TNS on the contrary believed in short meetings, quick decisions and short notes. He used to get angry, and fire people. People ~~to~~ used to meet him personally, to please him or even getting the angry firing alone but ^{to} finally get favourable decisions. He liked me and used to involve me in many decision making ~~or~~ processes (more so when he returned to ISRO after YS Das left and he returned to ISRO as

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it caused in my earlier notes which were described / attached in my earlier notes. I was in addition ASS.

Mr. Y.S. Das had joined as Addl. Secy a place vacated by Velloodi; TNS had to leave too, due to the ^{IAS} Cadre regulations.

My ~~note~~ second note gives some suggestions. I also ~~gives~~ gave in that note the unknown factors (as SD had not articulated clear roles or Programme Offices though he mentioned about them as a part of loud thinking process.)

These two notes are attached as continuities in next pages. It ~~was~~ around this time, after the joining of Y.S. Das, he developed a lot of liking for me. ISRO which was used to TNS methods, quick decisions, strong ~~extra~~ man actions, but passionate attachment to ISRO/DAS, found Y.S. Das difficult. He was ~~process~~ man of processes. He was from IAS Cadre

More of it ~~is~~ after ~~the~~ we read the two notes → 872 → 902, ~~the~~ ~~the~~ ~~the~~