India Smart Grid Forum

ISGF Advanced Distribution

R-APDRP STUDY REPORT - ADDENDUM

ISGF ADVANCED DISTRIBUTION

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Introduction

This addendum is to provide clarifications to some of the points raised by stake holders after submission of the R-APDRP Study Report to the Ministry of Power.

1. Readiness of Stakeholders

The overall opinion is that the utilities, consultants and especially the implementation agencies were not ready to implement R-APDRP in terms of manpower capacity and domain knowledge. While utilities lacked IT knowledge and IT savvy manpower, most ITIAs and ITCs had very poor knowledge of power distribution business.

"They did not know it was impossible, so they did it"

Nothing can capture the fait accompli of the electricity distribution companies (Discoms) that are implementing the R-APDRP Part-A projects than the quote above! It is indeed the first of a kind nation-wide IT implementation project in the world that covers 63 electricity distribution utilities, xxxxxx employees and xxx million consumers, to be implemented in 18 months and all packed in one contract per state.

Whilst all R-APDRP Part A IT projects have faced some challenges, the levels have varied from some projects experiencing huge difficulties to some with negligible issues. It is widely recognised that the biggest challenges facing are with the implementation of GIS and AMR/MDM/MDAS and these were mainly due to the capacity of the utilities and implementing agencies and the time frames permitted for completion of the project. The capacity issues can be attributed to the mass deployment 'big-bang' strategy for the project, which seriously depleted the very limited resources of the supply chain in the country.

When compared to similar projects globally, nowhere has such a large-scale project implementation been attempted. Only as part of the post WWII reconstruction did Europe and the US experience such an immense infrastructure development and since then most technology upgrades have been as a result of privatisation or regulatory evolution and the general need to improve profit through better performance. In addition, technology upgrades have usually been single product focussed such as utility-wide SCADA or ERP implementation and not full business process reengineering, IT, SCADA implementation and equipment upgrades all in one go.

Considering the European Smart Meters initiative, the EU has allocated 7 years for implementing approximately 300 millionmeters by 2018. For GIS, Europe and the US are in various stages of GIS implementation according to their need. Some utilities are in a process of or have migrated from traditional CAD based environments with graphical and alphanumerical data dispersed over several files, towards a database-centric GIS are in a similar position to India - starting from

scratch. Projects are however phased and they focus on integrating data where it exists already or mapping new data when it doesn't and then integration with all other business processes from IT to SCAD and Workforce and Asset Management. Typically these projects take no less than 3 years to implement and in the case of some of the 'best' mapped utilities these processes have evolved over 2 decades.

Enterprise-wide billing systems and CRM normally take around 2 years to implement when considering migration of all existing data as well as capturing new data and SCADA/DMS implementation from concept to completion takes no less than 2 years.

Details of IT implementation at some of the Indian Utilities are given below:

DETAILS OF IT & AUTOMATION SYSTEMS IMPLEMENTED IN INDIAN UTILITIES

Systems/ Applications implemented	**Tata Power Bombay**	**BSES Rajadhani, New Delhi**	**NDPL**	**Reliance Bombay**
	(485 Sq KM; 2.7 lakh Customers)	*(750 Sq KM; 1.7 million Customers)*	*(520 Sq KM; 1.2 million Customers)*	*(384 Sq KM; 2.3 million Customers)*
IT Infra: LAN, WAN, Data Center	Completed in April 1998; and upgraded many times	July 2004 to June 2008 (60 months) 100*2mbps , 150*512Kbps , 105*128Kbps , 126Grid Locations*2mbps , 2 Data Centres	1 year (started from 2003; main data center in 2005, DR in 2011)	115 offices - 1 Year
Customer Indexing and Asset Mapping on GIS	Indexing of 2.7 lakhs Customers and Asset mapping completed in 26 months (Feb 2010 to March 2012). GIS integration with other enterprise systems in progress.	2007 onwards; still going on. Assets mapping up to DT level is completed on GIS; Consumer indexing is done on Oracle – yet to be mapped on GIS.	2005 – 2010 1.2 million consumer indexing – 2 years; 3.1 lakhs poles, feeder pillar etc- 1 year; GIS-SAP-FAR integrated Asset Management on GIS – 6 months	2.3 million customers – 4 years (April 2004 to March 2008)
Billing System	SAP based Billing system covering all consumers implemented in April 2001 to October 2003 (31 months); upgraded to ISU/CCS in 2007.	SAP ISU/CCS – 2 years (July 2009 to May 2011)	Home grown systems developed since 2003; SAP ISU/CCS – 15 months (completed in Feb 2011)	1 year

	Tata Power Bombay	BSES Rajadhani, New Delhi	NDPL	Reliance Bombay
Customer Information System/CRM	CIS implemented in 2004 (5 months). New CRM system under implementation.	Part of ISU/CCS	Part of ISU/CCS	2 years
Mailing System	-	5 months	2 months (2003)	1 year
Customer Portal	4 months (2010)	Nov-2009	2 months	
AMR	For Industrial & Commercial consumers: 1500 meters - 10 months (Nov 2010 to August 2011)	5850 consumers, 1500 Grid AMR – 2 years	50,000 meters – 1 year	45,000 meters in 2 years
SCADA/DMS	SCADA was implemented 10 years ago; DMS to start in 2012	42 Grid points – 2 years	68 Grid points, 450 FRTU, 450 FPI : SCADA-3 Years, DMS- 4 Years	70 Grid points; old Siemens system implemented in 2002 (34 months) was modernized with ABB system in 2006 in 14 months; DMS covering 846 11kV S/Stns under progress since 2007
Energy Accounting/Auditing	3 months (in 2005)	Ongoing	6 months	-
Load Forecasting	Not implemented	6 months	1 year	27 months (includes weather forecasting integrated load forecasting)
Outage Management System	Not implemented	Not implemented	31 months	25 months
Mobile Crew Management System	Not implemented	Planned for 2013-2014	-	
Distribution Automation	Not implemented	Not implemented	4000 RMUs (C&I on 450 RMUS): 2 years	

The above Discoms are much smaller than the average size (> 5 million consumers) of the 63 Discoms executing R-APDRP; and these ones being privately owned and located in Metros have better access to resources – both their own and contracted. Still they have taken about a decade to have implemented all the systems covered under R-APDRP.

However in some states the implementation was less of a challenge because they had realised the importance of manpower capacity and a strong organisational structure, at the project conception and immediately took action by carrying out a training and capacity building needs assessment, devised a communication and awareness strategy plan and prepared a DPR/applied for a loan under R-APDRP Part C accordingly. Also some ITIAs took the initiative (at their cost) to carry out training and communication programmes themselves. All of this had a positive impact on the project. The project timelines (18 months for implementation) was highly ambitious – drawn out of total ignorance of what it takes to deliver such complex transformational programs.

Coordination and responsibility have also been identified as challenges, however there have also been extremely successful initiatives, which have taken place to manage these issues, such as the formation of core teams at a Discom HQ and field levels and well-structured project charters. These initiatives have been recognised as best practices and included in the revised implementation strategy as discussed in the Study Report.

Whilst all parties have faced huge challenges to be where they are today, those challenges are not foreseen to be any different to similar projects deployed on such a large scale. Having learned from the past experience, the inclination now appears to be more towards collaboration among all the parties to leverage the investments in built capacity and greater understanding of the project processes and benefits.

All of these activities will require additional capacity in organisations whether in the form of additional manpower or training.

In conclusion what has been attempted under R-APDRP is hugely ambitious but given the less advanced starting point compared to utilities on a global scale, completely necessary in the Indian context. What is critical now is ensuring that what has been done already is leveraged and is made sustainable; which means: Discom-wide deployment of all IT systems and processes for maintenance of analysis data and evolution to the next level of performance through smart grids.

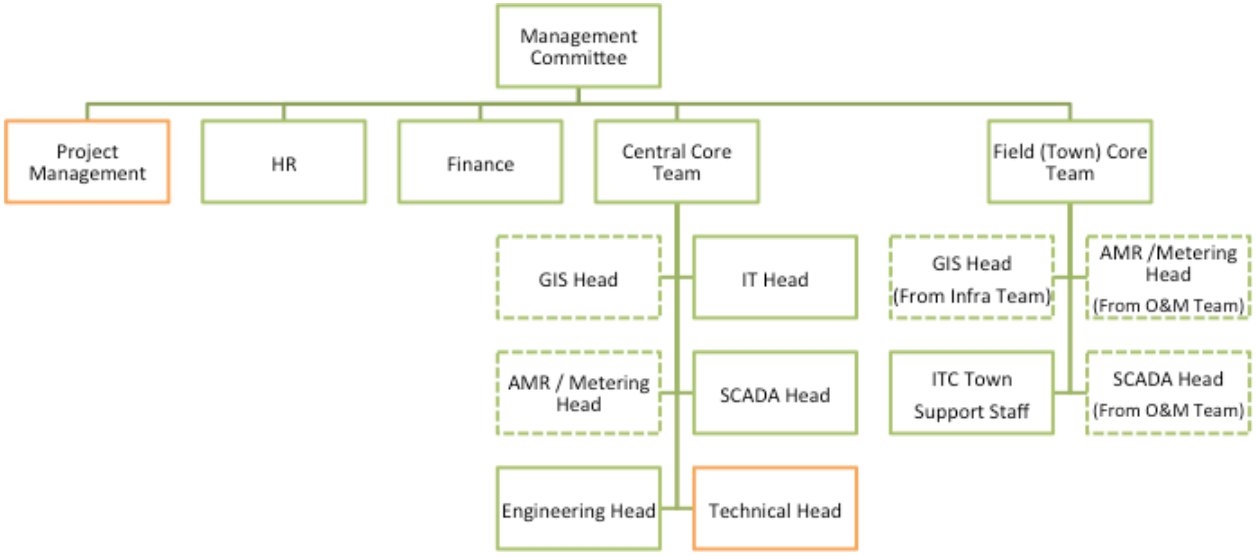
2. Implementation in states having more than 1 DisCom

Based on feedback from the field and to 'pave the way' for future private sector participation in DisComs, whether in the form of managed contracts or franchises, it is recommended that where there is more than 1 DisCom present in a state, that DisCom should have it's own systems and applications including data centre facilities. It is not necessary for there to be any additional cost associated with such strategies as hosted services can provide an economical alternative.

3. Organisational Structure: DisComs

The following diagram describes the recommended organisation to be formed at the utility level. The project team(s) is to be governed by a management committee with the ultimate responsibility lying with the chairman of that committee.

The diagrams below shows the project teams to be formed at central and field (town) levels:



The utility/project owner should form a multidisciplinary Core Team at the central and field (town) levels. These teams shall consist of representatives from the various key areas (IT, GIS, Engineering, Metering, Automation, HR, Finance, Quality etc.) to anchor the project in their respective areas. The core team members report directly to the management committee and ultimately the Managing Director of the utility.

The Study Report also refers to specific training and capacity building requirements for the formation of such a team.

4. SRS and MTS

There is no suggestion in the Study Report that any software application should be changed. However, In order to build on what has already been done, the Study Report does provide recommendations on how some functionality could be enhanced and processes improved.

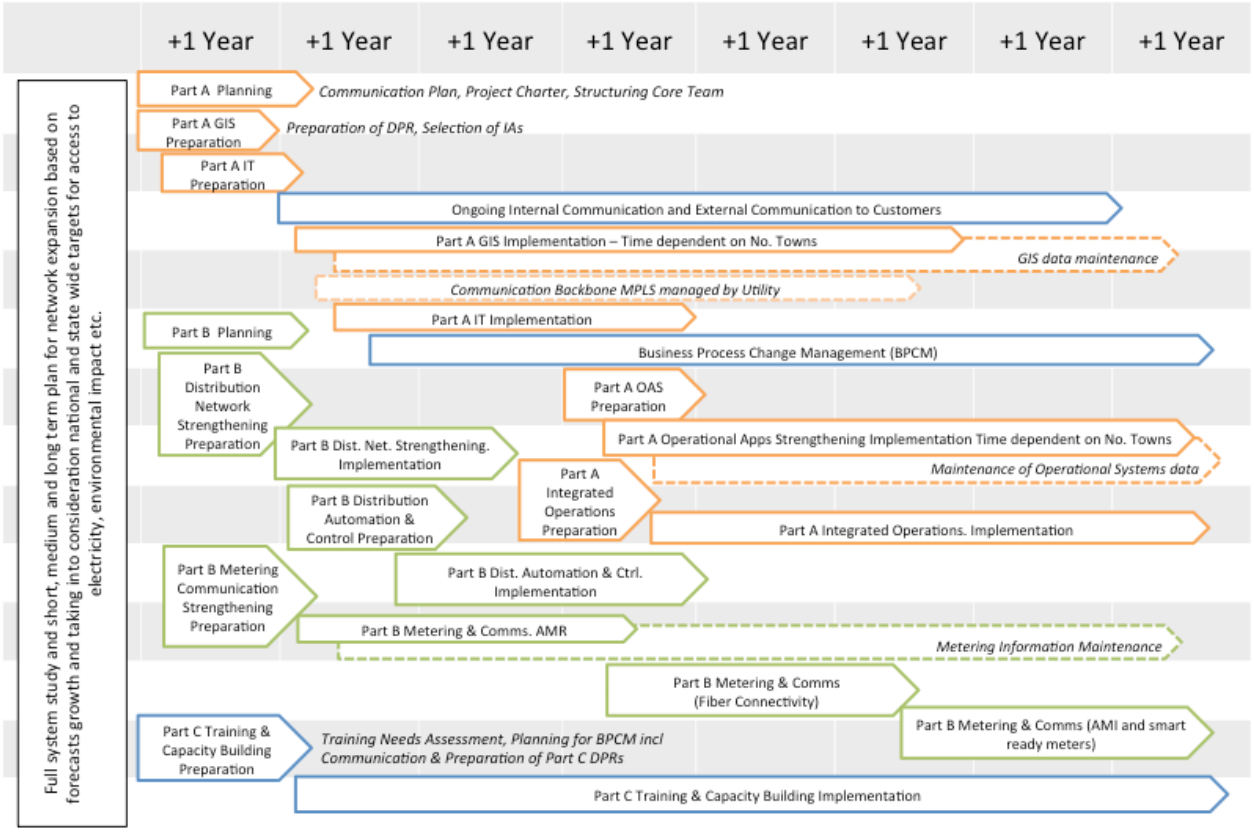
Regarding specifically the MTS, the Study Report provides some suggestions on what should be amended, however based on feedback from experts since submission of the report to the MoP, it is strongly recommended that further work is done in this area to make the distribution system more advanced and the ISGF can provide experts to manage this task accordingly.

Should instances arrive where implemented software applications are not working properly, then it is the responsibility of the ITIAs and SIAs to replace them with an alternative functioning solution.

5. SCADA & Part B Implementation

One certainty is that all equipment specified under Part B should be SCADA ready and whilst it has been requested that some DPRs are revised to suit it should be made compulsory that all Part B DPRs meet this criteria.

To further support coordination, the Study Report recommends the following revised implementation model:



6. Strengthening Capacity of Nodal Agency

Programme monitoring at a central level is a key aspect to ensure the success of the R-APRDP program and these processes need to be strengthened to ensure smoother implementation and resolution of issues and sharing of best practices. It is critical that the monitoring team has specific DisCom and IT expertise.

The Study Report also recommends a monitoring methodology at a National Level to:

- Provide overall governance for the entire R-APRDP program at National Level.
- Ensure that the R-APRDP program guidelines are strictly adhered to by the utilities.

- Provide sufficient guidance and support to the utilities to execute the R-APRDP projects successfully.
- Promote best practices across the utilities.

It is recommended that the monitoring is managed by the Nodal Agency and that they form a monitoring team with representation from:

1. MoP
2. Regulators
3. CEA for Standards
4. Utilities
5. ITIA/SIs
6. TPIEAs
7. OEMs

7. Part A additional requirements to deploy State-wide

1. Section offices will manage all new connections so will need access to all the necessary data and applications therefore the scope needs to include for:
   - Connectivity to Section Office: Secure link to Data Centre
   - Hardware: computer, printer
2. All new meters to have communication modem so that they can immediately communicate with IT and automation systems.
3. Contract conditions on how incumbent ITIAs should interact with incoming ITIAs for management of GIS data/training/complaints etc.
4. Specific contract management training for DisComs to enable them to handle multiple contracts.
5. An assessment of capacity of installed hardware to handle up-scaling and provision for any required hardware upgrades. An assessment of licence capacities (no. users etc)/software sizing and provision for any required upgrades.

8. R-APDRP upgrade for Smart Grids

In line with the smart grid roadmap envisioned by ISGF for India, the following items have been included in the revised scope of the Study Report:

- SCADA DMS with an 'enhanced' Network Planning Tool.

  The current SRS mentions the following for Network Planning and GIS:

  - G.3.5 Network Management (pg.no. 116/584)
  - (G.3.5.4) Abilities of Network Management: The application supports tracing operations to perform complex network analysis functions within a utility network.
  - (G.3.5.9) Network Analysis functionality: The ability to perform network analysis along with the display of its result shall be supported.

- (G.3.5.13) Export of network analysis product: The system allows the export of network analysis product to third party modeling packages.

For various reasons this tool is not being embraced by the DisComs. As Network Planning will become a critical element of planning for smart grids, it is suggested that there should be more specific descriptions of the Network Planning requirements and more emphasis given to this tool.

- Outage Management Systems (OMS):
  - At the core of OMS is a detailed network model of the distribution system. GIS is usually the source of this network model. By combining the locations of outage calls from customers, a rules engine is used to infer the locations of outages.
  - The outage calls are usually taken by the call centre utilising a customer information system (CIS). Customers are typically linked to the transformer serving their premises . It is important that every customer is linked to a device in the network model so that accurate statistics are derived on each outage.
  - More advanced Automatic Meter Reading (AMR) systems can provide outage detection capability and thus serve as virtual calls indicating customers who are without power, thereby obviating the need for the customer to call and report the outage.
  - Outage Management Systems are also commonly integrated with SCADA systems, which can automatically report the operation of monitored circuit breakers; and also with GIS to locate the outage on the GIS map.
- Condition Monitoring for DTs
- Integration with ERP (minimum HR & Finance)
- Substation Automation
- Integrated Volt/VAr Control
- AMI for all customers with loads >20 kW

  Note: Where AMR or AMI is mentioned then MDMS (in addition to MDAS) is to be considered.
- Fiber connectivity for all substations 33kV and above (fiber network connecting 250K Panchayats to be leveraged)
- Smart or Smart Ready Meters for all new connections

9. Database

SRS. (Pg.no.44/ 584) Sf.13: Central data storage:

Data shall be stored at central data centre. The Data acquisition server located at Sub division will acquire the meter data and store in it's own local database and upload to central database at periodic interval as agreed between owner and bidder during implementation stage.

10. Conclusions

In conclusion it is reiterated that R-APDRP is a mission that is well timed and required for Discoms in India. The timelines contemplated were highly ambitious. As explained in Section-1 above, poor preparedness of all stakeholders resulted in under estimation of time as well as cost. The projects are in various stages of progress and the utilities and implementation agencies may be granted another 18-24 months for successful completion of the project and appropriate cost escalation may be allowed. The payment terms in R-APDRP being back loaded all projects are suffering from cash flows which is pushing implementation agencies to cut corners and to a "somehow finish the project" mode which may not be in the interest of the utilities.

It is recommended to appoint a high power committee to examine the case for time extension and cost escalation and make appropriate recommendations to GoI. This committee may consist of members from:

1. Planning Commission
2. Dept of IT
3. NASSCOM/IEEMA
4. ISGTF/ISGF
5. IIT/IIM

The big bang project implementation efforts have now created massive capacity in the country which could be leveraged for export of know-how and services which will have huge benefits for the country in the coming years.