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SREE CHITRA TIRUNAL INSTITUTE FOR MEDICAL SCIENCES & TECHNOLOGY
THIRUVANANTHAPURAM – 695011, INDIA
(An Institute of National Importance under Govt.of India)

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MEITY + SCTIMST - Project Summary

Title of the project	Develop a value based e-delivery system for health care management and research
Project Number of SCTIMST	**5329**
Project Investigator	Geetha G., B.Tech (E & C), M.Tech (CS), PhD Bioinformatics Scientist 'G' , System Manager, Computer Division, Sree Chitra Tirunal Institute for Medical Sciences & Technology, Thiruvananthapuram-695011. Kerala. Phone – 0471-2524534
Project period	02/01/2017 to 01/01/2019 (2 years)
Funding agency	Ministry of Electronics and Information Technology (MEITY), Electronics Nikethan, CGO Complex, New Delhi and Sree Chitra Tirunal Institute for Medical Sciences & Technology,Thiruvananthapuram
Total project cost	Rs 12,55,79,064 (Meity share – Rs 8,94,93,474 and SCTIMST share – Rs 3,60,85,590)
Objective	To address the e-delivery of value-driven health care through seamless integration of medical devices, electronic medical records, and other digital health tools.
Date of commencement	02/01/2017
Date of completion	31/12/2019
Implemented by	Computer Division, Sree Chitra Tirunal Institute for Medical Sciences and Technology, Trivandrum

Fund received

First installment from MEITY	Rs 4,50,00,000.00 dated 01/01/2017
Second installment from MEITY	Rs 4,44,93,474.00 dated 18/09/2018
Total amount received from MEITY	**Rs 8,94,93,474.00**
Total amount spent by SCTIMST	Rs **3,09,40,348.14**
Total amount spent from MEITY	Rs **8,94,93,474.00**

Annexure-I to Utilization Certificate

Performance/targets achieved statement for the financial year 2016-17, 2017-18, 2018-19 to which the utilization of the fund resulted in outcomes is given below :-

1. **Performance/Target achieved statement against objectives**

Nature of performance/ targets	Sl. No.	Performance/target fixed	Performance/ target achieved	Purchase order number	Store receipt number & date
Physical performance/target	1	To have quick health data access/search/delivery for Medical Research /Reference Training/ Teaching.	Installed new Storage, Hyper converged servers, and Network switches and upgraded institute network to 10 Gbps from 1 Gps. Laid new fibre cables interconnecting all blocks. Quick access to all thesis, publications, project reports etc. published in Dspace. (Picture No 6 attached) Purchased licenses for MS Windows, MS Office, Adobe etc. Replaced old PC and Thin clients in OPD with new PC (60 numbers) for EMR entry of patient data. (Picture No 4 attached.) State of art Data Centre housing all Servers, Storage and Network units in 8 cool racks with redundant UPS power supply. (Inaugurated by Dr. Harsh Vardhan Minister for Science & Technology on 23/06/2018) Data Storage has a disaster recovery at the Biomedical Technology (BMT) campus of the Institute which is 8 KM away. Data from the hospital is replicated to BMT and vice versa. Facing problems due to lack of bandwidth in NKN VPN. Due to lack of fund; investment not made for dedicated bandwidth and Tape backup of data.	Storage – 2017-18/5013, 2332 Hyper converged servers – 2017-18/5014 Licenses – 2017-18/2131 PC – 2017-18/5004 Data Centre-2017-18/2372	6117,23/04/2018 6429,25/05/2018 6111,23/04/2018 6757,19/09/2017 6968, 24/10/2017 6590,6591,6604,6605 dated 14/06/2018 6608,6609 dated 18/06/2018 6820 dated 07/07/2018.
	2	For fast modality image analysis for cardiac/neuro science research.	Upgraded PACS of M/S Agfa with M/S GE latest version by installing new Servers, and Storage. This has made the image access from modalities (XRAY, CT, MRI,DSA, Ultrasound etc) very fast in all patient care areas. It helps consultants and senior residents for fast decision making, reporting, viewing images anywhere, easy image access for research etc. Saving chemicals by avoiding film print. Access to images at any time due to storage of images from 2011.	PACS-2018-19/5010	16096,26/7/2019

			Secured with Gateway Security Appliance Upgradation of the Institute LAN from 1 Gbps to 10 Gbps with new core switches, distribution switches with 10g supporting fibre backbone.	2017-18/2355 2017-18/ 2399,5019	7652,3/2/2018 6106,23/04/2018 7300 05/9/2018 6966 25/07/2018 6106 23/04/2018
	3	For faster patient care service/ decision making/ disposal etc.	Installed Oracle Database Appliance for fast database access with redundancy. With new PC's in all patient care areas; Doctors and Senior Residents are able to access EMR and dispose patients quickly. EMR software is developed in house for OP and IP. 100% uptime of system is maintained. Consultants and Senior Residents are having fast access to records with Barcode Scanners. All registered patients are able to access their reports through their login from Patient Portal quickly. https://www.sctimst.ac.in/PatientsPortal/. Public Health Information is provided to patients via https://www.sctimst.ac.in/Public%20Health%20Education/ (Picture No 7 attached)	Oracle - 2017-18/2242 Scanner – 2017-18/681	7375,20/12/2017 6466,31/05/2018
	4	To create specialized medical data repository /e-learning tools/genome database having contents of Research/Project Reports/Teaching materials to share with other institutes for the benefit of Research/Student /Public community.	Implemented Oracle database appliance and migrated database to 12c. Major reports and forms migrated to 12c. Enhanced medical teaching and has helped Consultants and Senior Residents to create teaching folders with medical images.	PACS-2018-19/5010	16096,26/7/2019
	5	To implement big data analytics for public health management.	Installed SPSS Server 25.0 with client licenses for the analysis of medical data. Microsoft Project for project management.	MS Project - 2017-18/625 SPSS – 2017-18/704	7462, 06/01/2018 7789, 13/02/2018
	6	To introduce VC based patient consultation	Software made in-house and is in use. Link		

			https://www.sctimst.ac.in/Patientsportal/Login/ Used mainly for patients having mobility restriction (Patients with movement disorder, Picture No 5 attached.).		
	7	To implement Robust and dedicated ICT infrastructure	Developed and built a state of the art Data Centre to hold all equipment's completed. Racks and cooling are electronically controlled. (Picture No 1 attached). E-Board Meeting Management System or Governing / Institute Body. Online paperless system from agenda upload to minute preparation, approval and distribution. https://intranet.sctimst.ac.in/GB-IB-BMS/ E-payment Kiosk for OPD and IP patient bill payment by patient integrated with Patient Bill (Picture No 2 attached).	2017-18/2213 Kiosk 2018-19/2008	6843,6846 12/10/2017 6935 30/10/2017 7565 19/01/2018 7489, 5/10/2018
	8	To implement mobile patient care management system for faster and high quality patient care.	Issued portable Rugged Tablets to view patient data and for making online entries on the bedside. Consultants and Senior Residents are able to carry the unit to bed side for discussions and data view than viewing at wired fixed PC's. (Picture No 3 attached).	Tablet 2018-19/2242	8587, 05/03/2019
	9	To introduce Voice recognition /Biometric authentication to ease data entry/ Video Conferencing Units	Pending due to lack of fund		
	10	To enhance data security and surveillance.	Installed surveillance system at the main areas of the Institute.	2018-19/2276	15072, 11/4/19 15173, 24/4/19 15229, 2/5/19 15240, 3/5/19
	11	To develop mobile health apps 'CHITRAWARE' - self management tools DO IT YOURSELF (DIY) for patients – to track vital signs / chronic disease / sleep monitoring etc.).	**Software - developed In House and implemented.** Mobile App for Heart Failure Patients E- Consultation Mobile App for Cognitive Rehabilitation (E- Games) Health information- FAQ Intranet access to all staff Cloud Storage to all staff Online Software access to all staff Network Bandwidth Upgrade		

			High speed internet access to all HOD's Academic Staff and Senior Residents for research High speed access of patient data and images		

2. **Financial Performance /Target**

Financial performance/Target	Sl No.	Budge Head/items	Approved outlay (Rs)	Expenditure in Rs	Expenditure Group total in Rs
a. Meity share					
	1	To implement storage for disaster recovery expansion of existing storage	₹1,10,00,000.00	₹1,98,01,559.34	₹1,98,01,559.34
	2	Oracle Web Logic server software with BI publisher with oracle appliance	₹1,50,93,474.00	₹2,18,83,033.75	₹2,18,83,033.75
	3	Purchase of software licenses (Microsoft, Adobe etc) (Total amount by adjusting – 548142)	₹11,99,999.00	₹14,06,060.59	₹14,06,060.59
	4	Server	₹32,50,000.00	₹53,70,795.00	
	5	Internet Security Appliance	₹36,00,000.00	₹22,89,200.00	
	6	Cisco Controller and Wireless access points and Network Core Switch	₹1,04,05,864.00	₹1,20,47,728.00	
	7	Barcode scanner Gryphone | GPS4400 2D	₹3,20,000.00	₹1,90,522.80	
	8	Kiosk with PC with touch Screen monitor 23"	₹3,00,450.00	₹2,24,200.00	
	9	Mobile Clinical Assistant(Trolley/Hand held)	₹45,00,000.00	₹34,42,296.00	
		Procurement of hardware (servers, network switches, security appliances etc. (Total amount by adjusting -2016314)	₹2,10,00,000.00	₹2,35,64,742.00	₹2,35,64,742.00
	10	PACS in (Cardiology / Neurology /Pathology)	₹4,00,00,000.00	₹2,83,88,676.00	₹2,83,88,676.00
	11	CONTINGENCY EXPENDITURE	₹12,00,000.00	₹12,00,000.00	₹12,00,000.00
		Total MeitY Share	₹8,94,93,474.48		₹9,62,44,071.68
Difference in amount ₹67,50,597 adjusted from SCTIMST share					

Financial performance/Target	Sl No.	Budge Head/items	Approved outlay (Rs)	Expenditure in Rs	Expenditure Group total in Rs
b. SCTIMST share					

	1	Data Centre (Civil, AC, Electrical, Cool racks)	₹1,59,07,590.00	₹1,06,40,733.00	₹1,06,40,733.00
	2	Printers	₹4,00,000.00	₹7,82,390.40	₹7,82,390.40
	3	PC	₹40,00,000.00	₹40,15,257.00	₹40,15,257.00
	4	Surveillance System	₹10,00,000.00	₹18,83,980.00	₹18,83,980.00
	5	Scanner		₹6,51,464.00	₹6,51,464.00
	6	Network passive items		₹18,31,947.72	₹18,31,947.72
	7	Information Display		₹50,944.00	₹50,944.00
	8	Total Software, Certificate	₹10,66,000.00	₹18,13,034.82	₹18,13,034.82
	7	Manpower- Two Technical Assistant @35000 for 3 years		₹25,20,000	
	8	Amount spent for completing MEITY project		₹67,50,597	
		Total SCTIMST Share		₹3,09,40,348.14	
Items – Video Conferencing Units, Biometric, Additional Kiosk for payment, Softwares - AutoCad, , Voice Recognition system, Work stations for PACS, PACS storage reduction, PACS PC etc. kept in abeyance due to lack of Institute/ MEITY funds. Will be executed as and when fund is received.					

2. Details of various schemes executed by the agency through grants-in-aid received from the same Ministry or from other Ministries (if any) during the financial year 206-17, 2017-18, 2018-19.

Details of grants received by the organization from Ministry of Electronics and Information Technology	Details of grants received by the organization from other Ministries
i)(a)Name of Scheme under which grant received: (b)Amount: Nil (c) Purpose of the grant:	i)(a)Name of Scheme under which grant received: (b)Amount: Nil (c) Purpose of the grant:

Date: 03/01/2020

Place: Thiruvananthapuram

Sr Accounts Officer
date: 06.01.2020 7.1.20
Email:

N. VENKITA SUBRAMANIA IYER
Sr. ACCOUNTS OFFICER
Sree Chitra Tirunal Institute for
Medical Sciences and Technology
Thiruvananthapuram

7/1/2020

Principal Investigator
ProJ # 5329

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10 JAN 2020

DIRECTOR
SCTIMST

निदेशक / Director
श्री चित्रा तिरुनाल आयुर्विज्ञान और प्रौद्योगिकी संस्थान
Sree Chitra Tirunal Institute for
Medical Sciences and Technology
त्रिवेन्द्रम / Trivandrum-695011

Other information on project implementation

Details of E-delivery of services (Major items) which got enhanced with the ugradation of IT Infrastructure

1. E-consultation - Institute Tele Medicine facility with higher bandwidth; is catering e-consultation service. This service integrated with Electronic Medical Record (EMR), E-payments. Registered patients are accessing the service and hence saving their time and money. NKN Vidyo is used for connectivity.

2. Mobile Clinical Assistant (Trolley/Hand held units) – is provided for fast data access and high quality patient care in all Wards /ICU's. This is helping doctors and clinical staff to have immediate patient data, images at finger tips. Due to portability; convenience is there for Senior Residents to access data at their convenient location through institute secured wireless.

3. E-Imaging - Upgraded the present PACS (Picture Archiving and Communication System) and integrated more modalities/equipment's of Cardiology. Present EMR is having access to Radiology and Cardiology images and reports. Centricity PACS of M/S General Electric is implemented as an upgrade from PACS of M/S Agfa Healthcare.

4. E-learning - The Present E-learning materials related to public health are shared with the affiliated institutes. Conference/Seminar materials, Video tutorials that are organized in the institute are made available to students in medical colleges across the country. The Institute runs many off campus courses and public health programs of CMC Vellore, Public Health foundation of India, National Institute of Epidemiology. (Institutes that are affiliated to the institute). All learning materials, publications, thesis, dissertation are published in Dspace http://dspace.sctimst.ac.in/jspui/ for public access. Data related to Public Health Information is provided at https://www.sctimst.ac.in/Public%20Health%20Education/.

5. Specialized medical data repository & data analytics – Database used in Neuro and Cardiac science are shared with Institutes having research collaboration with SCTIMST on request.

6. Mobile apps – Development of mobile health apps (DO IT YOURSELF – DIY) to help patients to manage facts, data themselves and to increase patient satisfaction. Details are:-

A. Application for monitoring heart failure patients

Main categories

1. Therapeutic Education
   a. Brochures
   b. Materials

2. Medication tracking (patient to confirm the intake)
   a. Beta blockers
   b. ACEI/ARB
   c. Aldo Blocker
   d. ARMI
   e. Diuretics

3. Appointment request for SCTIMST patients

4. Recording of Crital vitals and analysis (Patients enter the data after test mentioning the date of the investigation)
   a. Heart rate
   b. Blood pressure
   c. PT (INR)

d. Weight (if more than 3 Kg weight gain in a week to be alerted)
e. Urine output
f. Creatin
g. HB
h. Sodium
i. Potassium
j. Fluid intake (minimum 1.5 liters – 200ml per glass)
k. Any other
The System generates a graph to show the outcome with warning messages if the value crosses the upper limit

5. Reports for management
The report shows the list of patients with critical values for further action and alerts Doctor and Nurse in charge.

B. Application for Cognitive Rehabilitation (E- Games and Cognitive assessment) and E-Consulting

Games (3 numbers) developed for the management of disability happened as an aftermath of neurological disorders. The aim of these exercises is to improve the cognitive strength of the individual concerned.

7. Present data sharing initiatives G2C & G2G

- Facebook pages of SCTIMST
  - https://www.facebook.com/sctimst.trivandrum
  - Science central portal of DST
  - http://www.sciencecentral.in/.
- Health Inequity for Public Health Studies
  - http://www.healthinequity.com
- Compendium of technologies
  - http://www.sctimst.ac.in/About%20SCTIMST/Organisation/Biomedical%20Technology%20Wing/R%20&%20D%20Activities/Technologies%20for%20Transfer/TECHNOLOGY%20COMPENDIUM/
- Technology business incubators
  - http://timed.org.in/timed-incubatees.html
- Public Health Education
  - https://www.sctimst.ac.in/Public%20Health%20Education/

Conclusion

With the project implementation; Institute could setup a state of art Data Centre for housing all Servers, Storage, Oracle Appliance, Security Appliance and Core Switches with enough scope for expansion. It has helped online services available for 24 x 7.

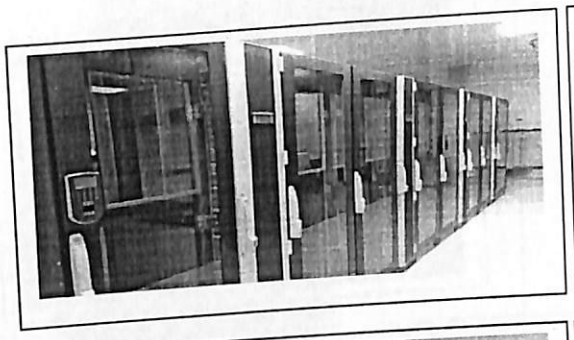
With the project implementation; Hospital LAN backbone got upgraded to 10G and is providing fast image access in the network of more than 412 nodes.

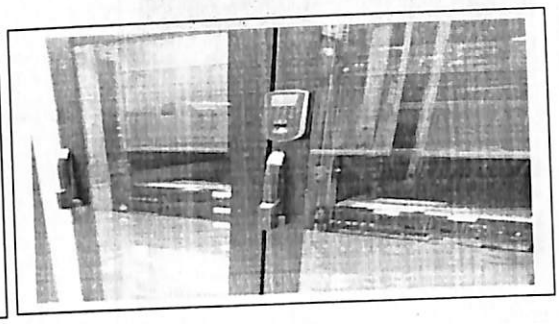
Increase in Patient satisfaction through Electronic services (e-delivery) due to easy access of reports at any time at low cost.

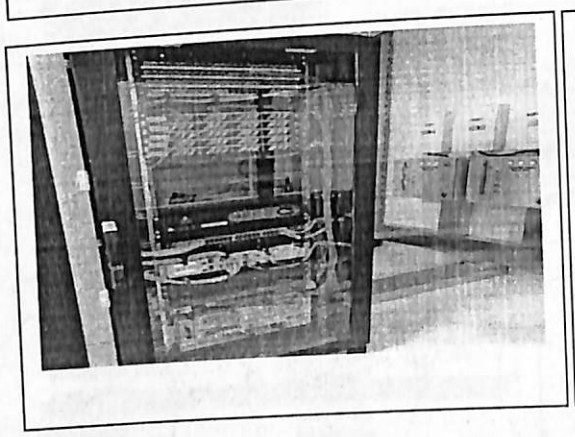
Storage of patient data has helped in medical education and research and has enhanced journal publications.

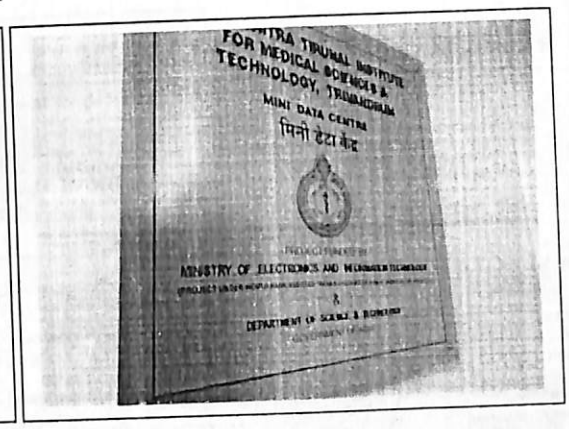
Pictures as proof

1. **Data Centre (Room before and after with 8 smart racks)**

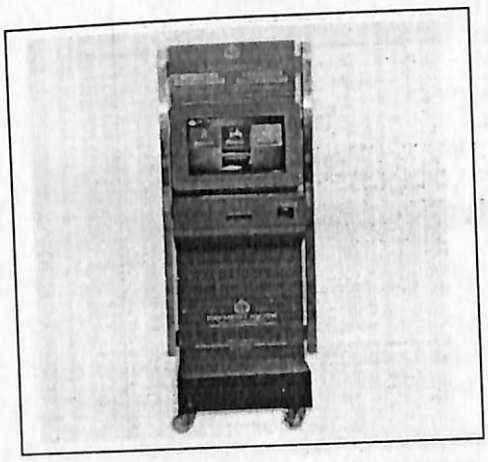








2. Payment Kiosk



3. Portable rugged table for patient care (Detachable Top screen)

4. OPD Consultation rooms are equipped with new PC and EMR software developed in house is running very fast compared to the old days.

Paperless medical treatment. Right treatment at Right Time

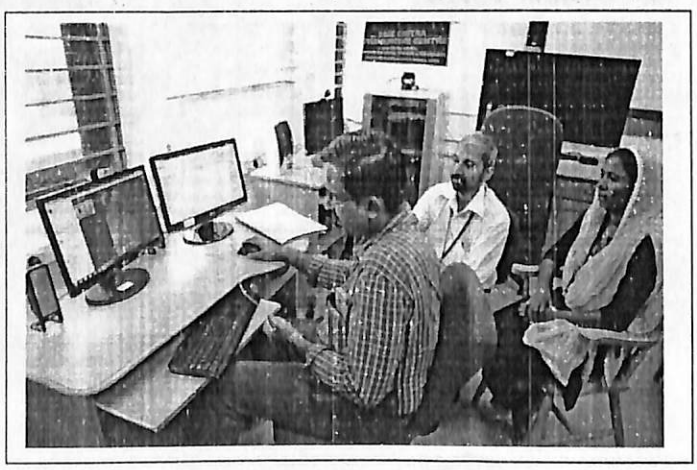
At reduced cost ,Eease of maintenance (Software in house made)

Reduced cost of care (Govt. Schemes covering the cost)

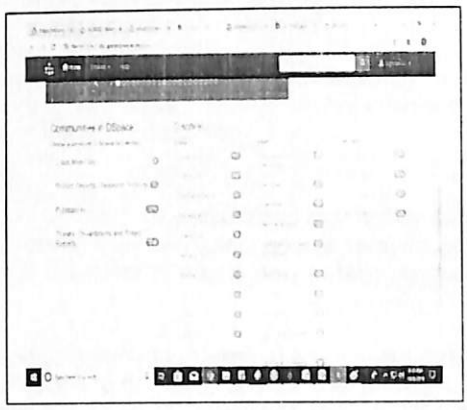
Acceleration of Research due to quick data availability

Ease for patients to avail their data at any time through Patient Portal

5 **E-Consultation integrated with EMR and E-payment**



6 Dspace – Digital Repository of SCTIMST



7 Public Health Education