Chapter 4
1970-80 cont

1970-80

Challenge was to take care of the sensitivities of URR; and also his constraints vis a vis various individuals (senior & juniors of the system).

How far SD was successful in making full, sustainable (somewhat impersonal) ~~system~~ ~~for I~~ for ISRO we would see in the subsequent sections. Was it only a good patch work for each case as was in ISSP? Also it ~~sh~~ should be a long term assessment. I wrote an article in Proc. of Indian Academy of Science in 1988 "Management of Indian Space Programme" — I had later the opportunity to study ISRO through the ISRO Strategy Grp (ISG) duty 2010 – 2011 (two full years)

We will revert to these later. But in the middle of 1974, I felt great that SD was visiting a system in which I had been trained in NASA and in which I saw lot of merit; & that I had role in evolving a system for ISSP is that direction made me happy.

* * *

There were also lots of developments in my personal front. Uma, Vijay & I, were settling down in the Hallappa Mane as we used to call it. Vijay had to go through lots of adjustments. Firstly he would not throw any trash anywhere but a trash can. ~~Indra~~ Dr Indra, Bangalore

Chapter-4 (Contd) (526)

wherever we went, there were no trash cans, even at homes. He would struggle after peeling the chocolate cover: "Mummy where is trash can!" Worst still was having no TV; no Sesame Street! Fortunately he did not have the problem of ~~speaker~~ conversing in English, as he had to struggle in DHG for a few months. He did not have malls to select food; have juices; occasional Coca Cola; No car to travel. His school was okay for him.

Every weekend Goma, V & I used to go to the M.G. Road

Brigade Rd, Cubbon Park etc in an auto, ~~a~~ which was available close to our house at Sadashiv Nagar Circle.

There was ~~only~~ one Koshy's restaurant in Brigade Road; Vijay used to enjoy Fish & Chips there; Sometime fried chicken; Amma loved her Vada Sambar. Near that Nilgiri's was there. That was the "micro-Mall" for us to ~~choose~~ buy some Cheese, Avocado etc.

Amidst all these activities and settling down, Amma & I decided to have Periamma with us as soon as possible. I went and got Periamma

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home. She had ~~a~~ a happy
period with her sisters and areas
in which she grew up in
her childhood and early young
age (They were getting married
in their teens and Periamma
would have to move to her
f-i-l place or with Ponappa
around her ~~to~~ age of 16.
She did not have the opportunity
to go there, afterwards - perhaps
once ~~of~~ or twice; ~~not~~ not even
once after we came. At best
for child birth she could have
gone; but she did not bear
any child. But my mother

did not go for child birth
to ~~her~~ ~~mom~~ mother / father
place. She went to in-laws
ie to Perauma / Periappa at
Kottaram.

So for Periamma after
a good break she joined
Gomati, me & Vijay. She enjoyed
the place but had by
then had severe arthritis
problem.

I could not spend
much time with her
alone. As such my own
time with family got very
limited as I had to be

rushing for ISSP / ISRO HQ
(S. Chandrasekhar)
work. Chandra tells me that
even during 1974 we had started
serious budget exercises for
at ISRO HQ. Funds were
limited; & he said it was
Rs. 19 Crores and so much
demand from the Projects SLV-3,
ISSP & SITE and related build up
plus some R&D. I don't
remember much of that except
for starting the Zero Base
Budgeting later in 1975
I ~~the~~ recall (rather
vaguely) that I had to
go once to USA to wrap up

some components for ~~A~~ ISSP projects — for flight model. Also I remember Prof URR asking me to go to his earlier ~~institute~~ University in Texas to collect a fully wired up X-ray detector system with its electronics. ~~I At~~ In the initial period after return, I had continued the practice of driving in USA to reduce costs of travel. ~~This trip~~ It was "Rent-a-car" system. I used to take a smaller

car (I ~~then~~ don't remember model but it was #7 incl. insurance ~~car~~ without gas (petrol) cost. We get a car with full ~~petrol~~ gas & we have to return fillers)

I remember some problems at the Indian customs with the X-ray detector. It was not the usual electronics item ~~demanding~~ requiring customs duty! But it looked an electronics item with wires all over. They were also afraid to touch it! I also told them to handle with care. I explained to him about what

it was and its role in the satellite being built by India. It was a time when in India hardly a few people would know about Space, satellites etc, ~~Thus~~ in relation to India. They would have known about 'man landing on Moon'. Finally ~~he~~ he left one. I handed over that payload safely to ~~Dr~~ UR Rao.

~~Those~~

Those were some of the side adventures. Having driven car (automatic) in USA was of great help in moving around in USA. For the later trips to USA, which were many times, ~~It~~ as ISRO had become rich we could have

Govt rates. The travel mode mostly by air & local taxi as contingencies. Also I was ~~a bus~~ a busy person attending to many things.

Building of a thermovac chamber and a makeshift clean room at Peenya ~~SAT~~ sheds by P URRao were real challenges. They all ultimately functioned.

On the headquarters front I ~~don~~ do not remember much more ~~that~~ than what I had written to Prof Dhawan, which he returned to me ~~at this~~ just before his retirement (in Sept end 1984). ISRO HR was at

formative stages. Kellodi was Additional Secretary — but he used to go many times & abroad for UN meetings. Even when he ~~comes~~ came he was like a top relaxed ~~corporate~~ ~~ex~~ executive. He had his afternoon nap, in a nice ~~Sofas~~ so far, in the small room; around ~~4~~ 4 pm would go for ~~golf~~ playing golf. He would have some quite discussions with SD.

Bulk of the ISRO ~~D~~ Dept of Space (DOS) activities were left to T. N. Seshan.

who had been promoted from
Director GOI to Jt Secy DOI.
He was the work horse, though
nominally he was handling
only finance portfolio of the
department. All administration,
union matters, preparing ~~briefs~~
~~for~~ making ~~to~~ ISRO Govt was
all his responsibility. Even though
Vellodi as AS was the Secretary
of the Space Commission, TNS
handled lots of the papers,
prepared them etc.

At the beginning
my contacts with TNS was
limited to those concerning

ISSP. There used to interesting conflicts (conversations) between him URR — which continued in the later years also — were interesting. URR wanted everything then & there (of course, he had taken up a deadly schedule for the first satellite for ISSP, which became a habit for the subsequent satellites as well). TNS's 'job' was to keep up the Govt norms; it was not needed because ISRO received the Govt grant (tax payers money) from the consolidated funds of India. Earlier, it was through

Dept of Atomic Energy (DAE) through PRL; They were relatively small amounts. DAE was still accountable to Govt / Parliament / CAG etc. PRL was yet small to attract CAG etc attention.

With the satellite project, SITE, SLV-3 & related developments of SHAR etc., expenditure was more and therefore visibility to the public accountability systems like audit etc ~~will~~ would be more. TNS's & job was to protect ~~them~~ the Govt processes as ~~of~~ the joint

of the DOS. It was not a personal task. It was on behalf of Secretary, Addl. Secy, and other juniors and also ISRO & DOS as a whole. To get into ~~disp~~ disrepute for procedural problems, lapses or blunders would ~~not~~ wipe out ~~all the~~ the results of all the good work done by ISRO; the sacrifices done by ISRO scientists, engineers, technicians & admin. staff. They were sacrificing a lot: working long hours, very little facilites (except to a certain extent in Trivandrum),

high pressure job with near impossible schedules on a daily basis. Being pioneers is not an easy job now or then.

Though there were some debates going on ~~in I~~ within ISRO during some spare time about 'governmentalisation'; it was a foregone conclusion.

TNS was not an usual bureaucrat, (slow, being very cautious and protecting oneself through references to other departments/ ministries etc). ~~it was~~ He himself was driven by an unusual zeal

to do lots of things for India. Since his posting in DAE, he had understood VS's mission very well. He had a deep respect and loyalty to VS (even after his death). So his intent was never to hurt ISRO nor to bring it Dept of Space (DOS). He was the one who drafted the Space Commission order which mentions about the avoidance of "needlessly inelastic rules". But still some

rules ~~etc~~ were (are) necessary.
We took effort with ~~etc~~ the
~~etc~~ help of an esteemed
retired IAS officer Bhaktavatsalu
to draft a Book of Financial
Powers for ISRO instead of
just saying that the DOS would
follow the General Financial
Rules (GFR) or the ~~etc~~
Standard delegation of powers
given by Govt for all depts
- DOFPR. ~~Draft~~ ~~etc~~ Starting
a Book of financial Powers

and having Govt approval for
it gave DOS ~~the~~ a special
~~the~~ status. It simplified
the maze of rules / supplementary
explanations / admin / fin rules
in which Govt departments
(notoriously, probably delightfully
for themselves) get into. There
was a general fear about
this within ISRO, though
none (including me then @ 1974/75)
did ~~not~~ know about the
details of Govt rules and
how it would affect ISRO.

Similarly ISRO promotion policies need to be written down as practices in Trivandrum, Ahmedabad, Bangalore (fledgling stages) etc were varied and sometimes considered random. BP helped a great deal to make them transparent & uniform in application. TNS ~~used to~~ had a major role in ~~the~~ the process of streamlining this (it so happened that later I had to be involved in such process including ~~the~~ that of purchase

procedure etc.

~~These~~ Impact of imminence of such processes affected ISSP also and hence the "clashes" between TNS & URR. R SD was also there to ensure non-breakdown of "solution-finding". TNS helped a great deal in giving a "rational" go-by to the purchase actions covered by ISSP under emergency purchases etc. # TNS, URR & I had worked out some such items for the flight model too.

* * *

We would come back to this globalisation later.

In the meanwhile SD wanted to discuss with me a great deal about what could be success criteria for ~~Aryabhata~~ ISSP. We had a long walk around in IISc campus around twilight hours. A quick recap of our conversation.

SD: Rajan, it is only about 7 or 8 months till the launch of our first satellite. We cannot deal with it ~~as we did for~~ secretly as was done with Pokhran tests. The satellite is going to go up the space and will be seen by everybody in the world. We can tell our

Soviet friends to keep quiet. They are used to it and will say nothing. But Americans & others ~~can know~~ ~~wants~~ will know about the launch and what will be happening to our satellite. We can't hide it.

~~While~~ We need to evolve a set of success criteria for the satellite. It can't be merely the 'East is Red' type of message coming through as was ~~for~~ for the Chinese satellite a few years ago. What can it be? It had to be a set of criteria right from the integrated tests at launch pad, ~~one~~ on wards. Of course, the

on ~~aboa~~ On board functioning of various subsystems would have better weightage!"

We discussed possible options. ~~Assume~~ If we assume a total failure of telemetry, then it was a major problem. Nothing would be known except for some marks for the functioning on the launch pad for the "send off" final tests. & I was not aware of any such criteria used by NASA; they might have for their first satellite. After discussing the relative weightages one could give for various subsystems, (many of it ~~had~~ had

redundancies), SD told me

"Rajaram: it looks like that it is better to have a larger number of parameters identified and we can even look at relative weightages later. Actually the final goal is to have an ability to build an satellite, have it launched and make it function in Space as per our specification limits. It is more a technology proving; the scientific payloads are an added bonus and not so primary. Any way you attempt a draft and later we can discuss with Rao

and then take it to the ISSP Board. Do it soon, so that we can finalise the criteria at least 6 months before the launch! Then at least we will have a baseline against which we can assess the actual performance."

So I did. I think it went to him or her three pages, with a scale of marking for most of the subsystems for on-orbit functioning and certain overall performance parameters. It also carries a certain (small amount) of marks for pre-launch functioning and ground system tracking. Some of the

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subsystems / assemblies were given by the Soviet side, like solar panel, control system gas cylinders etc.

~~I did~~ I did not normally attend ISSP Board; ~~it~~ ~~to~~ it was chaired by SD; BP & Vellodi (MAV) were there. ~~Do~~ Of course URR; ~~don't recall~~ TNS & Prof B.V. Sreekantan Director TIFR. ~~whether TNS was there~~. ~~I~~ The draft done by me was cycled several times ~~to~~ with URR and some of the ISSP seniors. So the final version placed, I recall, was ~~accep~~ approved by the Board. It had a very useful function later and had an important lesson for all of us in ISRO, that one should try to assess through some well considered baseline performance

expectations. Such a method was ~~it~~ was ~~by~~ for SLV-3 Project also later.

I think, these success criteria were not made public even within the ISSP project. It was kept a confidential document as otherwise there was a chance that individual stake holders may misinterpret it " My subsystem did not enough weightage etc.. " In making the satellite a success every little step, each soldering, each test, each measurement was (is) important. Every body had to feel that they ~~are~~ were the most important and on them depended the success.

One of the important task of ARR was to make them all feel so in ISSP — he would chase them, fire them, and at the same time care for them — he creates that confidence in them. He had to be the hero fighting for their welfare. So for the night shift which was needed for keeping up the schedules for the flight model (and eventual flight) he would arrange for food at night, coffee, tea (all small amounts but good enough to take care & as a gesture). He used to arrange for a small glass of juice also. This

was so for all the staff (though the lower salaried staff was also getting overtime allowance). Expenditure on these were small, but it was not "allowed" in govt norms: "when they are getting over time why the free juice etc?"; a good question for those who sit in the govt offices, work at a slow pace; ~~off~~ often gossip. Here URR had his soldiers fighting a war of "Quality control with schedules"; fighting a ~~ware~~ war in an unknown territory. That was really so. But govt wise it ~~used~~ would

be considered as a "civilian" work!
URR used to arrange for a couple of simple cots, for some who was very tired and would have to be there, just to be available on call of a problem. They could rest!

On such items he ~~was~~ sometimes had a tiff with TNS. URR would prevail; maybe TNS knew it and had fun! & None would know!

I had gone ~~at~~ during the nights to Peenya, but I had not stayed over in the night.

* * *

Another major technical requirement was the tracking of the satellite ~~##~~ when being injected and later during ~~the~~ its regular orbital revolution. Soviet side wanted to track it and had a tracking station near Moscow, an exclusive enclave of Mr Bogomolov. In that communist county, Bogomolov ran a princely empire! In the name of the ISSP project he had acquired a number of equipment & stations. The type of hospitality he used to give to his visitors ~~to~~ ~~was to~~ was an item to be seen to believe. On technical discussions he was very slippery! Though, of course, he

delivered goods.

On the Indian side we needed a station at SHAR & at Andaman Nicobar islands. I had gone with SD to find places. The flight was through Superconnie IAF flights; being an aeronautics engineer (practical not ~~booking~~ just book ist) she asked to enjoy & explain to me. In the flight I was surprised to hear sounds of ~~goats~~ bleating of goats; it was "mutton on hoof" (MOH) to be delivered to the IAF station! The responsibility of selling

(P.T.O)

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Assembly hall for PGM	
Missile Entry:	PGM-500/2000/Al Hakim/Pegasus/Centaur
Copyright:	Alenia Marconi Systems

these up ~~was~~ was that of SHAR and it came under Y.J. Rao. ~~The~~ URR's desire to keep all of these under his control, created conflict. It was nearly impossible for him to run around SHAR & A&N Islands. Also these facilities cannot be built for one satellite alone. No country USSR or USA did not do so. He would tell PM/SD that he would set up a station in Peenya, he got ~~one built~~ one

"mickey-mouse" station built at Peenya.

~~This~~ Having a proper T & tracking station was a technical & managerial challenge. Rightly YJR wants tell that he wants set up to meet URR's specifications & he could test! It was a long tussle & I had detailed technical knowledge of this, much better than the persons ~~was~~ named by URR for this. It was ~~fine~~ I played a great role in resolving the problem. I had worked with PN Jayaraman (PNJ)

who later came to HQ and K. V. Venkatachary (KVV) at TERLS/SSTC. ~~#S~~ YJR was aware of me due to my short stint in SSTC & also through transponder. URR had ~~some~~ confidence in me.

I suggest to ~~B~~ SD to have KVV made in charge of establishing ISRO Tracking Station to be technically under SH~~RR~~/ ~~#SR~~ YJR. But ~~URR~~ ~~to~~ KVV would also report to URR. YJR did not dig in. So we solved the problem with a funny

arrangement. Fortunately both YJR | URR had trust in KVV & his colleague PNJ as both ~~techn~~ were technically competent but ~~the~~ always had a low profile. Always smiling even when ~~to~~ ~~[illegible]~~ asked to complete a difficult task. Actually the nucleus of ISTRAC was born then to grow further as independent entity. This was an important element for the success of the project, as it was the only link to the satellite if launched successfully.

When ~~we~~ I look back many items done for the first satellite project was with the philosophy that we build the bridge when we had to cross. Lots of patch work to ~~Just~~ meet the technical needs and to adjust to the idiosyncracies of able people, who One ~~cannot~~ could not afford to hurt their "egos". If I say that this has remained a part of "ISRO culture", many in ISRO even now (~~especially~~ the higher ups) would not agree. To me it appears that these genes were set up even then.

In places like SAC there was even "bloody removal" if some

persons when the more "purgful" one could not adjust and SD had not stabilised by then as Chairman ISRO.

"Interneciene" warfare and funny adjustments (or coalitions) were also the part of VSSC; there were also some "bloody removals" as I describe more the later years. I sensed these but could not comprehend the genetic make up; my deep understanding of biological evolution, genes etc then was limited!!

I thought simple minded rational / planned systems could still brought into ISRO, given SD's stature and BP's presence.

(To a certain extent, my mind might have still been mechanistic while dealing with aspirations and actions of individuals.

It might have been my weakness derived from ~~a~~ my deep (564) ~~too~~ attachment to Marxism where the collective was more important. Individuals were subservient to it. But it took time for me to understand workings of life)

No doubt rational planning and real goal setting were hall marks of ISRO ~~&~~ especially during SD era (1972 – 84). More can be seen in my article in Proc. Ind Aca. of Sciences ~~&~~ (1988?), "The Management of the Indian Space Programme". That ~~at~~ article also lists questions or makes statements requiring analysis / answers. We would revert to this important theme in later sections as well because it is not an easy topic with 'yes', 'no' answers. But understanding the underlying currents in ISRO, actions (external & internal) would give some insights ~~about~~ for building

Indian institutions in the future as well and also for rejuvenating some older ones.

* *

I am not listing a great deal of technological contributions of ISRO & India by the engineers of ISSP — from a range of precision components, testing machines, electronics assemblies, tracking stations etc. Prof URR has listed some of them in his recent book "India's Rise as a Space Power" Camb Univ. Press 2014 (Foundation Books). Even that listing is not exhaustive. It will be good

if a "technology historian" lists each of them not just from ISRO alone but at HAL, CMTI, NAL, BEL, Hegde & Gollay, ECIL, SHAR etc. That would give an insight of technological evolution.

* * *

Parallelly a low level activity was going on for defining the satellite that can follow on the first satellite which was mostly technological with some science payloads. The desire was to get into an Earth observation satellite (Satellite for Earth Observations — SEO later named Bhaskara).

Basically there was no escape from the configuration of the first satellite – which had structures, solar panels, battery and control gas systems etc given by the Soviet side. No major communication expt. possible due to the low earth orbit. & The satellite was spinning and at best one can control it to lower speeds of revolution. Then one can have the types of TV cameras which will scan slowly, as NASA was earlier. When I was at NASA during 1973, I had arranged for (GJ)(SAC) George Josephs visit to a few experts in the field, so that

many current (@ 1974/75 for possible launch around 1978/79) can be discussed; also availability in the market. It had a coarse spatial resolution but to begin with, it was an useful beginner for ISRO. — for imaging, sending data which was much more than the usual telemetry dom & process at ground. I had also learnt about these options.

A side show: When I had to get appointment with persons in LSFC with whom I did not have regular

I had to talk and fix appointments through phone. After finishing the technical explanations when they agree I had to give the name of the visitor. I would say "George Joseph" in Indian style thinking that they would catch it as ~~dioti~~ different from Other Indian names. Lo & behold, they don't. I will spell "G as in girl; E as in English; O as orange etc.) When I ~~was~~ through a few pesons on the other end of the phone: "Gosh, I

should have caught it
before! It is a beautiful
& biblical name!"

So much for preconceived
notions and their effects
on human beings. It was (is)
so within India also!

So the work on ~~SEO~~
defining SEO was progressing
on a low key ~~way~~ manner
between GJ & ISSP (URR + team)
Of course, whether it ~~will~~ would
be approved or would depend
upon the success of the first
satellite! I was not birthing

myself too much with that system definition etc as pushing the first satellite through success, and briefing SD often on that, raising issues, ~~eaten~~ caring for ISSP – ISTRAC interfaces etc. and solving a number of items directly with URR was my priorities.

There were many VIP visitors to Peenya. I was not involving myself with them. My office (ISROHQ) was at CBAB Complex, Cauvery Bhavan (just behind Indian Airlines Office) I was at fifth floor, PDB office was there; Chandra, VS, etc sat there. SD, MAV, TNS at 1st floor. So I was conserving my time of transport. Though traffic was very low compared to the standards of @ 2000's, roads

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were bad and (motorable part was) narrower than what they are now. ~~Some~~

Another factor was right from my early young days even dating back to my teens I had no special attraction for VIP's and be seen with them or photographed with them. ~~At the last~~ ~~All~~ When I came to ISRO, I found that such visits were more disruptive of routine work, which had killing schedules. Such PR (public relations) was essential, was something I learnt! But not for me, at least then! (1974) Later I had to do a lot for

for ISRO, I did not even imagine!!

(Only VIP attraction I had in my younger ages was the fact that Sirimavo Bandaranaike & Nikita Khrushchev share the same birth day with me. I recall writing a letter to him (aerogram)! I did not know at that time that VIP's don't even look at them, let alone read them! It may go dust bins, junk archives;

...

That was perhaps only aberration.)

* * *

In addition to ISRP/ISRO HQ work my general reading continues with more vigour. I read not just the IEEE Proceedings, Spectrum (as I was a member, which I relinquished around 1990's as the membership fee in dollar but in rupee ~~dollar~~ terms became unbearable with my salary.) I used to be an elected Fellow of British Interplanetary Society (BIS) Their journals were totally stimulating. In addition I started

reading many other books, as
we used to have a special old
book stall only on Sundays
in the M. G. Road. They ranges
from popular paper back
novels, to historical fictions
covering many parts of
the world, works of Aldous
Huxley, etc etc.

I found reading of
Aldous Huxley very gripping
but after finishing I used
to be left with a feeling of
"disturbance" in mind, difficult

to pin point one ~~or~~ or two single strand of thoughts.
ISRO HQ library was not yet built well ; it later became a pride of place with V Siddartha (SiS), Chandra (SCS → S. Chandrsekhar) and myself with occassional ~~does~~ inputs from P. Sundarsan (PS) & others.

My time & plate were more than full.

~~Year~~ ~~Week~~ Days, weeks and months passed by .. The First Satellite (FS) built in India left for the Soviet Union. We ~~also~~ were to join in later.

SD decided that I also ~~going~~ go along with the regular satellite team some 50 plus led by URR. I was an involved observer, concerned participant, enjoyed the confidence of URR to yet ~~not~~ did not have a direct executive responsibility though I had all the necessary knowledge. For SD it was like having an independent observer and his "own eyes & ears". In a way it was a delicate situation. I don't recall having

any burden or tension due to this conflicting role of a "spy" and "participant"! I had excellent working relations with all the engineers ~~with~~ right from SP Kosta (SPK), K Kasturi Rangan (K) et al who were close confidants of URR as well as R. Ashiya, Patki, et ~~all~~ al who came from VSSC who were technically competent but were not "as loyal as URR wants trust them to be".

As URR had given in his book Rise as Space Power, there ~~wee~~ were three main sources for the teams of ISSP:

- One who came from PRL (smaller number ASPrakasa Rao - ASP -, KKR etc)
- Another came out of

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Satellite Systems Division (SSD)
built by PPK as ELD(S) before
for India's "First" Rohini Satellite
to be launched by SLV-3 ~~but~~
- Those who recruited ~~for~~ at
Peenya for ISSP Project.

(Even as ISSP grew
later as a major Centre ISAC,
the tensions between URR
and the "senior" members of who
came from VSSC existed.
In VSSC also for a long time
- many years - the tension
of losing ISSP, the first satellite
project, from Trivandrum existed
That decision was taken by
Py MGKM at a time when

(SBO)
(interim)
he was Chairman ISRO
from VS's death to take over
by SD in 1972 - I think May 3. The
issue was even raised in Parliament
as one State "loses" to another
"State". At that time I was
in USA, middle of ATS-F
programme. Many of the technical
reasons given by ISRO were
contested by VSSC engineers even
later. "How they can say that
SSTC or TERLS is not a good
place for solar arrays & they
will be corroded. Some of the
test space solar cell/ array making

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facilities of USR are located in sea coast in Western USA"

Any way Govt managed to have it at Bangalore by giving some form of assurance that it was only for this project, ~~sea~~ I learnt it from URR's book Rise to Space Power.

But on the ground I have heard about ~~this~~ the continuing grouse. I also that way belonged to SSTC when I joined from PRL to transponder ~~pro~~ project at Ahmedabad, which was transferred to ~~VSS~~ SSTC; I went. Then I "belonged" to SAC for a ~~short~~ while due to SITE

582(a)

ANNEXURE 2

QUALIFICATION
ACQUIRED DURING THE YEAR/PARTICIPATION IN SEMINARS, CONFERENCES, COURSES, PAPERS PUBLISHED ETCETERA.

1 Visited USA in March 1974 in relation to components purchase. Also held negotiations with Radiation Inc, Motorola etc. Visited Lincoln Lab in connection with Hi Rel components.

2 Visited USSR, Orbita System, Space Research Institute, CNES - Toulouse, Engins Matra, Aerospatial, Thomson-CSF, ESOC, DFVLR - Oberpfaffenhoffen, UKRAS, HDS, Marconi etc.
September-October 1974.

(P.T.U)

* * * * *

(From the self appraisal form for 1974 sent to ISRO Hq Admn)

582(L)

ANNEXURE 1

DUTIES AND RESPONSIBILITIES OF THE POSITION HELD.

1 Convenor - Technology Programmes Group:

Overall monitoring of progress/technical status of technology area.

2 Member - SPAG:

Specific monitoring and planning in satellite area. Acted as technical monitor assisting Chairman to assess ISSP-I (ARYABHATA). Also related ground system for Rockets, Launch vehicles [redacted]. Planning and general monitoring of Satellite Fabrication and Test facilities. Planning for Hi Rel screening facilities for ISRO.

3 Member - Communication Programmes, Budgetary Programmes Group & Science Programme Group:

Doing specific tasks at times planned with the respective convenors or otherwise. Budgetary aspects of ISSP & Avionics portions of VSSC.

4 Other administrative items like handling of DFVLR training programme, equipment purchase etc.

5 Member - ISSP Coordination Committee:

Dealing with many administrative and managerial aspects of ISSP.

* * * *

experiment. I was not a part of ISSP though I helped the project substantially right from the early stages of 1972 from USA & later.)

During 1974, I had travelled USA (see the attached note 582(a) for typing continue)

~~I think it was for the~~

During 582(a) For the second time, ~~first time~~ I went to the Soviet Union — Moscow Aport. (Muskva in Russian). My learning Russian language as a part of the Ph.D. course work through Mrs. Limkar was of great help. I could read all what was written, though many words could not ~~make meaning to me~~ be understood by me. Most others were totally ignorant of Russian language. Their job was

done through The ISSP interpreter Ram, who accompanied us.

It was a great feeling to be in the first communist country which was still a powerful one then; it could challenge Europe & USA. Even by the first impression (I think it was in January ~~25~~ 1975) ~~it~~ it looked beautiful. The statutes of Lenin ~~en~~ was tall, big, and affirmative of ~~a~~ future. My liking of Moscow or USSR was now without the ignorant propaganda against USA. I had seen USA & lives there. It was a great country too! Moscow had its own charm. Not understanding the spoken language and most of the written language was really a handicap.

We were all put up in the guest house of the Academy of Sciences of USSR (Gastinneetsa Nauk Academia Nauk USSR) I think we had a couple of stay in Moscow, some meeting, some gap to see things, Beans lake station etc.

Our destination was Kapustin Yar (KY) (The Cabbage Yard). We were taken by a flight to Volgograd again a beautiful city. The Russian aircraft looked very different from the Boeing aircraft I had seen in USA. They functions well. The buses were overly rugged.

Our travel to KY started

one night in such a bus - may be two of them. Some moonlight was there. But we could not find where we were going. The boisterous Indian crowd were cutting some jokes. It was almost like we being taken blind folded.

Later I came to know that KY was an Army Town. No foreigner was allowed to go there. We were the first to go there, at least in such a large group and to stay there for a couple of months.

I was trying to identify some writings in Russian and used to tell it loud. But that was of little use as we did not have any map. The Russians (or the Soviets) who took us were in military uniform and looked stern.

It is a great credit to the Soviet system that they managed to get us through without our knowing anything about the route. We ~~read~~ reached the guest houses there. Rooms were very small but clean & well maintained. The striking thing about the lavatories was that while they were

clean, the tissue papers were
not there; either old nicely
torn to size of Pravda newspapers;
and/or some ~~rags~~ webs plastics/
nylon wastes. It was a challenge
to use them especially after
having got used to nice toilet
papers in USA, even in the "lower
quality" ~~ones~~ ones we could
get in some malls / Peoples Drug stores.
Indian style cleaning was not
possible.

When we went to the
satellite integration hall a
huge one, it was difficult
to believe that they were
clean areas; pigeons were there

flying around; there ~~were~~ some droppings too. Otherwise ~~lifts, et~~ sliding cranes, and other equipment were technically perfect. Much more ~~so~~ huge and strong than what we would expect. Electricity supplies were equally good. Since the satellite teams had earlier experience of working with the Soviet side subsystem engineers and their equipment, there were no interface problems. For each of the subsystems (irrespective of whether Soviet ~~suppl~~ side

~~(592)~~ (589)

Supplies or not) there was one ~~a~~ Soviet side person identified & one ~~a~~ Indian side person. Each of them had to sign off final readiness (as also the problems & their resolution, rework & final certification). The documentation system was excellent, at the end of each day there would be a document for each of the sub-system & also for overall system related sign off documents in Russian & English. It was a fun to see the arguments, counter-arguments between the engineers from both sides, some time jokes

(~~593~~)(590)

etc. Sometimes a negotiation ~~will~~ would be tough on one sentence or word. URR ~~will~~ would be in continuous touch with them. URR would not let any of them to go out, even those who had successfully completed the work of the day — or even week in advance!

I also used to sit down with ~~[illegible]~~ URR when he was reviewing the final days work — the signed off documents (in some rare cases pending documents)

~~(394)~~ (591)

Prof Kovtunenko & Dr. Poppel
(Prof Director) (Dy Prof Di)

used to come and be there only for a short while. They would have some word with Prof URR.

Kovtunenko had ~~a~~ some (childhood) disability with his right hand; looked like polio attacked. He was still using ~~it~~ that hand. While reviewing things, he would take out ~~some~~ a small piece of paper and hold it in that hand. It was his check list written in Russian. He was an experienced satellite maker!

(592)

He would make his judgements as to which one to worry about. It was rather unfortunate that I could not speak Russian, as otherwise I would have benefited from his great knowledge. He was not good English either; so was Popper. There was so much endogenous knowledge strengths in Russia/Soviet Union. One had to see it to believe. The Soviet haters back home in India would like us to believe that they copied/stole everything from the West. Their entire approach to satellite engineering was different from that of NASA.

(59B)

The Soviets wanted us to live comfortably within the constraints they had in that military town, which had no need to take care of foreigners (even internal tourists). It was a missile base full of launch pads (many of them underground silos). We could get a glimpse of it when we had to go the launch pad.

The first big challenge they faced was how to face ~~the~~ as some 50+, boisterous difficult to regular young

Indians. We could not let into the military ~~cafes~~ canteen ~~or~~ Or dining room.

So they arranged for a place for break fast, & ~~dinner~~ lunch & dinner ~~in~~ in a place where we would be separate but under the close watch of a Colonel, whose duty was to see that we were transported. He would count several times. At the last minutes a couple of our engineers would get down and rush to the rest rooms.

(59/5)

The poor Colonel used to check all rooms incl. rest rooms & count again before he orders "Payakali" – (Yes – go ahead) to the driver. This was the fun for ten guys who would joke boisterously. After some time the Colonel ~~used~~ started taking my advice ~~about~~ for counting and ~~so~~ confirm to him, that all ~~are~~ were in ~~[illegible]~~ ~~to [illegible]~~ whether it was for moving for lunch & bringing back and returning.

(596)

Giving lunch & dinner for the Indian team was again a challage. Their cooks in the army canteen were trainers differently. Therefore they had selected two women (one around 45 yrs another about 30 yrs) who were residents in the KY town to cook for us.

Abot 70-80% of the team were vegetarian and that too not of the Russian type (actually in those days the only two veg dishes of Russians were Kaartofil — potatoes & Kapusta (cabbage) — boiled. This family women realised the predicament of the Indian young men (an average age of abot 25 years)

The usual Russian dishes — even the non-veg ones — were too bland for Indian palate. Veg one were totally unfitting: black bread, butter, kartoffel, & Kaputs. Even milk was not in plenty (rather it was scarce). ~~They~~

The two women (our master Chefs & Cooks) ~~to~~ sensed the tastes of these young men. Drew upon the culinary menu from the other (Soviet) republics from the south — like Georgia. They drew upon many other ~~pot~~ tinned vegetables: they prepared rice; and some of these spiced vegetables

in dry and semi-wet forms. One had to believe ~~of~~ how these young persons jumped at 2" rees, & ~~ragu~~ raagu '12 — ~~will~~ would be finished in no time.

As a bonus, I could get the Georgian shashlik spiced meat kabab, rice, bread etc. I ate ~~the~~ Russian ~~and~~ non-veg & veg dishes also for me it was a principle and also an adventure to eat what the local people ~~a~~ eat. Respecting the locale forms of food is a respect to the culture of people. This principle I follow it

even now, even in different
parts of India & I would ~~eat~~
in Goa what normal Goans eat &
in Nagaland what the local people
eat etc. I followed this principle
~~in~~ when I stayed in USA (1970-73)
Eat in Fisherman's Wharf Sea food
in San Francisco to Texan breakfast
when I visit Houston etc. Only
thing I was avoiding was
consumption of liquor even ~~the~~
mild ones like beer or wine,
even if it local ones. Also
I never smoked — not even now.
I wanted to speak local languages
but ~~I a~~ my work schedules

(~~180~~) (600)

did not let me pick up substantially any language beyond 1966 (my 22 years and after going (the transponder project) Only the speaking of Hindi improved in later years. Russian language knowledge almost froze at the level what was taught by Mrs. Linker. Still I used it to communicate with those women about food. Want in hot: zhanko ek. I used to help & especially my veg friends to communicate their version of vegetarianism: without fish (byes riba); without egg (byes yayitsa) ek I could

~~(581)~~ (601)

I could write a list of food and spices in Russian with its English translation so that they could show to the waiters.

So I had a good time. ~~eaching~~ eating all the dishes. URR used to comment: "I find only Rajan's bill exceeds one rouble." That was because others ended up only with ~~rice~~ "rees & ragu"

We ~~will~~ would come back to these women who patiently took care of all Indian personnel with the care of a mother/sister.

There were some spare time started getting available

as days passed. URR allowed the Indian team limited amount of shopping time. ~~Indian~~ The ISSP team had a lot of roubles with them as the convertible rupee checks ~~were~~ were made into roubles and they had to be taken spent; it could not be taken back ~~to~~ nor converted back to rupees! Prices were very low but items very limited. The ISSP hordes virtually invaded the shops in small groups. Actually some shortages would have been created.

The local residents were

amused to see us; men, women and children used to come out to us. A star attraction was Mr. Tarsem Singh, a tall, fair & handsome Sikh gentleman, with his nice turban & well ~~g~~ maintained beard under the facial net. Most of other persons in team were relatively short, dark a brown.

It was a pity that I did not know spoken Russian. At least I could have had a glimpse of their thoughts. But most of

(~~584~~) (604)

wished us by waving. In general there was a good feeling for Indians. (They would have been informed through the Party channels that we were Indians)

One important thing I decided to do during that period of my stay was to stop shaving. I had a desire to grow beard for a long time: may be there were multiple reasons: ranging from the beards of many European scientists who were great discoverers (there were many non-bearded ones with long

~~facts~~ head hair flowing down the neck; that of many revolutionaries idol being Karl Marx; many ~~this~~ Hindu Sadhus, bairagis or ~~Sufis~~ Sufi fakirs (they also attracts me!), Jesus; In addition practical problems of shaving in the early years when I was strongly committed to Indo-made blades (shunning the smuggles 11'o Clock); inspiration from many Bengali revolutionaries/ intellectuals from Aurobindo to Tagore & others. Above all my beard did not require any shaving to make it aligned; it had natural borders for moustache side and other two cheeks as well. So trimming was easy.

~~(586)~~ (606)

The reason of choosing my Russian trip for growing beard (as I grew head ~~beard~~ hair in ~~at~~ USA which was going through post-hippie adaptation by the elite some of them "unruly symbols") was practical. Even if ~~one~~ I skipped shaving a couple of days, it just to itch a lot. I had seen many start growing beard & quitting; it itches; then it looks funny for some days (people will ask "are you not well?" etc). It was therefore better to have it grown out a place where you ~~do not have~~ ~~no~~ are anonymous. Once it grows, I felt it won't be good. (I extrapolate from my black

head hair). That transformation was taking place in me which was to become life long. When I returned from USSR after the launch, I was a bearded person with long curly head-hair as well. Later I had for many years & such a ~~Kalos~~ 'Karl Marx' look with thick black hair.

Irony was that most people with whom I moved in ISRO/ DST/ DOI etc might not be aware of Karl Marx (nor was he in their radar)

Work on Satellite went on very well without any major crisis with the flight fixed around April middle → (may be 17th as well)

Prof SD was to join us only around the later period, when he had come he had asked for what can be brought

for ISRO teams from Bangalore
& The answer was some sweets
and lots of green chillis.

Ambassador D. P. Dhar
~~from~~ (from an Embassy) in Moscow
had asked Chandrasekhar then
from military attache places from HAL
was asked by him to go to
Kaputsin Yar ~~not~~ not only with
chillies but with lots of pakoras
of various sorts & Indian sweets.
I remember how ~~the~~ an engineer
pounced on them & finished them
off. Indian palate reigns Supreme!
(I learnt about this much later
in life!!)

When I met Chandrasekhar later some time, he told me that since Ambassador told him he got them made and took. He was later "caught hold of" by the audit: alas for Chandrasekhar D.P. Dhar had passed away. He told me that he was struggling with the audit for a couple of years! "They might have enjoyed those nice fried stuffs; but I am being fried by the audit!" Wonderful are the ways of working of Govt. I had to do later as Scientific Secretary, ISRO certain things for ISRO such as celebration of our human

flights at COSPAR at Vienna in 1984. I had arranged for it in an unconventional way More on it later at appropriate places - - - -

SD came and joined ~~up~~ us. He was updated. For this level Acad. Boris Petrov met him. A charming man. I also liked his very ~~figure~~ figure. When he spoke Russian ~~it flew~~ it was flowing like ~~Ghant~~ chant in a soft tone. He was Chairman Intercosmos Council, an institution created by the Soviet Academy

y Sciences (SAS) for dealing with
all international cooperation including
with ~~its~~ USSR's allies ~~East~~
European Countries. One
Vice-President was N. S. Novikov
(Nikolai). ~~He was~~ It was
told to us (not by Soviets)
~~but~~ that he was ~~a top~~ an
important member of Communist
Party of Soviet Union (CPSU)
and his role was mainly
that of a political commissar.
He spoke good English as well.
Our relations ~~became~~ grew
very well in a short period.

SD did not have much to do after a couple of days. But he was there as a moral support; also such a stay kept his own anxiety level low. SD had a remarkable capability of self-restraint. He was not going around 'poking around' the daily work. He left URR alone to his ways of running the mission there, taking only a brief review at the end of the day, that too as per the convenience of URR; fixing a time may put URR in a bind

as the real life problems on the ground ~~may~~ ~~migh~~ might need his presence.

I divided some of my time between my usual work done so far and SD. We used to talk other things of ISRO as well.

I found in my limited archives a fairly detailed note dated March 31, 1975 (typed memorandum with annexures) written as To: Prof. S. Dhawan Chairman, ISRO From Y.S. Rajan Scientist ISRO HQ Subject: ISRO's Problems and future, and their

their effects on me — a personal note. The next day 01 April 1975, ISRO was becoming full Govt — every thing about it would be Govt; I would also be a Govt servant!

As it appears to be my pattern of approaching my work & career, as it was [from 1964 when I joined PRL, that is; I look at the future work unfolding, possible organisational structures evolving, composition of main actors / stakeholders, and later

I put the organisation first and its interests. I identify what should be done by the organisation etc. They are mostly impersonal. Then comes my interests. I don't leave them to 'fate', ~~as~~ I find options and raise it to the big boss (It was VS earlier; then SD). An unique feature of my life was that I was able [concerning me] to raise the issues directly to the big boss, even while helping ~~them~~ him in his

organisational tasks: analysis of options etc. Some of it may go against my own interest as well!

Was it of help in my career? Or was it a hindrance, as I was too much exposed to the big boss? Or was my "systems overview" at a too young age, removed my "killer instinct" which partly comes at various stages of evolution of life/career through "ignorance of the total picture" and therefore focus on one's own self-interest?

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Well it depends on the 'viewpoint' one takes about success in life! More about these & in later episodes as they would unfold in later years. I had myself written about them to SD who remained as my sounding board and occasionally as a "punching pad" all through his life, even after he ceased to be Chairman, ISRO.

I will deal with that note of March 31, 1975 more elaborately a little

later.

* *

To continue through the launch story, the days for the launch were approaching. Many subsystems had been fully cleared. The subsystem engineers had been released to stroll around (not to go away from the place at KY). I distinctly remember one Soviet subsystem engineer coming out laughing and saying in English "I am now

a Project Director! I can move around!" He shrugged it keeping his hands in pockets and chest up & walking. It took a few seconds to understand! It was a great humour on the role of PD. ~~He~~ ~~We~~ ~~He~~ CRR may not have liked it, if he had told him then; ~~later~~ much later, ~~he~~ after lunch ok, he enjoyed it!

Looking back, unlike the Western propaganda, there

was no overwhelming fear in the engineers. They had their fun; jokes etc. ~~Perhaps they too~~ They would not have been allowed jokes against the Govt, President, PM, etc ~~Govt~~ CPSU etc. But they were happy, jovial & relaxed.

Amidst these, there was a problem from our Ambassador; an outgoing person, with strong political clout with Indian PM, then,

and having a Cabinet rank,
wanted to come and witness
the launch. But the problem
was, a Cabinet rank ~~Ambassador~~
from one of the very friendly
country had to be given the
highest protocol in terms
of place of stay, Carsek.
KY did not have any of it.
We were all living in a
place which was almost
like a dormitory, & though
~~some~~ with many single/double

(621)

rooms and URR & SD a little better! No way for an Indian Ambassador. So the Soviet side (from Academy) were trying to dissuade him and wanted SD also to support us.

Ambassador D. P. Dhar told SD, "When our first Indian satellite is going to go up, do you think I will sit in my room and wait for a telephone call? I don't care about protocols! I will

also stay like you people.
I want to be a part
of the excitement!"

SD did not have
any further opinion.

~~Th~~ DPDhar did not
stop ~~that~~ at and phoned
up ~~Th~~ Soviet Prime Minister
Alexei Kosygin in Russian
(I heard that DPDhar was
fluent in Russian and AK
was his personal friend),
that he was keen to

witness the launch. That did it!

Academy of Sciences USSR (AS-USSR) got orders.

Early morning launch of the satellite which was scheduled would have meant a night stay. So it was shifted to 10:30 AM so that our Ambassador could stay at night at Volgograd with all the protocal due for him & staff

early morning to come
and witness the launch.

Considering this & other
@ factors of satellite etc
the time for launch
was fixed at April 19, 1975
10:30 AM. I wonder have
a small extra pleasure
had it been April 17, 1975!
(my birth day, me turning 31 years).
I did not tell any body
including SD about my birth day.
I was usually shy on that!

And in ISRO such personal touches were missing then & also now! Now they may greet Chairman ISRO & Directors of Centres!!

Satellite was ready on the appointed day well before time on the launch vehicle. In fact the work had started of the earlier night and all fine. On the morning of 19th April 1975, we were all anxiously waiting for the arrival of an Ambassador. We

knew that it ~~won't~~ would ~~be~~ not take off without him. It was a Soviet order which the persons from AS-USSR ~~cannot~~ could not violate. ~~It~~ His arrival was getting delayed beyond the planned time. There was tension! He would be coming ~~a~~ by luxurious Soviet ~~Chair~~ Chaika (equivalent of Mercedes) with the ~~ento~~ entourage. Now with every thing with the satellite and ground systems fine, ~~we~~ all eyes were fixed on the Ambassador car. SD was not

used to such tension. It was visible on his face; he already had worries, since his mind ~~can~~ could look at various things that could go wrong!

Finally the Ambassador car arrived and he was directed rushed to the place where SD, & the Soviet General in-charge of the overall launch were sitting along with a few aides. URR & Kortunenko were in another block where details operations were monitored. I was with SD & Ambassador.

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Ambassador DP Dhar was in a great mood and started talking to SD asking a few questions about the well being of the satellite. SD was in no mood. So it was my task to keep the Ambassador busy, answering to his questions and explaining something more.

Finally the launch took place. A few minutes later, the General was so happy that he started

(P.T.O)

hugging everybody around.
He hugged the Ambassador
also with several words of
congratulations.

Ambassador asked me
" kya ho raha hai?"

I replied:
" Saab, abhi tho launch
vehicle se apna upagrah ~~tho~~ ko
achhi taraf se chod ~~tho~~ diya.
Unka launch mission accha
hua hai, isliya congratulate
~~karte~~ karte hain"

Ambassador: " Apna
upagrah ko kya hua hai?"
" Saab: woh jaane mein

With best wishes,
Rajan

aur ~~2~~ samay lagega."

Ambassador: "Yaney, unka part successful ho gaya hai. Apna hone ~~that~~ tak mein kyo congratulations ~~lo~~ loon"

He literally disengaged himself from the General and told me: "~~2~~ Apna success ho gaya toh turant batana".

Now I was in a fix. SD had said that it was not enough that satellite was sighted at Bears lake near Moscow or nearby their stations.

we ~~should~~ have our confirmation too!"

In the meanwhile SD got the info that while Aakash was sending signals right it had a problem; the spin bottle had not worked and therefore he was going to the part control centre in which ORR, Kovtunenko was there. SD could not tell about these to Ambassador. He caught hold of SD and asked him what was happening. SD ~~did~~ wanted to explain to him the details. Not so much for DPDhar. "Dhavan sahb, itna

details maybe nahin chaahiye; ~~si~~ sirf boliye, apna upagrah theek hai ki nahin".

Poor SD! He ~~was~~ not used to such a simplification. He said: "theek hai." ~~Ambassador~~ "Sir."

Ambassador: "Thank you, mujhe itna hee chaahiya. mein jaata hoon!"

Then he went out to go to the hall in which the celebrations had been planned with a great style. It was to fit the occasion of great friendship between the two countries. He ~~did~~ joined the crowd there & wish each other, ~~did~~ celebrate and make big speeches. I did not go with him; nor did

wait for us. After some time SD came out and it was known that the spin bottles (given by the Soviets) had fired and the satellite got into spinning mode! So the Indian satellite had started working.

By a prior working with GOI/PM, it had been decided that the satellite if successful ~~would be~~ would be named Aryabhata. So Aryabhata had been now in orbit after a 3 years of hard work ~~with~~ by URR & his project team with, of course, the help of USSR in ~~satellite~~ party making and fully for launch by USSR.

A number of electronics components, connectors, sensors etc were procured from USA. Through my coordination with NASA/GSFC's Lagow Q&A group, suitable Hi-Rel components specifications were given to get good quality components & the fact that Aryabhata was alive for 14 years in a proj for component selection and electronics/mechanical/thermal design by ISSP engineers. URR's ~~this~~ & Texas Univ. contacts got him a number of assemblies for scientific payloads. But for all that the overall systems engineering, systems management & project mgmt were under ISRO-ISSP-URR

control. ISTRAC also played a very good role.

So. It was a time for celebration. Beautifully laid out tables even within the KY Army Tent. A dais for VIP's. When we had reached after SD ~~was~~ had ~~been~~ there been satisfied with the spinning of ~~the~~ Aryabhata (AB) a little late, our Ambassador was on full swing giving a major talk on Indo-Soviet cooperation — past, present & future. I don't recall the details, as I was (as was most of the ISSP team members & corresponding persons from the Soviet side) in a different

world of happiness with the success of Aryabhata.

The Soviet penchant for hierarchy was so visible in the seating. The top persons on the Dais, and the two parallel ~~rows~~ columns for the dining tables represent the hierarchy. But that also gave a degree of freedom! After the speeches toasts were raised, small glass of vodka, to be taken top down! ~~That itself~~ But some would sip a good amount & fill up for next toast. This ritual for a while. Then the various serving begin & flow of vodka

too. Then the freedom for the lower hierarchies was great. Each one around their own small neighbourhood, four or ~~five~~ six or eight, raise a toast for any thing: "for the beautiful functioning battery" or "antenna" etc and had many toasts & downing of vodka. And some eating. The Indian teams had their veg food.

I was seated near N. S. Novikov. It was a great elevation for me; I was a staff of a big VIP. In Soviet hierarchial calculations I was up! But it was

also a good learning period.
First about drinking. N.S. Novikov
knew that I ~~was~~ did not
drink liquor from ~~a~~ of a few
earlier occasions; he tries to
cajole me to take on that
day.

"A great day! Raise a
toast Rajan!"

Also, "You know our Soviet
women do not like of men
who don't drink!" &c

I said, "No!" But
poured water in the vodka
glass and raised it!

~~He~~ NSN said "Rajan!

You should not raise a toast with water. You can have wine or fruit juice if not Vodka!!

I requested him to get some fruit juice & he did.

"~~I~~ I raised a toast with fruit juice in a separate glass (not in Vodka glass) and said " For our fruitful cooperation!!"

He did too with Vodka & said " Rajan, you are mischievous fellow!" fondly.

Later he gave some serious management lessons. " You people have been

lucky: You got the first launch itself as a success. We had failures. But let not this success go to your head! Not good for ISRO not good for your career!"

I was very much reminded of Greg Andons of NASA, who would have been around the same age as Norikov. ~~They tr~~ Both treated me fondly and gave me lessons for a good life and for success in organisational matters. I have photographs of Norikov and signature. I have only

the letter & signature of Greg.
I have to check my slides
from USA ~~to~~ whether I have
Greg & Patti's photos.

NSN did not comment
any thing on my growing beard.
That afternoon was for
enjoyment & rest. Many engineers
of ISSP had also taken their
vodka beyond their limits. (Many
of them drank well, a habit
they got from their engineering
college; but during the
Satellite mission days, they
did not have much opportunity.

as the work schedule was tight.
I think the next day also
was off ~~in~~ for shopping en
& some wind up of equipment
URR & a limited number
were needed for ~~tracking~~
seeing satellite track data
a few times a day.

It ~~is~~ was in
next day afternoon or a
day after that the two women
after ~~our~~ lunch was over
wanted to greet all of
us. It was announced earlier also,
well in advance.
Lo & behold! Not ~~two~~ even
ten turned up!

I was ashamed of our countrymen! For two women who had disturbed their regular family life to work for all these persons, worrying as each of the menu, ordering a whole of vegetables, rice, milk etc which were rarely used in that town, and feeding them with care, when they called us, no one to care to ~~come~~ come, let alone presenting them with some gifts. Ram, who was a geologist but acted for ISSP as a translator had arranged for some gift.

I was very particular to attend. I don't know how they would have felt that from the army of eaters only 10 or so turned up there. Their faces did not show up. They were now in a different not the usual cook ~~waiter~~ cum server mode. They were relaxed. After some time, the elder among them gave a speech which was duly translated. She spoke about India - Soviet

people friendship, about films of Raj Kapoor, about goods from India... all of it were about friendship between people. Did not look like a Party dictates speech. It was ~~short~~ Spontaneous and fluent.

In the end both of them opened two big bottles of Champashka (Russian Champagne) and started pouring for us. I had to take a

Split second decision whether I sticked to my 'teetollership'. First of all, the whole event was out of affection, care of people (individuals) — no pomp and show, no photography, no formality ...

½ Do I also do a nakra? ½

~~No, No~~ "No, no, give a fruit juice!"

If it were a full room with all fifty persons, most of whom would have loved a free champagne, it might have been different situation!

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We were handy ~~to~~ TEN!

I extended my glass too which was filled! We all raised the toast for all of us, our families and for the Indian & Soviet people.

~~I sip~~ I sipped my first few millilitres of of alcohol, through the champagne given by those two women who took care of us. I don't recall whether my glass was filled the second time.

So just after my age of 31 years (after 17 April 1975), Y.S. Rajan became non-teetotaller, something Greg Andrus & N.S. Nanikar — wanted and could not make.

Later in my career, I had to entertain many persons — international teams, internal ~~ISRO~~ Indian teams, Press & media and several others for ISRO, for DST, for TIFAC, etc. I had to take part in many such functions organised by others — in India & different

countries. That too I had many crucial roles, sometimes lead roles.... In the years 1970's, 1980, 1990's ek, not taking alcohol yourselves and ~~feeding~~ giving others (which was very much needed in those years) would have been difficult (except for medical reasons!)

"Don't trust a guy who ~~do~~ does not take a drink and still gives you a negotiates!"

These were those days.
Just as an engineer or systems engineer, I could have continue ~~to~~ with my non-alcoholic mode. Not as a major organisational representative, which I turned out to be later!

So Destiny (God!) was guiding me, I guess. In an innocuous way, in a pleasant way! There were no challenges to Y. S. Rajan's pride as was done by Greg 'I'll make you a non-teetotaller

before you leave USA!"

Or a gentle teasing by Novikov

"Soviet women don't like fellows who don't drink vodka!"

The event went off well, making a major impact on my life: Y. S. Rajan was returning with a beard and also as a non-teetotaller. Of course, above all with a great feeling of success of Aryabhatta, for which I had also contributed from the beginning.

I did not tell anybody

I felt none of them
had the sensitivity to understand
that event when the women
offered us a send-off champagne.
I told Anna on return,
she took it easy.

* * *

Work wise it was packing of
equipment for most of the
ISSP team, on way visit to
Beaulake station for some of
them. Some shopping in Moscow
I also did, some souvenirs ek

But. We also finished
an important job of signing

of MOU for the ~~Indian~~ second satellite SEO. It was under low key processing. The Satellite design was almost like Aryabhata with also subsystems given by the Soviets, as ~~it~~ it was earlier. Indian ~~side~~ side will put a different payload, ~~TV~~ slow scan TV camera (by George Joseph) & passive microwave radiometer (SAMIR) by ~~the~~ OPN Calla. The demand on the control system was slightly more rigorous, ~~than~~ about which the Soviet side had studied earlier. Now with a good

Success of Aryabhata, it was also a good political advantage for USSR to sign for the second, with the launch scheduled for 1979.

Fast forward and return home. ~~This~~ A lots of euphoria. But only for a But even then typical of Indian elite & middle class, ~~a~~ debates and ~~Control~~ controversies as to whether Aryabhata has to Spelt so as ISRO did or Aryabhatta. They had some thing to cheer.

SD had got it ~~to~~ selected earlier by Prof Vasudevamurthy &

vetted by a number of Sanskrit scholars.
Even as ~~they~~ that was going
~~on~~ on, one disaster struck!
~~It~~ The power supply feeding
to the scientific payloads,
which had no redundancy
(as it was not primary mission
& due to mass/power constraints)
malfunctioned (failed). It was
~~not~~ not easy to underplay it
as it was not merely a payload
from PRL (X-ray payload)
but also from TIFR. They were
unhappy. The news spread.
Many commands were tried; ~~it was~~

some hope was invoked whether it might recover. Prima facie, it was due to the corona discharge of the high ~~vo~~ voltage supplied to X-ray payload. General rumour in ISRO was that URR was in a hurry to switch it on, against the technical advice. It was (is) normally a practice to switch on high voltage items only after a few days when all the ~~resi~~ residuary air particles would ~~be~~ have ~~est~~ escaped & there was a very good vacuum thus preventing corona discharge.

~~657~~ 657)

I don't think a thorough review took place. In any case SD understood that GRR was a man in hurry (otherwise he would not have accomplished the impossible mission with such a deadly schedule for Aryabhata). Fortunately all other items of Aryabhata were functioning superbly. As per the success criteria approved by the ISSP Board, etc, Mission success was 85%. Scientific payload ~~was~~ had low marks. But had it worked at least

for a few months, it would have been great. There would be some good Space Science papers from India.

Well, one had to face it. SD with his approach to openness used & various forums to explain about the main Mission goals ek. Indians (elite & media) were cynical even at that time (@1975) Also there was general turmoil in the country. Even while the PM Indira Gandhi & was powerful, she

She had her ~~the~~ enemies, ~~and~~
a number of leaders including
Congressmen working against her.
JP was stirring the pot
of ~~the~~ rebellion, ~~and~~ and also to
some extent anarchic behaviour
of the crowd — many students,
youth included.

Check → ~~It~~ One ~~can~~ should
see this period as it at
June 1975 when Emergency was
imposed! Just over a month
of our Aryabhata success. No
wonder the press & some elite
wanted to ~~be~~ make it appear

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That ISRO was finding an alibi in rational mission criteria etc to "cover up" its failures. For them, it was an after thought. The TIFR scientists too, who had good reason to be unhappy & even angry, would have also got the others in TIFR against URR. Much later, when I was Scientific Secretary ISRO and inherited all the files of PDB starting from the early days of ISRO (VS writing to Homi Bhabha: "Let us discuss Space Research over lunch")

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I had arranged them carefully with the help of J. Raja. We only took out those which were notes from PDB for tea/coffee or tour programme. JR had a deep sensitivity for ~~historic~~ items of historic significance. In those carefully sorted out papers (which I had ordered to be kept carefully – hope ISRO had kept them), I had seen a whole set of letters from TIFR & other scientists to PDB, ~~Chair~~ SD etc (even I think to Prof MGKM) against Prof URR

being PD of the ISSP Satellite & also PI for a Scientific Payload simultaneously as it would cause conflict of interest.

There were other complaints too. Some pacification would have taken place by PDB, SD etc. but not substantially resolved. It was one of those lingering problems, which was carried forward "let us go ahead and see later!" type.

These things were festering and erupted when their payload could not

operates for no fault of their own. They had also worked hard for 3 years, ~~on~~ just ISSP teams worked!

So ISRO had a problem before it, though in some terms Aryabhata was successful.

I remember ~~once~~ that during this period V. Siddhartha (Sid) had brought Abu Abraham the famous Cartoonist and also a Rajya Sabha M.P. to Peenya to explain. ∀ Sid knew him well. # Sid gave him the documents arising at the success criteria for Aryabhata

several months before the launch and how the performance was vis a vis that

AA was very impressed. "Give me copies of these, I will go hammer & tong against those guys who write things without looking at these!"

SS gave him but added: "Abe! I don't know whether it will help. I find that Indians are generally ~~not~~ jealous of success and intolerant of failure!"

Yes in Aryabhata launch

ISRO had a great success, ~~first~~ first for India, Indian institutions in a major way. ~~There would have~~ That would have many persons jealous of ISRO, SD & URR. So they were nit-picking on ~~Araya~~ Aryabhata spelling! Then this failure of payloads, though ~~a~~ relatively of low markings for this ~~p~~ first Satellite; the great intolerance could be poured on ISRO, URR etc.

There were some who were trying to argue that why did you name it Indian Scientific

Satellite? Why not technological?
It was first Indo-Soviet Satellite.
(ISSP)
As I had explained earlier that
word Soviet caused some problem
in procuring components in USA;
hence Soviet was replaced by Scientific!
If we try to explain that it
would have taken many nasty
turns! Also the jealous, intolerant
ones would latch on to our
dependence of USA's components!

ISRO wisely decided to
rough it out! Life went back
to normal in ISRO. ISSP started

working on its next project SEO.
ISRO was getting ready for
SITE! ATS-6 was already
launched by this time (30 May 1974)
and was doing well. I was not able
to follow it up well. It in
terms of details of performance
But it was getting ready for
movement to India.

* * *

Taking a pause from the purely
technical & programmatic part of
my life's description, like launch of
Aryabhata & related work; and the
next satellite to follow, let us look
at the 31 March 1975 Memorandum
I had given to SD. I was really

(P.T.O.)

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Supposed to see it & read it. I wonder where I had it done. Normally I used to write & give for typing in those days as I did not have a dedicated stenographer. In the later years say from 1976, I used to mostly dictate. My colleagues ~~who~~ who had seen me in those days still say "Rajan, the dictator" — I used to dictate to about 3 to 4 persons near - simultaneously disposing of the papers or reading a new one. Even many persand notes I had dictated to persons like Suresh Rao.

Most likely this note would have been written & got typed & given to SD. I had gotten it back from him. The file reference says persmal; even those would be in ISRO office. But ~~Thus~~ the date of this one, I would have been in KY and SD would have just arrived a few days before launch. The note also starts with the fact next day 1 April 1975, ISRO would become

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Govt and describes about ~~two~~ its implications in the working of ISRO. Most likely I would have got it typed at KY through the steno/typist staff who also accompanied the team. I was friend with all!

The final main thrust of the note ~~is~~ had been about my career path. I had been given jobs (after my return from USA & being at ~~HQ~~) in ISRO HQ by SD (~~earlier~~ after earlier ad hoc arrangement with SAC (ISSP etc). Regarding my role ~~Even then~~ SD's whole mind had been to utilise my satellite experience ~~with~~ for bringing systems to ISSP, to ~~monit~~ monitor all technical details, ~~etc~~ briefing him etc. I was doing them effectively. Now the launch ~~is~~ was so near: I ~~had~~ have been having questions as to what further for me! I can see one pattern: I had not accepted the idea of leaving it to fate (dey ~~kuc~~ khuda kai raah par) or with a philosophy that "we will cross the bridge when it come!"

Was it because of some form of insecurity or over emphasis on "planning". That had been so right from choosing the Ph.D topic etc. But at the same time I had accepted the practicable: going to Kanpur or accepting the transponder project both of them ridden with uncertainties! I had really commandeered the course of events for transponder ... later working my way for a position in BRR's ELD(R) division, while 'fate' took me away somewhere else totally different! USA, MIT, NASA etc. Now I was a very different person even in my philosophical, political and social outlook!

But still the yearning had been not to give up questioning the

the options available and to optimise for myself: It was fortunate that SD had given me that "space". I had been waiting to him, for such matter a better way to express as during discussions he might lead me away some where!

How will he read them is a question mark! But the fact remains that he had kept them safely and returned to me the whole bunch of them a day before he retired. He had carefully preserved in a Russian (brown) hand bag! (Unfortunately the bag was damaged by termites ~~in~~ in Delhi but the papers were intact, as the bag was very thick & safe!)

This particular note is very clear & articulate about the

the 'vagueness' of the ISRO HQ role for which he had selected me; how would it shape? & give options.

On the macro-organisational side, I had analysed the problems & impact of ISRO becoming Govt (in a way it would also affect me!)

I think instead of writing a precis of what I had written in the memo, it is better to make it a part of this writing and therefore with pagination along with this manuscript.

Para 1.0 states the intent of my memo.

INDIAN SPACE RESEARCH ORGANISATION

HEADQUARTERS

(674)

MEMORANDUM

STRICTLY CONFIDENTIAL

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

File / Ref : Personal

From : Y.S. Rajan,
Scientist, ISRO HQ.

Date : March 31, 1975

Subject : ISRO's problems and future, and their effects on me - a personal note.

1.0 Like a programmed robot I have been doing many analyses, monitoring and reporting regarding ISSP, which I will continue to do till launch and slightly beyond. That iron discipline of mind, which you have instilled in me and to some extent in the Project is for its SUCCESS, which I feel WILL BE OURS.

Besides these, I have been doing some technical and scientific analyses and writing reports which can form a good basis for many a decisions - policy type or otherwise. Also there are many mundane chores to be done at HQ.

Unfortunately one cannot leave things at that and be happy. A slight introspection, observing of working environment, little projection into one's own future etc are also needed, at least for sheer survival. These activities, done a little bit, lead to many disturbing conclusions which I want to convey to you, in the following.

2.0 First and foremost, from tomorrow we are being governmentalised. It brings along lots of administative rules, and red-tape along with it. Unless watched in detail and curtailed, the Secretariat will set the pace for ISRO programmes. The Secretary DOS, the AS & JS may be very understanding; but many matters on a daily basis cannot be brought to them. The US's are what they are in their culture.

2.1 This is one aspect of governmentalisation. Another aspect is the terrible amount administrative procedures being introduced. To tackle these the only way ISRO or DOS would deal with the situation, is to delegate signing powers to "Senior Officers". This definition of Senior Officers for administration has always meant salary structure. Once this is done, which would be done to meet the horrendous administrative procedures, you have set up a salary based hierachial structure which has not existed that much in ISRO. With governmentalisation the power will be wielded through authority to sign. Let me remind that in the existing ISRO nobody is really keen on "authority to sign".

Hence I am afraid that we will soon introduce, governmental seniority system superseding merit, capability etc.

.... 2

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3.0 Having touched upon problems relating governmentalisation, let me come down the existing ISRO itself. It is none too rosy. Especially the HQ-Centre relationship and Programmatic controls.

What is HQ? What is its role? The Centres would like to reduce it just only to Chairman, ISRO. They hate questioning or controls. They would like the few men around the boss to be mere post-offices. It is all okay as one could have many wishes. But is it good for ISRO programmes?

Are there any instances in ISRO where people at Centres themselves coordinate with other Centres of ISRO without intervention of Chairman, ISRO? I am afraid such instances are zero. If this were so, without Chairman's control we will have three to four parallel ISRO's within ISRO, each doing many items subcritically. How one controls these? The present mode of Chairman's reviews and some of us from HQ as minutes-recorders has some very good effects; but this is not enough for instilling System Discipline. It requires more (continuous) pressure. This means some form of Programme Offices around Chairman; some delegation of executive powers to them. Can this be done? How can this be done? Will the (ISRO) cultural problems demand induction of high salaried people into these tasks? If so, do these "high salaried" people perceive the ISRO-HQ problem, in a programmatic sense?

I had requested my SPAC colleagues to think on the Program Offices. A copy of the memorandum sent to them is attached herewith (see Appendix-1). Soon they may hopefully work out a consolidated list and send to you.

3.1 Let us assume for a moment that we do not name Program Offices and still run program control through virtual offices, that is, through some scientists doing analyses and monitoring for you, as is now. Here again, the present mode of poor staffing and internal organisation within HQ is not conducive for work output. As there are no fixed guidelines of mode of work between individuals some of us are just overloaded. Horizontalism is an excellent principle, if everybody understands the rules of the game. Some of us have to beg Centres for data (as we do not have locus standi) and on the other side also beg within ISRO HQ and have no support! I will have to bring this to your notice, - this problem of supporting scientific staff to the "Senior" scientists and their relationship.

Thus to summarize, your SPAC is in a situation where it feels moral responsibility to ISRO's programmes without any locus standi with Centres or the Projects, and even locus standi within HQ. It is a band of four or five individuals thinking they are holding some banner of Renaissance or Revolution. I don't say that these individuals, including myself, are perfect beings - we have our shortcomings, jealousies and the rest. But there is some cohesiveness in this group, probably because it is near the Source!

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4.0 It is at this point I am raising my personal note.

To summarise my perceptions:

(i) There is an impending danger of governmental salary-wise seniority engulfing ISRO activities through the backdoor of administrative procedures

(ii) Poor definition of ISRO HQ and its role vis a vis Centres and programmes is making programmatic control ineffective; if left like this, there could be three or four ISRO's within ISRO functioning subcritically.

(iii) You have a band of four or five individuals, who feel moral responsibility to ISRO programmes without any locus standi. I am one of them.

4.1 So what do I do after launch, which in all probability would be a SUCCESS? It is not just a question keeping myself busy. I can do lot of reading, analysis, planning of ISSP-II, the Telemetry, Tracking, Command Network Study and so on. How do these activities weave into ISRO programmes or my own aspirations (of which I have given a fairly detailed write-up earlier). An escapade into Centres or Projects also have many problems, as there are basic systemic problems; I have described these to you.

I am not asking for the moon, nor do I insist on ideal solutions, as you may know. I am in search of operational, but viable solutions to the problems. Only you can show the path way or allot a path. That is why I am writing this memo to you, though I very much wish that I do not load you with problems. I am sorry for this selfishness, but in the present context it has major elements of need for sheer survival.

5.0 To end this memo, I wish to quote a verse from Gitanjali:

"DELIVERANCE? WHERE IS THIS DELIVERANCE TO BE FOUND? OUR MASTER HIMSELF HAS JOYFULLY, TAKEN UPON HIM THE BONDS OF CREATION; HE IS BOUND WITH US ALL FOR EVER".

I seek from my master to set up the process of creation (in ISRO) so that one could develop the bonds.

Regards.

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M E M O R A N D U M

For: Dr K S Prabhu/Dr R D Sharma/
Dr V Siddhartha/Prof J P Singh.

File/Ref: Org/Man.

Date: March 21, 1975

From: Y S Rajan,
Scientist, ISRO HQ.

Subject: Programme Offices at HQ.

1.0 Some of us were drafting a management plan for ISSP-II. It became very clear during this exercise that establishment of Programme Offices is a must for ISRO HQ, if various Projects/ Programmes are to be integrated and coordinated properly. For example, ISSP-II has "Programme Contents" of

(i) Remote Sensing Applications

(ii) Satellite Technology Development

and (iii) Telemetry, Tracking, Command & Data Acquisition.

Unless separate programme offices for these elements are established in ISRO HQ, the Project will take the development of elements in its own way, as currently happening in ISRO (for ISSP-I, SITE and SLV). It is projects which run ISRO, and not ISRO Programmes, the Projects!

In order to reverse this trend, we should think of setting at least six Programme Offices as under:

(i) Launch Vehicle Technology Development Programmes Office

(ii) Satellite Technology Development Programmes Office

(iii) Telemetry, Tracking, Command & Data Acquisition Programmes Office

(iv) Communication & Navigation Applications Programmes Office

(v) Remote Sensing & Meteorology Applications Programmes Office

(vi) Space Science Programmes Office

You are free to modify these.

..... 2

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2.0 I am describing a concrete example of what a Programme Office will do, by explaining Satellite Technology Development Programme Office (Appendix-1) and will do one for Space Sciences. You are requested to send such a description in areas as suggested under:

Action on (i) VS
" (iii) KSP
" (iv) JPS
" (v) RDS

If you give drafts by Monday evening, it could be compiled and sent to Chairman.

Encl: Appendix-1

(67) DRAFT

APPENDIX-1

DESCRIPTION OF SATELLITE TECHNOLOGY DEVELOPMENT PROGRAMMES OFFICE

This office will be based in HQ and will consist of a small core of scientists overseeing the Programme elements of Satellite Technology Development relevant to ISRO. The tasks of this office will be done by this core team in consultation with Centre personnel wherever necessary.

The tasks of this office are:

- Coordination with other Program Offices (Application & Science) for defining Satellite Systems and conducting studies
- Advanced Planning for Satellite Technology Development, related to these studies
- Analysis of priorities in Satellite Technology Development and related facilities
- Definition of Satellite telemetry command & tracking standards in coordination with TTC&DA Programme Office
- Monitoring of identified Satellite Projects (executed by Centres)
- Monitoring of technology contracts related to satellite development (Detailed technical monitoring will be done by persons from Centres)
- Coordination of activities and facilities relating to High Reliability electronic components.