CLIx Performance Assessment and Scalability Framework Document

IBM Corporate Service Corps – India 36

Introduction

IBM Corporate Service Corps Overview

IBM launched the pro bono Corporate Service Corps (CSC) in 2008 primarily as a vehicle for global leadership development. Teams of from eight to fifteen members partner with government, business and civic leaders in emerging markets to address high-priority issues such as education, health and economic development. CSC teams spend four weeks on the ground working with local organizations and other relevant local stakeholders to develop recommendations for short-term and long-term actions.

Since its launch, the CSC has emerged as a new model for leadership development and social engagement in the 21st Century. It's a living laboratory for experiments and learning at a time when corporations are under incredible pressure to transform the way they operate because of globalization and technology shifts, and when economic challenges and social instability threaten to slow human progress.

Team members for the CLIx Performance Assessment and Scalability Framework include:

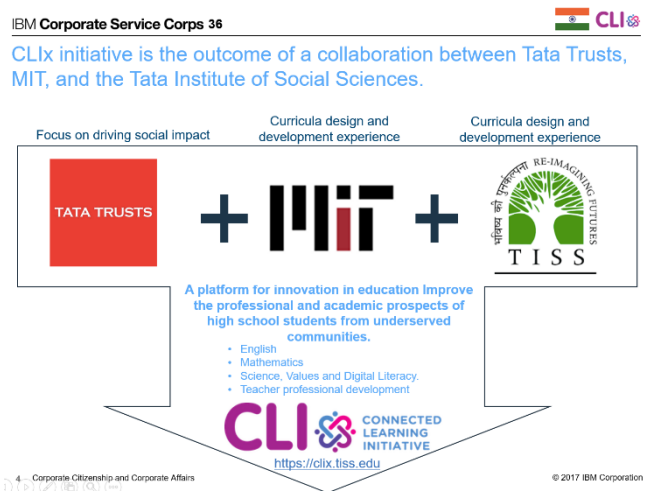
- Gavin Farmer, Australia
- Luis Morras, Spain
- Maarit Palo, Finland
- Barbara Wherry-Skog, USA

IBM CSC Team visiting a school in Rajasthan

The Connected Learning Initiative (CLIx)

CLIx is a bold and innovative experiment that harnesses modern educational technology to improve the professional and academic prospects of high school students from underserved communities in India. Through thoughtful pedagogical design and the integration of educational technologies, CLIx aims to provide high-quality learning experiences that focus on authentic hands-on learning, conceptual learning, development of values, citizenship, professional skills and competencies to widen opportunities for Indian youth and enable them to be successful in further academic studies or the workforce. Their goal is to offer scalable quality teaching and learning experiences for science, mathematics, English, and life skills. Teacher education will be an integral part of the initiative. CLIx catalyzes access to quality learning opportunities at a scale that is capable of changing what Indian students and teachers know and can do. A massive quality intervention, providing curricular alternatives to students and teachers, has the potential to 'change the game', in improving the Indian education system and the knowledge and skills that the Indian youth learn. This initiative is focused on two outcomes. The first outcome is to make quality learning possible to increase social capital and expand opportunities for participating youth. Secondly, CLIx would like to create innovative interventions that can be taken back into the system and be re-purposed, re-worked and re-integrated.

CLIx is the outcome of a collaboration between Tata Trusts (India), the Massachusetts Institute of Technology (MIT), and the Tata Institute of Social Sciences (TISS). Tata Trusts provides financial support to TISS for the development and implementation of CLIx. MIT provides its experience in designing and developing curricula that reflect the importance of an active and engaged, hands-on learning approach. The other key partners for curriculum development are Eklavya, Bhopal, and National Institute of Advanced Studies for Science (NIAS), Homi BhTISabha Centre for Science Education at Tata Institute of Fundamental Research and Tata Class Edge. SCERT Telangana, Mizoram University and Centre for Education Research & Practice are implementation partners along with TISS.



Scope of Work: Project Assessment and Scalability Framework

In the Scope of Work document provided by CLIx, the IBM CSC Team was asked to prepare the following deliverables:

1. CLIx Project Assessment Document - based on support team interviews, materials reviewed, stakeholder meetings and field visits, the report should assess the challenges posed and suggest systems, processes, and tools that could be adopted for strengthening field implementation. This would cover all levels of field implementation sites - state government, district, cluster, and school. This could include (and may not be restricted to) technology, monitoring, data, and accountability measures.

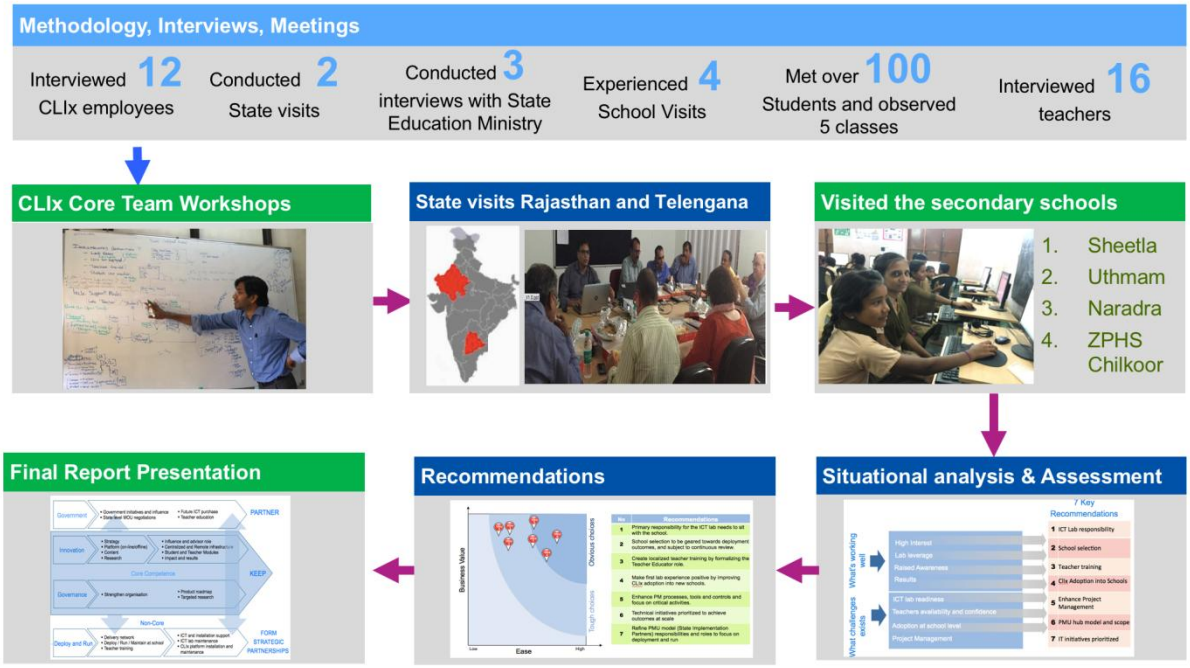
2. Framework on strategy for scaled implementation which may include a Project Management Unit. Based on data collected through interactions with key stakeholders on the field, this conceptual framework should prepare an idea for scaling operations, building pathways for sustainability, leveraging technology, and leveraging human and financial resources available in the state. The framework should also suggest how the PMU should be constituted, its role and relationship with the government, the capacities it should have, and the strategies it needs to adopt in order to ensure outcomes at the school level. If exercise suggests that a PMU is not the desirable structure, then an alternative model should also be proposed.

During this assignment, the IBM CSC team had four weeks to:

- Interview CLIx employees and review materials provided by the CLIx team
- Travel to both Rajasthan and Telangana over five days to:
    - Interview Project Management Unit team members
    - Visit four schools to:
        - Talk with Head Masters, Principals, and Teachers to seek their input
        - Observe activity in the ICT computer labs
        - Discuss the current situations with field support staff
    - Observe part of a teacher workshop
    - Meet with government representatives if available during our visit
- Synthesize the information gathered and validate observations where necessary
- Determine recommendations and validate with Implementation Leaders on 9 November
- Prepare deliverables for meetings on 13, 16 and 17 November

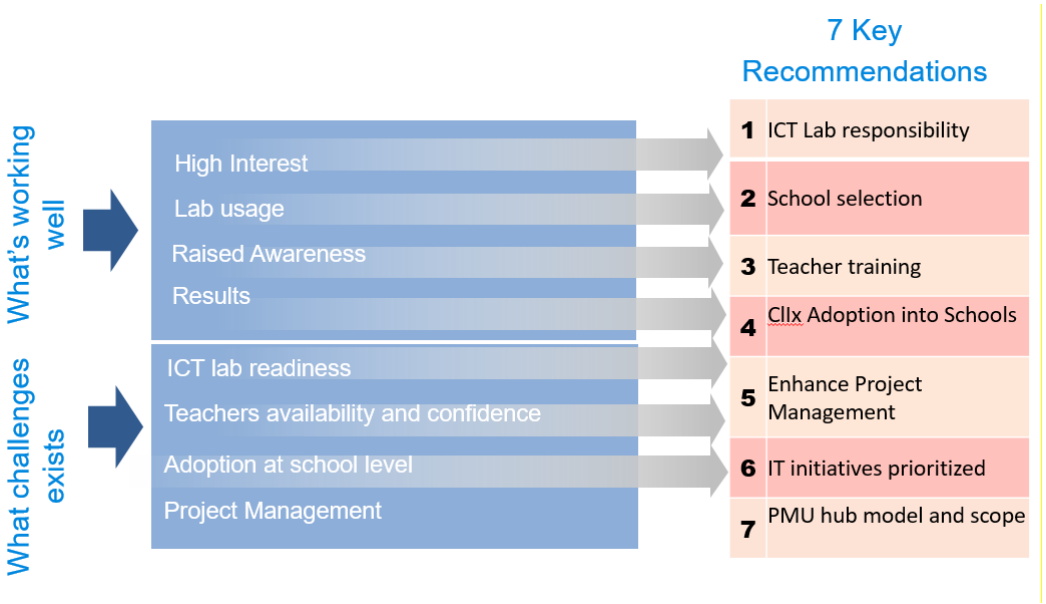
Both the Project Assessment and a Scalability Framework focus on deploying to 1,100 government high schools, as part of the first four state MOUs. The figure below visually depicts our process during the four weeks.

Methodology and Timeline



Challenges Observed and Recommendations

While conducting the performance assessment, we were able to hear from a wide variety of CLIx stakeholders who shared their experiences, feedback and provided materials for review. We synthesized our observations into seven challenges, which are not only impacting CLIx deployment today, but will also continue to affect the scalability of CLIx going forward. The challenges and recommendations include:



Recommendation 1: School Ownership of ICT Lab

Summary / Observations:

- ICT Labs have not been maintained to the level required to support a viable ICT class
- ICT Labs required intervention to support the CLIx roll-out
- Schools have a paucity of IT skills, as such are overly reliant on CLIx support personnel

Key Actions:

- Primary responsibility for the ICT Lab needs to sit with the school
- Enable the schools to be responsible
- States to leverage their commercial arrangements with the Service Providers(whomever maintains the ICT Lab), based on the gaps in service discovered to date
- Educate schools on their rights, duties and process (to engage ICT assistance) in regard to having a functional lab
- Simple instructions; on ICT Lab walls for Simple problems / process, quick videos to fix issues
- Create support decision tree, e.g. when and who to engage
- 'Keen' Students identified and given basic training

Suggested Approach to Operationalize:

1. Work with each state to understand who maintains the school ICT Lab (referred to as Service Providers / SP)
    a. note - if the answer is 'the school' this should be probed, it is highly unlikely that a school will have the right technical expertise and/or be able to negotiate an individual contract covering computers, solar panels, batteries etc.
    b. expect this work to be undertaken by the PMU
    c. This will likely be an ongoing challenge until the state governments can provide training and resources who maintain the lab and are a champion of the lab. Both the PMU lead and leaders at CLIx Central should continue to discuss this challenge with the state governments.
2. Create simple process flows and work instructions on when and how to engage the SP
    a. Engagement must result in an official 'tracking number' being provided
    b. Service levels must be clear e.g. 15 days to resolve a problem of X type
3. Create simple process flows and work instructions on when and how to engage the CLIx

4. Package and provide education to the schools on SP & CLIx engagement, their rights and duties
5. Create Checklists – what to check, frequency, etc.
6. Create simple instructions for basic problems (e.g. mouse issues) which can be turned into posters on CLIx walls
    a. For more complex problems, details and short instructional videos can be made and stored in the CLIx platform, the poster can advise how to access these
7. Schools to identify student ICT Lab assistants, hands on instruction to be provided to them
    a. We recognize that the process to move from field support owning lab responsibilities to the school owning them will be challenging, but by developing an 'exit strategy' and equipping staff and students with materials and getting them comfortable, the process will be easier.

Tools and References:

- http://www.tools4dev.org/resources/how-to-improve-processes-with-swim-lane-diagrams/
- https://en.wikipedia.org/wiki/The_Checklist_Manifesto
- https://en.wikipedia.org/wiki/Managed_services#Advantages_and_challenges

Recommendation 2: School Selection

Summary / Observation:

- It was observed that often activities were occurring in the implementation that were resulting in rework and a delay in achieving the goal of student module use:
- Deploying CLIx server into ICT labs that did not have the minimum requirement levels to ensure a student outcome (Telangana state, ICT labs running unsupported Operating System, XP and outdated n-computing)
- Training teachers where the ICT lab was not yet ready (Rajasthan and more recently Chhattisgarh)
- Deploying CLIx into schools where the release of teachers for training was not confirmed (Rajasthan)

Key Actions:

- Design and implement ‘quality gates’ (thresholds) that schools and clusters must move through before being considered for the next Implementation stage
- Where a gate has been passed yet significant issues are encountered STOP until the problem is rectified, even if this means going back through the gate

Additional Background:

- Quality gates in an implementation flow are based on the principles from the Toyota Production System; in particular Muda (the seven wastes) and Jidoka(quality at source) if an abnormality is discovered stop the line, fix the problem, remove root cause
- In this situation proceeding without the key components that are in place to ensure the success of the next step is equivalent to an abnormality; training teachers who have no working ICT Lab creates ‘waiting’ waste

Suggested Approach to Operationalize:

1. Map the process flow from School Readiness through to Implementation of the modules by teachers for students
2. Identify where the gates should be and the conditions to pass (usually a hand-off from one stage to another)

3. Make the process and conditions visible / add ‘gate readiness’ to the reporting / prioritise work to achieving

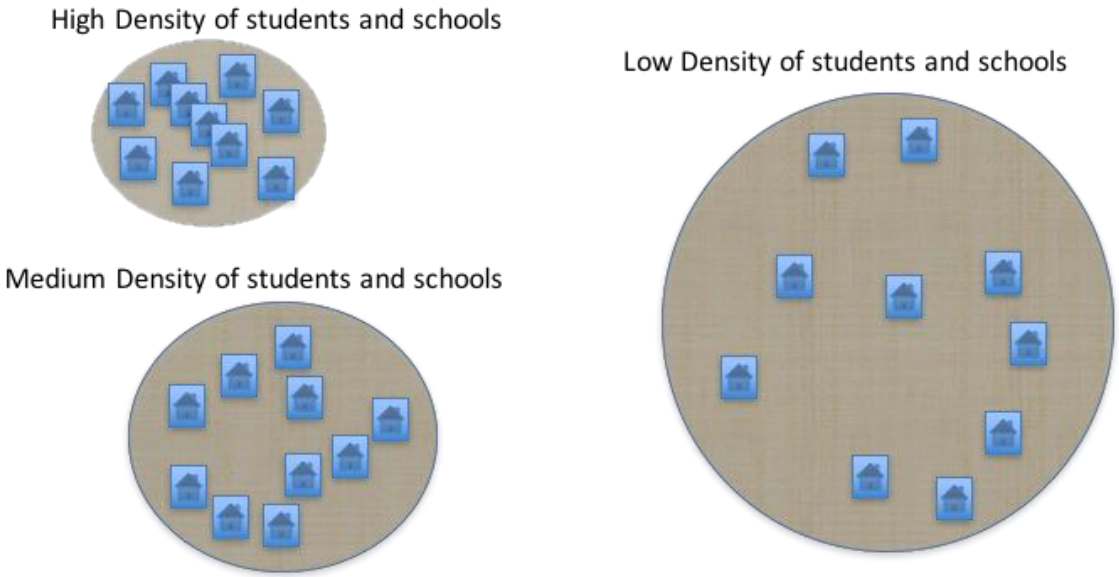
4. Where an abnormality is discovered, STOP, remediate, find root cause, remediate and repeat the cycle

5. Immediately review Telangana and the student experience of running CLIX on the XP platform

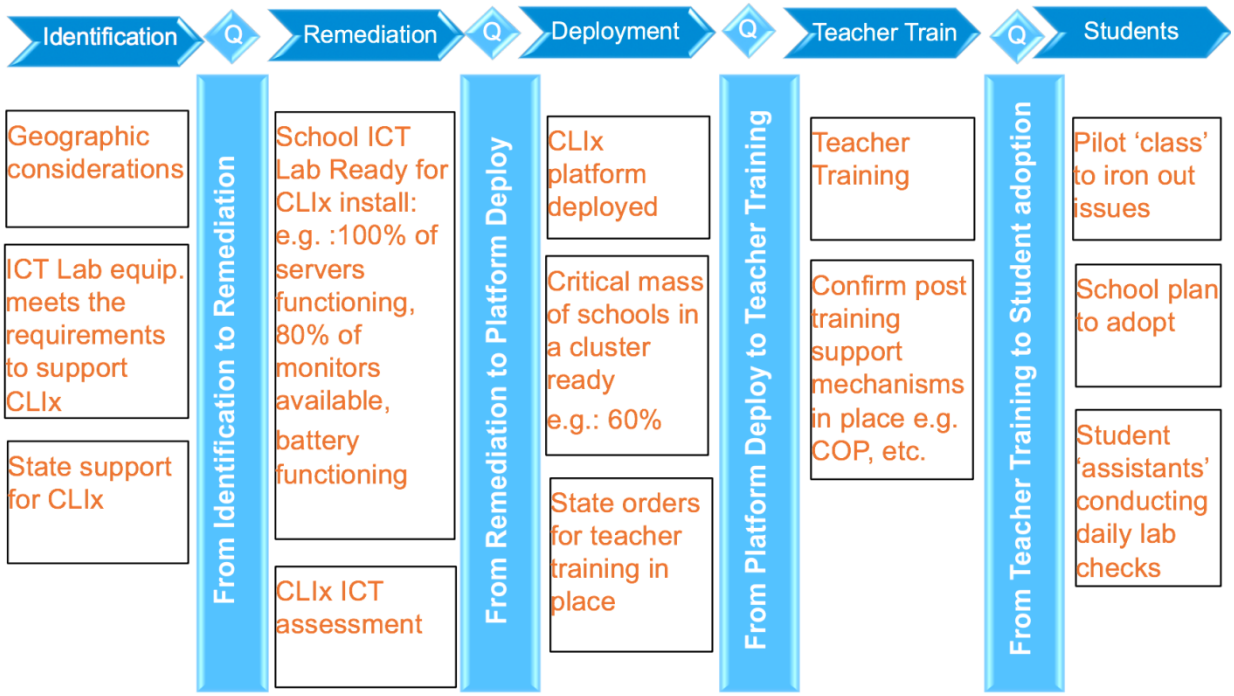
6. Under the MOU – create a timeline for when the next group of candidate schools will have the readiness of their ICT Labs confirmed as per by the Lab maintainers
    a. Also links to school ownership of ICT Labs

Tools and References:

- ‘Quality at source’ refer to http://leanmanufacturingtools.org/ and the sections on Jidoka and Muda (the seven wastes)
- Example of Quality Gates:
    - Schools should only be included if the school head supports the initiative
    - The CLIx platform should only be deployed in the school ICT lab is already functional, 80% or better and 60%+ of the schools in a district are at this level
    - Teacher training should only be scheduled for those schools where the ICT Lab and CLIx installation has completed
- Graphic: Geographical separation of Schools in a Cluster increases travel time and impedes peer school interaction



Example of Quality Gates in Implementation



Recommendation 3: Create localized teacher training by formalizing the Teacher Educator role

Summary / Observations:

- Teacher vacancies, transfers, etc. impact teacher attendance to training
- CLIx is training teachers directly now which isn't feasible as CLIx scales
- Some teachers travel far to attend workshops

Additional Background:

- During our time in the field visiting Rajasthan and Telangana, we had the opportunity to interact with several teachers, principals and head masters, and field support staff (FSPs/FRCs). We also had a chance to observe a small portion of a teacher workshop and reflect on some of the materials presented. During our visit, we learned than teacher attendance was sometimes very poor, with less than half of the expected teachers turning up for the Teacher Professional Developing Workshop. Vacancies in teacher positions was a major challenge for teachers, whether the subject position itself was vacant, or whether a teacher could not afford to be absent three days because there was no one who could watch their class for three days. In all four schools we visited, vacant teacher positions were a challenge. It was problematic in both their inability to send the teacher for training, and also because the current teachers had to lead the vacant teachers' students. This is an incredible burden, which CLIx is dependent of the state government to resolve by investing in educating and incentivizing more teachers.
- In addition to vacancies, teachers are periodically transferred to a different school which can be disruptive to the existing school and it can also result in the teacher having an even longer commute. Lengthy commutes six days a week means even less time a teacher would have to invest in a certification program outside of school hours. As we understood it, decisions for teacher transfers reside with the state government. Since CLIx servers are in a limited number of schools in each state, it would be beneficial to for the PMU and/or CLIx central team to request the state governments to make every attempt to transfer CLIx trained teachers to other CLIx server schools.
- Given the above circumstances, it is important for CLIx to develop alternative ways to train teachers, ideally locally. We recommend CLIx take the following actions related to teacher training:

Suggested Approach to Operationalize:

1. Assess the current face-to-face workshop course and materials
2. Determine how Teacher Educators can lead trainings and create a plan

Considerations for Teacher Workshops

We had an opportunity to observe part of a Mathematics teacher workshop in Telangana and we also reviewed the course agendas. While this was too little time to have a comprehensive review of the workshop, we did develop multiple suggestions for CLIx to consider:

- Consider reducing the current workshop materials where possible: It appeared that at least some of the workshop content was spent teaching teachers about a subject which they are already teachers. If the CLIx modules are heavily tied to the education curriculum, some of the subject matter review could be reduced which will allow time for other lessons. The opportunity to review some of the modules as a group and test them in pairs at computers was excellent, but CLIx will have to decide if all modules need to be reviewed, and for what length of time. Likewise, we recommend moving some content online and to handout materials. This will benefit teachers in two ways because (1) it will be referenceable when the teacher goes to teach the module, and (2) it can reduce the level of detail discussed during the workshop about current curriculum and student modules.
- Ways to add to/expand in the current workshop: We strongly recommend spending even more time in the workshops, providing teachers with detailed instructions for how they can lead the modules. Teachers seem to struggle getting started with CLIx when back in the school, so more time should be spent working with them on how to make the transition. We suggest providing detailed instructions on how they'll lead modules and giving them practice time teaching ICT and modules, perhaps in pairs or small groups. Another critical improvement is to spend even more time helping teachers incorporate both ICT and CLIx into their routine. We suggest gathering best practices and examples from active teachers on Telegram. How did they work the lab modules into the curriculum? For example, we heard from a teacher in Rajasthan who had a very large class size that modules were completed Monday, Wednesday and Friday during class with one third of the students on each of the days. Then remaining two thirds read their textbooks or did other classroom work. By giving several real-life examples that resonate with your teachers, incorporating CLIx modules will not feel like such a daunting chore. Perhaps those teachers could also articulate just how much the students enjoyed the modules and became more enthused on the subject matter.

- Other observations to consider: There are a few additional suggestions we had regarding improvements to the teacher workshop. We had been told by CLIx Central personnel that teachers were very enthusiastic when completing the workshop feedback forms. However, we observed teachers were asked to add their picture and to post their feedback on Telegram. You will likely get more candor if you allow at least some of the workshop feedback to be anonymous. Similarly, CLIx should ask more targeted questions about teachers' concerns and potential challenges to better understand their point of view and allow the program to further grow. On a slightly different topic, we did not have much time to assess the Teacher Professional Development certification program, but the feedback we heard during school visits was that teachers did not have time to complete the certification on their own. They also did not see much benefit to it in terms of their career. As CLIx continues to assess the model, it is worth assessing how many teachers are using the TPD, gathering information if the numbers are low as to why, and considering what alternatives should be made going forward.

Develop Train-the-Trainer materials for Teacher Educators (TE)

Another recommendation we have is to devote time developing train-the-trainer materials and leverage Teacher Educators. Because of the vacancies and absences mentioned above, it will not be easy for CLIx to get all teachers to attend the training as expected. While CLIx Central team members and PMU staff have a deep understanding of the subject matter and modules, ongoing dependence on these same people to conduct all teacher training is not a reasonable nor scalable model. Instead, CLIx must enact the concept they've been considering by using state based Teacher Educators to conduct a large portion of the teacher training. Since the Teacher Educators have had no additional training, CLIx will need to determine how to get them prepared.

- Determine what elements of the current workshops are most critical? Teacher Educators will still need to show some sample modules to new teachers, and CLIx trainers will need to document what is most effective when teaching the modules. Any changes made from the workshop recommendations above, should certainly be incorporated into the TE lesson plans. For example, time will need to be spent on how TEs can work with new teachers on incorporating ICT and CLIx into lesson plans.
- Provide written and online materials: The Teacher Educators will be working independently compared to your 3-day workshops today; so it is even more critical to provide the TEs with written instructions and/or online materials which will allow them to have easy reference and follow your requirements. This content should provide a combination of checklists of what to cover as well as written information as needed. Some of the content can also be provided to all teachers who attend training depending on what is provided.

- Decide who will plan/schedule TE Training: CLIx Central should consider getting out of the role of lead planner/coordinator for all of the teacher trainings; however, that means they will need to rely on others in the state to take more ownership. Deciding whether the state government, the PMU Hub or the TEs themselves will be responsible for planning and holding these trainings is not a simple task, but it is an important one.

Recommendation 4: Make first lab experience positive by improving CLIx adoption into new schools

Summary / Observations:

- Skills and confidence gained in the workshops are diluted by implementation delays
- Teachers have a high dependency on CLIx Field Personnel, especially for initial classes

Key Actions:

1. Provide ‘smooth first day’ detailed steps to teachers and a troubleshooting guide
2. Help the teachers plan for the module roll out

Additional Background:

During our state visits to Telangana and Rajasthan, we had the opportunity to visit four schools in different stages of CLIx module use. Most of the teachers expressed how difficult it was to get started using the computer labs due to lack of familiarity with computers, lack of time in their school schedule to incorporate it, etc. Likewise, when we spoke to state field support staff we confirmed that very few teachers begin CLIx modules without heavy field support involvement. During the school visits, we also observed strong bonds with some of the field support staff and the principals/head masters, teachers and the students. So, the field support-school relationship is a critical element for CLIx adoption, and CLIx needs to identify ways to make the transition and first day with their modules more comfortable and ‘smooth’ for the teachers.

Suggested Approach to Operationalize:

Provide ‘smooth first day’ detailed steps to teachers

Teachers need to be confident and comfortable with the CLIx modules, so helping to facilitate that will be value added. We suggest the following:

- Provide specific, written instructions for first day in lab: Teachers are receiving a book about TPD certification, but we did not see any ‘how to guide’ on teaching the modules, especially their first few times. Getting started with anything can be intimidating for a novice, so CLIx should consider making the first few times as easy as possible. One option is to develop a poster or small checklist which the teacher can use when leading sessions. The figure below is just a sample, but it provides some of our ideas on ways to

make the first few experiences go more smoothly. For example, the teacher ought to lead the students in a similar fashion as to how we observed the workshop being led with teachers. We saw the teacher leading the entire group together through some sample problems rather than letting 20 students go off on their own. The teacher can even consider reading the module introduction or cartoon aloud as a group, which may help assure all students are making steady progress and that computer challenges are not delaying some groups of students.

Planning Your First Student Module Session (Sample)

1. **10 minutes before class, have a student/teacher set up**
2. **Once the students arrive, explain to the group:**

- ❑ To what classroom lesson the module aligns
- ❑ What computer lesson you will cover

3. Send the students to the computers

- ❑ Ask the students to log in
- ❑ Walk around to see if each computer is set up correctly
- ❑ Read introduction/assignment out loud as a group
- ❑ Confirm their understanding of the assignment
- ❑ Have students start the module and walk around

- Help the teachers plan module roll outs: Teachers will also need additional assistance getting started. Whether done by field support or lead educators, planning for one-on-one attention to get then thinking through the details will be very important. Once a module is planned, field support or lead educators could consider sending a 'good luck' reminder message on Telegram. This kind of positive attention should help cement the foundation for ongoing CLIx module usage.

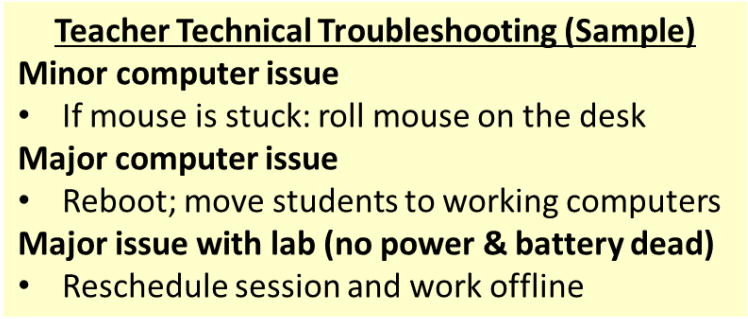
Additional support to aid teachers

Teachers can use additional support, so the CLIx team can consider the following:

- Provide videos of teacher workshops: CLIx should consider making videos of their best teachers leading segments of a workshop. These materials could be used as a reference for teachers to refer back to when getting ready to lead their class. Likewise, the Teacher Educators could utilize them. By giving them more tools to refer to, coupled with other written instructions and field support, teachers can begin to get more self-sufficient and work more independently.
- Offer teacher materials on CLIx servers: There should be room on the CLIx server to store some of the materials the teachers can use. Written materials, videos of

workshops, TPD and other valuable content should be considered to be stored on the CLIx server. Teachers will need access to the lab to use the server, but it's a simple storage option for useful teacher materials.

- Provide computer troubleshooting materials: While complex technical issues should be tackled by state assigned personnel (MIS coordinators, service providers, etc.), the teachers should anticipate some computer problems. Likewise, they should have basic instructions for how to handle things when there are issues in the lab. By proactively educating students and teachers on these things and managing expectations, new teachers will be less daunted by simple failures. The figure below is a very simplistic sample of a possible lab poster or checklist the school could be provided.



Tools and References:

- http://www.businesswire.com/news/home/20171019005359/en/
- Quote about teacher engagement for
- online math games for student homework. "Initial research of an early prototype of DreamBox's just-in-time professional learning, done with a grant from the Bill & Melinda Gates Foundation, included over 600 teachers and found that students demonstrated over 30 percent more growth when they had a teacher who engaged in DreamBox's professional development sessions."
- www.marketing91.com"7 simple reasons that justify the importance of planning"

Recommendation 5: Enhance PM processes, tools and controls to focus on critical activities

Summary / Observations:

- Numerous, competing priorities which pull resources in different directions
- In some states, implementation has stopped without clear next steps to complete additional school deployments

Key Actions:

1. Revise charter and develop a "SMART" work plan focused on POC deployment
2. Define cadences and metrics with quantitative, measurable targets
3. Clearly distinguish activities and their owners

Additional Background:

The original charter and work plan that the CLIx Team used to get started with this impressive program worked well. There are student and teacher modules developed and deployed, there are state MOUs negotiated and in place in four states, and there are some school labs which have CLIx modules in use right now. Yet, the Proof of Concept was to reach 1100 schools, and CLIx staff have many, varying priorities to attend to at present. We recommend CLIx Central revisit their priorities to focus on deployment to 1100 schools.

Suggested Approach to Operationalize:

- Revise charter and develop a "SMART" work plan
    - Refine charter to focus on the Proof of Concept (POC) goals: First off, CLIx leadership should reassess their charter. If the goal is truly to deploy to 1100 school to prove the proof of concept, then focus on that mission primarily. Managers need to recognize which 'pet projects' are interesting vs. critical and have hard conversations with all stakeholders to focus on the end goal.
    - Develop a detailed work plan which is Specific, Measurable, Actionable, Realistic & Time-Oriented: Once goals are prioritized, a revised work plan ought to be developed which includes detailed assignments with actions that can

be measured with a deliverable or a metric, and the timing of each task should be considered and should be realistic, but also action-oriented.

- Reassign or postpone tasks unrelated to POC deployment: One of the most difficult items for the CLIx leaders to tackle will be to deprioritize and/or postpone those items which do not align with the proof of concept. This includes activities such as negotiating new MOUs, adding new module content, participating routinely in TPD Workshops, researching and collecting non-critical data, etc. These activities can be worked into the work plan, but at a later date, so they are not missed by the team. For example, perhaps a new MOU negotiation should be considered after 800 schools have run at least five CLIx modules.

- Define cadences and metrics with quantitative, measurable targets
    - During our review of CLIx materials and visits to the states, we sometimes found it difficult to fully understand the status of an individual school and the state and program as a whole. This is partly because some materials have numbers that do not seem to align with what we heard from CLIx employees and PMU staff. For example, the double sided, one page handout on Telangana states the current and proposed reach is 300. Based on our understanding from other states, the current reach figures were represented by the number of schools with CLIx servers deployed, such as in Rajasthan where 101 schools is the current reach number. When we visited Telangana, we were told CLIx servers were in 147 schools and roughly 20-30% of the 147 were ready to start using CLIx modules.
    - Any project should have sound metrics they are using which are well defined and ideally quantitative and measurable. CLIx will benefit from using clearer metrics and holding the PMU and states accountable to those metrics. For example, if a state is not holding their service providers or government coordinators accountable for ICT lab equipment, clearly tracked numbers will help CLIx Central and the PMU leads when working with District and State level contacts. While some of these elements were discussed in quality gates, the idea of tracking all metrics at a school, district, state, and program level, helps put the data into perspective. CLIx is doing this today on their website and in some materials, but there are some inconsistencies in what is reported and we recommend even more clearly defined metrics be tracked to aide you in achieving the proof of concept schools.

- Clearly distinguish activities and owners
    - We also recommend that the CLIx leadership reassess assignments and critical activities and remove people from activities that are not critical to their success. This includes reducing travel to negotiate MOUs or teach a three-day course, reducing time spent on large group conference calls where a limited amount of information is discussed. A call about technical issues and a call about module contents does not need to contain all of the same people every time. Likewise, leaders will need to hold one-on-one meetings/calls with their direct reports rather than assuming all relevant topics will be fully covered through a large group call. For example, the Implementation Lead should problem meet with the PMU leader weekly or biweekly and during that call, the PMU leader should have metrics to share with the Implementation Lead. This is especially critical if a state has fallen behind the expected targets CLIx has established. It doesn't mean there is not a good reason for the issue, but it needs to be discussed in detail and performance issues must be handled too.
    - We recommend the CLIx leaders develop a list of all activities that are critical to deployment and/or maintenance of existing CLIx schools. Then establish any related deliverables, meetings, owners, stakeholders, etc. This type of communications and reporting plan for activities will help CLIx revisit existing deliverables and meetings to determine if they should remain as is, be revised, or be eliminated. It is also important to trust in your leaders and teammates to own other aspects. For example, if you are the lead over state implementation, you would mostly work with PMU leads and the technology representative for deployment. So, unless all of technology is in your purview, refrain from sitting in on discussions about new TPD modules and the software that's being used, unless it's of critical value.
    - The table below provides a few examples of possible deployment deliverables.

Deliverables:	Frequency	Owner
Implementation/Maintenance Metrics: Defines stoplight thresholds to be used in weekly status report updates	Once; alter as needed	CLIx Lead
Implementation Workplan: Details schedule of activities for new school set up through the use of modules and data monitoring	Once; alter as needed	CLIx Lead
State Weekly Implementation Status Report: Contains a summary of the PMU's metrics for deployment and maintenance	Weekly	State PMU Lead
Government Escalation Issues - ICT Lab Status: Provides update of non-resolved lab issues to help a government manage service provider and/or state personnel responsible for lab equipment	Weekly/ Biweekly	State PMU Lead
Module Issues Summary - Identified and Resolved: Summarizes module issues identified to assure all concerns are addressed	Weekly/ Biweekly	CLIx Module Lead
Critical Improvement Initiatives: Determine reporting for each critical initiative selected (e.g. create train-the-trainer materials)	Weekly/ Biweekly	Process Owner

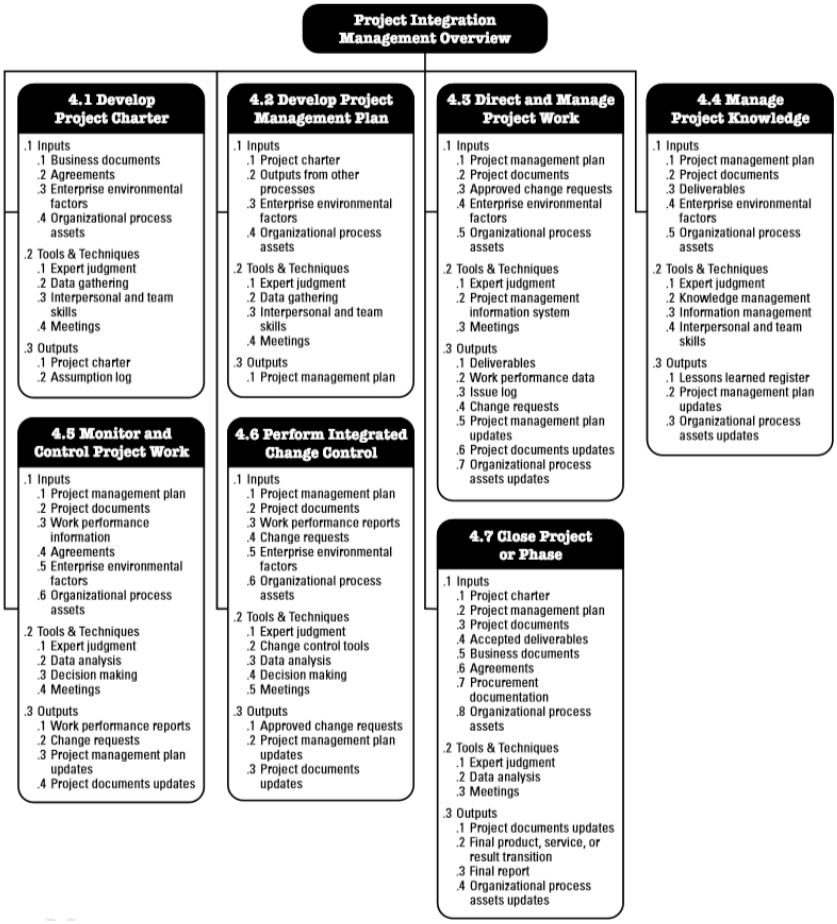
- **The more complex CLIx becomes, the more important it will be to leverage PM tools, processes and methods:** The CLIx has been very successful in starting up their organizationand it is impressive how well they've handled the many project management aspects in a very short time.
    - While CLIx was successful up to now, it is time for CLIx to reassess the PM processes and tools they are using and reconsider their options.
    - Sound Project Management is not just about have good work breakdown structure tools and charts. It is also about having a disciplined, structured approach to completing the work. As CLIx scales up, the project needs tools, but it also needs to follow a disciplined approach. When an organization is small, it is nimbler and may be able to handle changing scope relatively quickly. But as an organization grows, it needs to follow a more structure approach as one unexpected change, can have a ripple effect on other critical processes, which can create quality issues and delays.
- **To assess the Project Management needs, CLIx will need to ask a series of questions:**
    - **WHO?** Who are your stakeholders? What are their expectations for PM? Do any team members have relevant certifications?
    - **WHAT?** What have you used before and how did that work for your project? What pains/issues are you facing today and what are your business needs?
    - **WHERE?** Where will information be stored and managed (especially since you're geographically dispersed)?
    - **WHEN?** When do the tools need to be used (and how complicated will it be to learn them)?
    - **WHY?** Why are you looking for PM tools (e.g. regulatory, stakeholder reporting, etc.)?
    - **HOW?** How will information be shared? How have tools used previously worked for the team (e.g. WRIKE?)

Tools and References:

- References to Project Management best practices:
    - There are numerous sources of project management materials, many of which are sound and provide helpful tools and processes. IBM has developed their own set of Project Management tools, and it provides PMs with significant training and tools to lead engagements. PMs on top tier projects and programs are required to be a certified Project Management Professional (PMP) from the Project Management Institute (PMI). PMI has a textbook called The Project Management Body of Knowledge (PMBOK) and it has a logical, detailed

approach to managing and leading a project. There are costs for each of these aspects, but having a certified Project Management Professional on the team could be a worthwhile investment.

- Each chapter of the PMBOK has section which show inputs, activities and outputs and it is well structure and worth considering. For example, the chart below provides an example of the PM Integration Overview.



- We found a few articles useful in determining what Project Management tools/processes/methods were best to use for an organization like CLIx:
  - For an article about selecting PM Methodologies, consider starting by reading the following blog:
    - The entire article is worth a look; here are some snippets:
      - "The Project Management Institute (PMI) has developed a globally recognized standard called the Organizational Project Management Maturity Model (OPM3). This assists organizations in identifying, measuring and improving PM capabilities and standardizing processes. It helps solidify successful project outcomes, ultimately determines best practices, and strengthens the connection between strategic planning and execution."

- "Because of the various strengths and weaknesses of each PMM, organizations may want to consider adopting multiple project management methodologies based on the unique nature of their project, organizational makeup and project goals. Either way, organizations need to develop standardized best practices that can be refined as various factors change. Here, the key is to figure out how a specific project aligns with company-wide objectives. Once success or failure criteria can be isolated, it's easier to find the most suitable methodology or methodologies that will enable your organization to effectively and efficiently reach the desired business result."
- "When evaluating methodologies, here are just a few of the numerous factors that should be carefully considered:
    - Organizational strategic goals and core values
    - Key business drivers
    - Constraints
    - Stakeholders
    - Risks
    - Complexity
    - Project size and cost

- For ideas on how to determine what software you need. http://zilicus.com/project-management-software/Selecting-Project-Management-Software.html
- For suggestions for free and open source tools and there are many options out there. CLIx will need to determine what best suits their needs, the following blog had some helpful reviews. This site lists the top ten free or open source PM software tools, and it provides pros and cons for each of the top ten. We understand CLIx has used Wrike in the past, which is listed as number 5 on this list.https://blog.capterra.com/free-open-source-project-management-software/

Dashboards (Deep Dive)

- One of the easiest management tools to implement is a dashboard
- The dashboard aims to give 'at a glance' the status and allow focus on the right areas
- In general, it is better to compartmentalize different phases of a project e.g. Deployment and Run
- For the deployment state, the focus is on current state vs forecast, a summary of what's working and what's not, call out for help needed. Suggested steps:
    - Confirm for each stage of the implementation process what are the key activities (these become common for all PMU Hub's and the Core Hub)

- Design the quality gates that must be passed to move from one stage to another (these become common for all PMU Hub's and the Core Hub)
- Run solutioning workshops with each PMU where various options are reviewed against which deployment numbers and accompanying assumptions can be made
- Run a workshop with each PMU and key stakeholders - agree the forecast out 3, 6 and 9 months, reconfirming the responsibilities each has to achieving (note - if this agreement is not reached, then the forecast should be zero)
- Workshop with each PMU on how best to gather the data (referencing existing options) and confirm the frequency that would be relevant
- Confirm reporting frequency, when and where the data should be available (usually a minimum of 12 hours before the meeting - placed into a common box folder)
- Design reporting template and circulate initial data capture format
- Note: suggest reviews (fortnightly) should be PMU based to avoid wasting times, a monthly 'all PMU' meeting to share status, innovations, collaboration, etc. ensures continuous improvement
- Tools and References:
  - Excel
  - https://www.box.com/home (for common access)
  - WebEx
  - Once established... : https://blog.capterra.com/free-dashboard-software-programs-for-bi/
  - 
    Deployment DASHBOARD -

- For the run phase, focus is on the status of any core items that effect the end user (e.g. student on module use). Key performance indicators such as how many days a significant issue has been outstanding, days without a science teacher etc.Suggested steps:
  - Agree the key measures to monitor (e.g. Schools with significant infrastructure issues, days issues outstanding, schools that have no teacher for a module, student ratios above X)
  - Agree the range for the issue (e.g. Infrastructure: Red = an infra issue that renders > 50% of all terminals inactive - such as a faulty battery, power cables severed, multiple missing keyboards, etc.)
  - Workshop how best to gather the data and the frequency that would be relevant
  - Test all the above based on 'what are we going to do with this data' -> suggest focus would be weighted 80% towards leveraging it to gain assistance e.g. from the government for long running issues, 0-20% for cross referencing research)

- Start simple - e.g. a ICT LAB log book from which the data can be extracted and loaded
- Data to be collected and consolidated by the PMU before updating the dashboard
- Tools and References:
  - Excel
  - ICT Lab Book - paper based
  - IMT Tool (modified!)
  - Excel and Power point... however this is better online: https://blog.capterra.com/free-dashboard-software-programs-for-bi/

Recommendation 6: Technical initiatives prioritized to achieve outcomes at scale

Summary / Observations:

- There is not a non-functional requirements management process
- There are many issues that directly affect scalability and are not being addressed:
- There is not a standard way to connect CLIx servers to a WAN network (via internet), and is not considered as a way to reach them.
- No remote support. Any task on servers has to be performed locally. Those actions that are beyond school skills needs a Field Person(FP) to go on site. This has two main negative impacts:
    - FP workload: FP has to go to the school (transport waste time) and needs to redo his schedule, and will result in less optimized routes. Both has direct negative impact on scalability.
    - Response time to solve a problem in a school is very long, so students will not be able to use CLIx (or in a limited way) during that time.
- Manual tasks are limiting seriously scaling of the deployments. Every time a new piece of software is released, it as to be sent to every Field Person (FP) and then he has to go to every single school to download and install it. Therefore, updating software or deploying new programs/modules is very slow because FP must travel and to repeat the same steps in all servers). It also uses the FP who is a limited resource to do a repeating task.
- Student activity gathered data is outdated or incomplete. Same rationale than in previous item. Gathering data is so slow and costly that is performed less frequently than desired.
- No technical performance data that helps to have data of user experience. It has not been observed any kind of system monitoring. Then user experience in based on (subjective) human observations, and not in a systematic way. Moreover, there is no log of system errors that can help to solve pervasive issues.
- No evidence of housekeeping procedures on CLIx Servers. It has not been observed any kind of periodical housekeeping procedures and tracking of such an activity. So far, it would be performed by FPs, thus with same impact in scalability and workload.
- No backup of student progress. If a server has a data loss or student data is lost by other means, there is no way to recover her/his progress.

Key Actions

1. Implement way to manage a roadmap of Non-Functional Requirements.
2. Implement Network access to servers

    a. Consider aspects to harden systems (ports/daemon services) and access rights. It is necessary to design a common architecture and to define a set of technical specifications in order to prevent unauthorized access.
    b. Prioritize according to 3G coverage. Using adequate network protocols, availability and reliability should not be an issue. The fact that there will likely be schools where implementing the minimum requirements is not possible should not stop the implementation in the other ones
3. Implement remote access to servers (e.g.SSH). Once Servers are hardened, accessing them can be accessed remotely (e.g. with SSH). Then FP or even central team (when necessary) can take actions on a server when needed skills are beyond school's knowledge.
4. Develop an automated module update mechanism based on pull mechanisms (each server checks if there are new modules and downloads and installs them f there are), opportunistic network techniques and Peer to Peer mechanisms. Whenever a new module is created or an existing one updated, it will be deployed automatically to all connected schools in a short period of time. With this feature, no (or very little) FP dedication will be needed to deploy module updates, and time to deploy will be reduced dramatically.
5. Develop and automated program to extract and upload al recorded module, student and teacher relevant data. If data is recorded in a MongoDB database, a periodic process could extract data added or updated since last time and push it to a queue subsystem (e.g. rabbitmq). These data will be gathered in a central site and stored accordingly to business needs. This gathering process, will not need FP involvement, and its only limitation for scalability is central infrastructure capacity.
6. Once gathered, data can be used for research purposes, or, additionally to recover school data (student progress, teacher data) in case there is a data loss in a school.
7. Implement a mechanism to gather server workload data, inventory changes, system errors …etc. and send them to a central site (can use the same queueing subsystem than the one used for student data). With the technical data of all the schools it is possible to:
    a. Do data mining, about user experience (students/teachers), response time, system errors …etc.
    b. Develop a proactive maintenance process.
    c. Establish a performance and capacity management process, look for way to improve user experience and better use of resources. In addition, it could be used to manage server upgrades, hardware refresh

Additional Background:

Non-Functional requirements are those that are not directly involved in what the platform does but in how it operates. A common definition is that Non-functional requirements describe how

the system works, whilst functional requirements describe what the system should do. Typical Non-Functional-Requirements are:

- Performance
- Availability
- Reliability
- Recoverability
- Maintainability
- Serviceability
- Security
- Manageability
- Data Integrity

Suggested Approach to Operationalize:

- Define architecture and technical specifications to provide a safe network connection
- Select network providers based on their coverage and agree dongle/SIM purchase
- Develop program for Software Delivery (update/install)
- Develop Module for teachers and deploy it.
- Develop and deploy data gathering programs

Tools and References:

- Hardening CoreOS (as a starting point). https://coreos.com/os/docs/latest/coreos-hardening-guide.html
- SSH, FSTP
- Rabbitmq (as a queuing sub system to send buckets of data)
- See P2P protocols, e.g.
- http://www2.ensc.sfu.ca/~ljilja/ENSC427/Spring09/News/Leon-Garcia_Widjaja/LGW2EChapter5Presentation.pdf
- https://www.slideshare.net/anishgoel/peer-to-peer-protocols
- http://www.scaledagileframework.com/nonfunctional-requirements/
- http://leadinganswers.typepad.com/leading_answers/2009/03/nonfunctional-requirements-minimal-checklist.html
- http://www.it-checklists.com/Examples_nonfunctional_Requirements.html

Product Owner (Deep Dive)

Summary / Observations:

- No committed target dates for new features. Priority settings are not clearly documented.
- New functionalities are being developed whereas some infrastructure ones are still not completed. i.e. Non Functional Requirements are taken aside and team only focuses on new functionalities.
- Milestone tracking and product evolution are not clearly documented.
- Manual tasks limit seriously scaling of the deployments.

Key Actions:

- Appoint a Product Owner, who will define and ownthe IT roadmap. Product owner is a different role to team lead and architect lead although should work closely with them.

- The appointed Product Owner serves as the stakeholders' proxy responsible of defining and prioritizing activities in the team backlog. Therefore, must have good knowledge of what are the goals of CLIx project and empowerment to lead the technical team.

- Define a management system to maintain the roadmap, set priorities, milestones and target dates.

- Product owner will be the only team member empowered to accept target deliverables as completed

- To be successful in Product Owner role and responsibilities implementation, it is also high advisable – if not necessary - to deploy Agile across teams, or refresh their training.

Additional Background:

Product owner is a key role to align technical team activities to project needs. Without strong leadership, there is a higher risk of the technical team paying attention to areas that are less important to achieving project goals.

- It is very important that the product owner is focused in achieving project results to what stakeholders are demanding, rather than what is challenging or interesting to technical team members.

- Product Owner is a role defined in Agile methodology, there is plenty of documentation in Websites, Agile documentation and Software development books. Product Owner must understand which of Non-Functional Requirements are directly impacting the scalability of the project, and prioritise them according to stakeholders' criteria in urgency and value. Among her/his characteristics the Product Owner must be:
    - Highly available: Must be available to the team throughout the entire project
    - Knowledgeable: Will ultimately steer the direction of the project, and thus everybody must trust his/her guidance
    - Empowered: But must also be able to make decisions for the organization based in accurate information.
- In our opinion, considering the project goals and team characteristics, the Agile methodology would fit well in the continuing CLIx project, facilitating a better achievement of goals in an effective way. The components of Agile being used by CLIx technical teams were evident, as were the common pitfalls of an Agile engagement.
- Implementing Agile is often more difficult than initially estimated. Agile principles and process implementation makes easy to struggle with some common pitfalls. Among these common pitfalls, there are some observed in CLIx development, e.g.
    - Assigning resources to areas that are not in the critical path but are interesting or requested by a stakeholder
    - Doing many things in parallel
    - Activity tracking and prioritizing

Suggested Approach to Operationalize

1. Appoint a Product Owner with the project knowledge, skills, leadership and empowerment to lead the roadmap.
2. Give empowerment to the Product Owner, communicating his/her role and responsibilities to stakeholders and team members.
3. Train the project owner in her/his responsibilities, processes and tools
4. Launch a program to deploy Agile methodology in technical teams.
    a. Implementing Agile is a complex project, that needs expertise and follow up. There are many traps that can make de project fail.
    b. Agile implementation will likely require also a change program in CLIx organization
    c. Consider seriously requesting help from an Agile Coach to supervise the process until the team works with methodology in a natural way.
5. Implement a project management tool to manage activities and deliverables of technical team (roadmap, user stories, sprints…).

Tools and References:

- There are many open source tools to manage roadmap. One that is powerful and easy to deploy is Taiga (https://taiga.io/), e.g.

- 'Product owner and Agile do's and don'ts can be found in:
  - http://www.ambysoft.com/onlineWritings.html#AgileAdoption
  - http://www.ambysoft.com/onlineWritings.html#AgileAtScale
  - https://www.slideshare.net/olgatolga/agile-presentation-3548088 (many additional links referred in this one)
  - https://www.infoq.com/articles/pitfalls-avoid-agile
  - https://help.rallydev.com/top-10-mistakes-teams
  - http://www.agileadvice.com/2011/12/05/referenceinformation/24-common-scrum-pitfalls-summarized/
  - https://www2.deloitte.com/content/dam/Deloitte/au/Documents/risk/deloitte-au-risk-how-fragile-agile-14.pdf
  -
- How to manage NFR:
  - https://www.mountaingoatsoftware.com/blog/non-functional-requirements-as-user-stories

Recommendation 7: Refine PMU Model (State Implementation Partners) Responsibilities and Roles to focus on Deploy and Run

Summary / Observations:

- Multiple MOU's, some with significant differences, hinders a strategic Hub model
- Implementation has been slower than desired, project discipline is lacking
- Significant cost at set-up, teacher training and ongoing maintenance
- The purpose of the Project Management Unit needs clarifying and autonomy strengthened to maximize deployments

Key Actions:

1. Remove all activities from the PMU in regard to research and refocus them on implementing CLIx into new schools whilst maintaining the existing deployments
2. Structure for the future with Lead roles in Education and Project Management and targeted focus on Field Personnel
3. Focus is on the efficiency of deployment, not the effectiveness of the pedagogy which can come later

Suggested Approach to Operationalize:

- Work with CLIx Core Team to clarify responsibilities, reporting expectations and budget through to March 2019
- Each PMU to table a comprehensive assessment of the Service Providers, how they are engaged and who in the State Government is responsible to ensure they are performing their role
- Each PMU to have a Lead Educator responsible for establishing the train the trainer program in their state
- Each PMU to have an experienced Project Manager in place
- Maintain State issue trackers with summary reports delivered to core, only issues which cannot be solved at the State level and/or require a platform or module update should be registered in the core Problem Management system

Tools and References:


PMU Suggested Job Descriptions

- Detailed Job Descriptions (Sample activities, use a formal template)
- Roles and Responsibility https://en.wikipedia.org/wiki/Responsibility_assignment_matrix

Documenting Processes (Deep Dive)

- Use Swim lanes to clearly document every process
- Use 'Value Stream Mapping' to identify areas of 'waste' in a process

Background:

- There are a number of processes where there is a passing of ownership between different groups and/or where the process is inefficient. This is not immediately obvious from the process itself however symptoms such as poor completion, collected data not being represented in up line reports, conflicting next steps and responsibility are all indicators that a process needs revisiting
- New processes, or steps to processes are often added to meet an immediate need, over time and especially where a business is changing, they can end up consuming significant resources. Ironically the original reasons the process/steps were added no longer exists

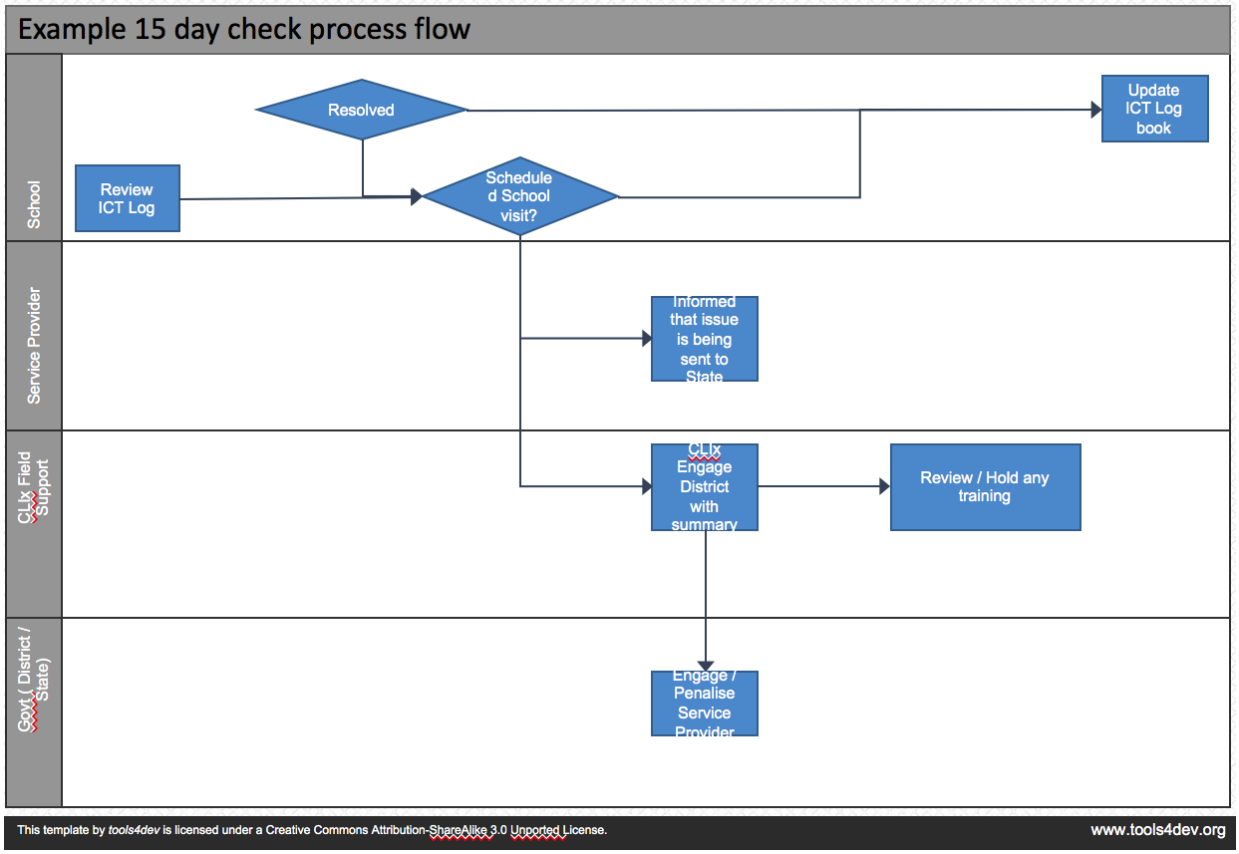
Suggested Approach to Operationalize:

1. Run a workshop on value stream mapping
2. Have each core group go and map a key process that is known to have issues e.g.: ICT Lab issue reporting, Project Office data gathering, Technology initiative prioritisation
3. Create action plans off the identified areas of waste
4. Create Swim Lanes to clearly communicate the new process flows

Tools and References:

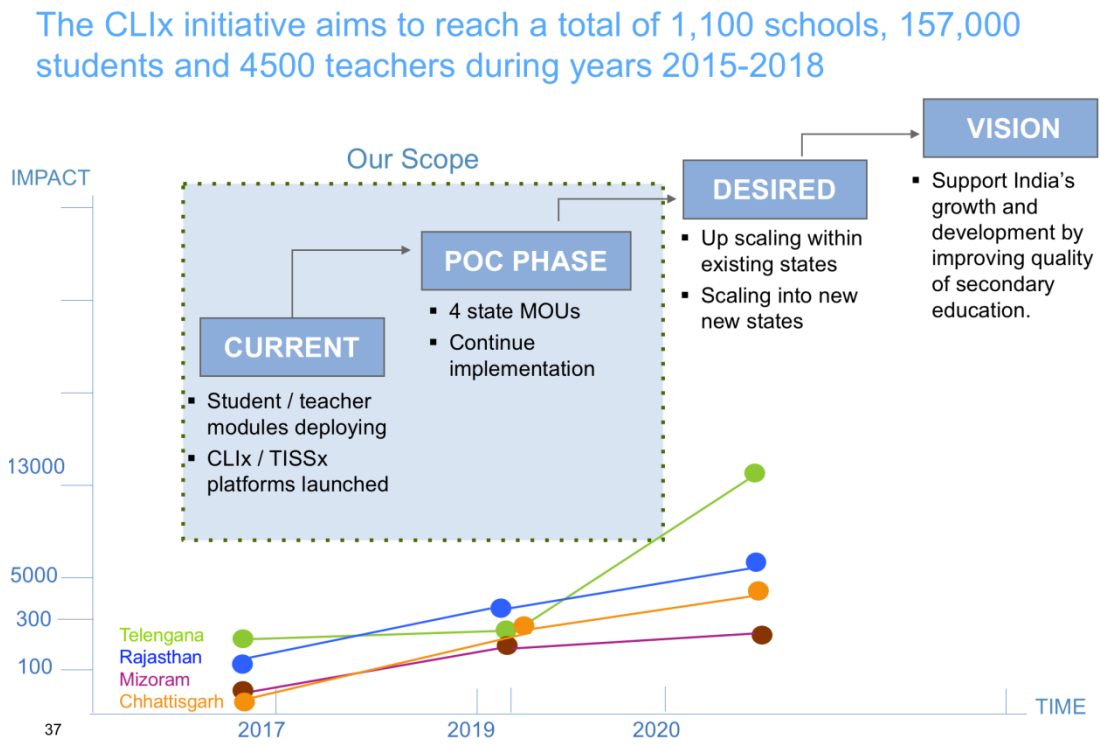
- 'Quality at source' refer to http://leanmanufacturingtools.org/ and the sections on Muda (the seven wastes)
- https://www.lucidchart.com/pages/value-stream-mapping
- https://www.slideshare.net/anandsubramaniam/Value-Stream-Mapping-Process
- http://courses.washington.edu/ie337/Value_Stream_Mapping.pdf

- https://www.slideshare.net/AMEConnect/value-stream-mapping-for-non-manufacturingmartinreplacement
- https://www.lucidchart.com/pages/how-to-create-a-swimlane-diagram-excel

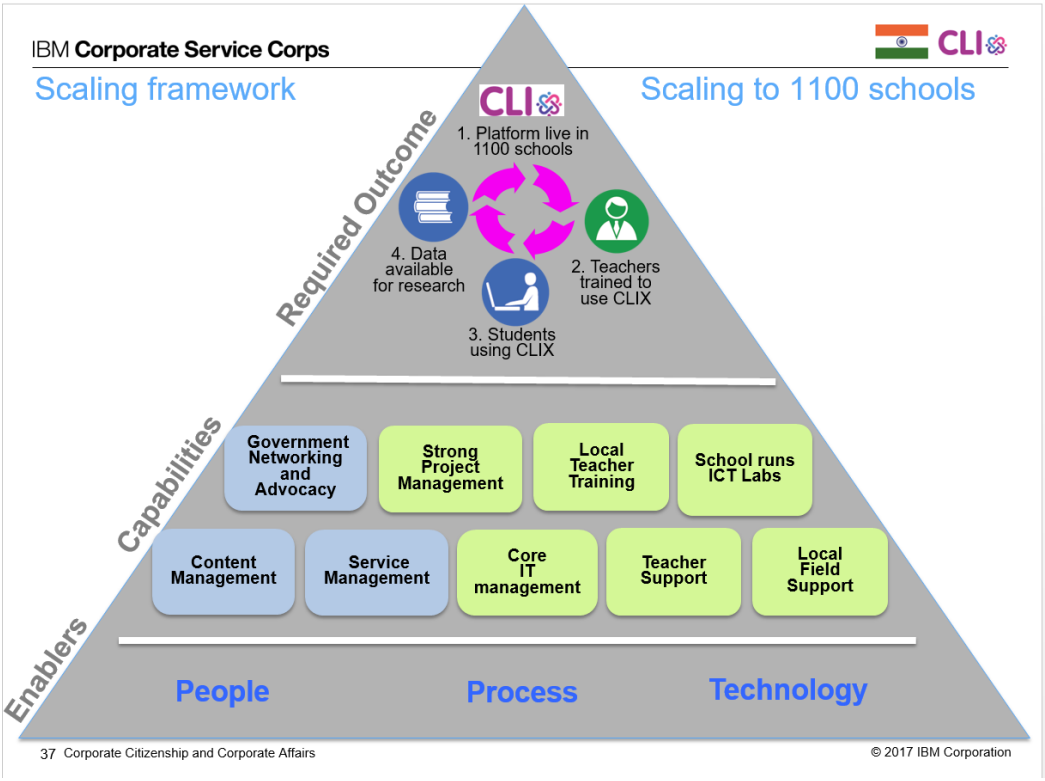


Scalability Framework to Reach 1100 Schools

Because CLIx was designed as a proof of concept, it is important to achieve the proof of concept goals, and determine what changes need to be made within the CLIx program for scaling purposes. The picture below shows our understanding of CLIx current state, proof of concept goals, and their vision for the future in both the short and long term.

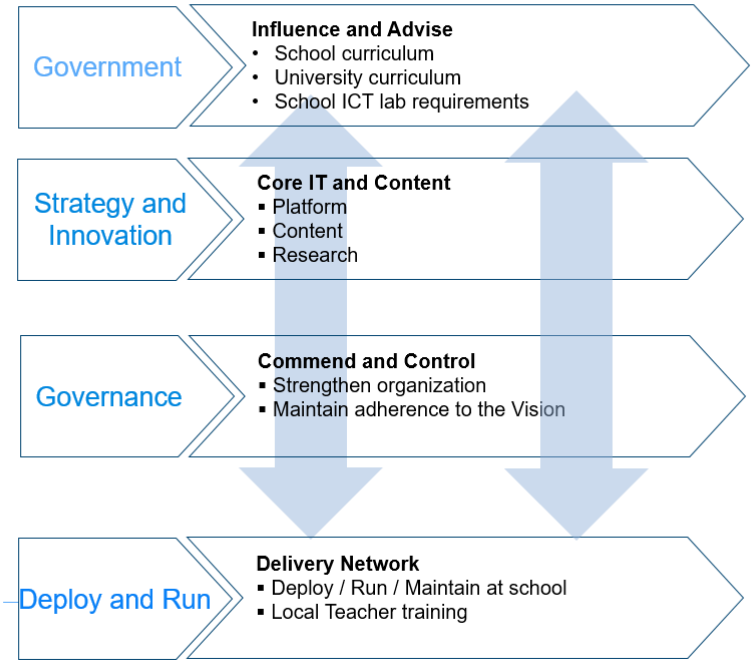


To achieve the proof of concept Required Outcomes, CLIx must successfully deliver the Capabilities documented in the figure below. And, our seven recommendations noted above align closely with the Capabilities also critical elements of the scalability framework.

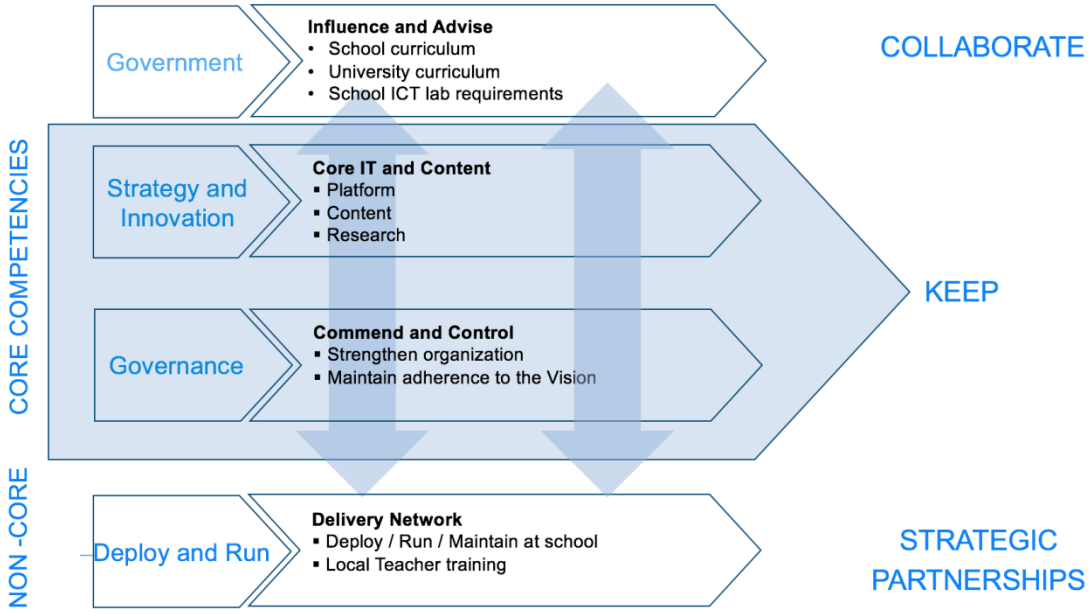


As CLIx works to incorporate the seven recommendations, they will be more successful in achieving the 1100 proof of concept schools and they will be in a better position to scale in the future as well. While all of the recommendations will assist with future deployment, once CLIx begins to expand to even more states and across India, we recommend that CLIx reconsider which of the competencies are within CLIx's core competencies. In our opinion, managing the 29 state hubs is untenable and not reasonable for CLIx to handle at that scale. The picture below depicts our recommendations for CLIx to scale to the 1100 Proof of Concept (POC) as well as scaling beyond the 1100.

Scaling to 1100 schools



Scaling beyond 1100 schools



Key Actions

1. Assign an owner and stand up an Improvement Plan covering the seven key recommendations
2. Arrange a workshop to go through the value-ease assessment of the recommendations, sub recommendations along with anything else that's on the critical path
3. Create a work plan / work breakdown structure, with owners, utilising the SMART approach
4. Determine the timeline for implementation, this will drive the resourcing requirements
    a. e.g. if the target is to make inroads before the next school year starts, this sets the level if urgency behind ICT Readiness
5. Map out all of the roles required
    a. each role needs a name (rather than each name needing a role!)
    b. if multiple roles have the same name this is an indication that you need to reassign workload, remove workload or add additional staffing
    c. ensure the Product Manager role is filled
6. Make incremental improvements (prove and grow) aligned to the work plan
7. Beyond 1100 – this action needs to be assigned to a senior working party

Tools and References

- *MAKING IT BIG* Strategies for scaling social innovations:
- https://www.google.co.in/url?sa=t&rct=j&q=&esrc=s&source=web&cd=1&cad=rja&uact=8&ved=0ahUKEwj4jv_uh8PXAhUKT7wKHfJkBDMQFgglMAA&url=https%3A%2F%2Fwww.nesta.org.uk%2Fsites%2Fdefault%2Ffiles%2Fmaking_it_big-web.pdf&usg=AOvVaw20J05UY8NxCxn4XSqX1HLh
- World Health Organisation : Nine steps for developing a scaling-up strategy
- http://www.who.int/reproductivehealth/publications/strategic_approach/9789241500319/en/
- Value Ease Spreadsheet

CLIx Prioritization Spreadsheet.xlsx

OTHER THINGS OBSERVED

Observations

During our interviews, document reviews and field visits we observed a number of things that whilst not significant in their own right are worth noting as areas where improvements can be made

Observation: Issue Tracker

- **It was observed**: that the Hub Core issue tracker was sparsely populated in recent months and that this was in contrast to the issues we personally observed in the field. This is in contrast to the expectations set.
- In addition, Rajasthan State had a very detailed tracker of school visits and issues which they used internally
- **Opinion**: the level of detail requested in the issue tracker is not relevant to the HUB Core team, they would be better served by requiring a summary report on State issues and repurposing the Issue tracker to be focused on escalated items in regard to the Platform and Modules e.g. the issues for which HUB Core are responsible
- Refer also Project Management – Dashboards

Artefacts:

- CLIx Core: Issue Tracker Form (IT) - Every time the Field Resource Coordinators visit the field and come across a technical glitch/issue, they log in the issue in the issue management tracker form (attached in this mail for your perusal). Though any field team member can log in the issues, they are later followed up and taken up with field technologists and the technology team at Mumbai.

Issue Tracker Form -

Rajasthan State

Tracker.xlsx

Observation: IMT(Intervention Monitoring Tool)

- **It was observed:**that the IMT questionnaire had 64 questions, and that whilst it was completed via an android app there was little intelligence built in resulting in the same questions being asked each time, that the data quality was not trusted by HUB Core, that the results fed into a public portal and that the use of the word 'implementation in progress' contradicted other reports that the schools were implemented
- **Opinion:** The use of a single visit to determine the status based on that day, and bypassing any quality checks at the PMU needs to be urgently reviewed.
    - In addition, a common definition of Implemented must be urgently agreed and adopted
    - Consideration should be given to human nature i.e. the completion of 64 questions, especially if the exact same questions are asked each time, is subject to low adherence and data quality issues
    - Data should only be collected which will be used, else it is 'waste'
    - Data should be collected at the PMU, consolidated and reported on

- **Refer also Project Management –** Dashboards and ideas on ICT Lab logs

Artefacts:

Intervention Monitoring Tool (IMT). The Intervention Monitoring Tool will have to be filled out by the Field Resource Coordinators (every time they visit a school) once the implementation of the modules has begun in the schools. The IMT form also should be filled and sent out using the "ODK" app. IMT would be able to tell what modules are being implemented in each school, the quality of the implementation, teacher participation in the module implementation,etc. (mentioned in the attached document).

https://clix.tiss.edu/clix-in-action/

IMT Updated 3.05.17(2).docx

Observation: Rajasthan (Restarting Deployment)

- **It was observed:**that in the CLIx Status Update 13.9.2017, Page 6 '…. Infrastructure related commitment from the state' which we understand relates to additional monitors to ensure the ratio does not go beyond 1:3 as well as additional headsets for the English Module.
    - In our meetings with the State Official XXXX he advised that the state had many schools without an ICT Lab and that
    - In our meetings with the PMU Filed Technologist he seemed comfortable that the latest version of CLIx platform could run on a re-purposed server from the ICT Labs
- **Opinion:** Given that the current PMU construct has the technical and field capability pilot deployments should continue in the state to investigate ways to reduce the cost from the original 101 schools
    - Lab test the new CLIx Platform to confirm it can run on the low-end server, and the rest of the lab can function (via n-computing) on the high end
    - Pilot the same in 3-5 schools
    - Lab test (if possible) the installation onto a phase IV school (Linux Platform)
    - Pilot the same in 3-5 schools
    - Create new lists of target schools based on the findings

Costs Example:

Server~30k; Hard Disk ~5k; Headsets ~7k

	Options			
Hardware Options	Pristine Install - Linux Server - Add disk - Add headsets	Hybrid Install - Reuse server - Add disk - Add headsets	Reduced - Reuse server - Reuse disk (with reduced content)	English Option - Don't deploy English until school provides headsets
Cost	~42k	~12k	~7k	~ neg. 7k
@ 200 Schools	~8400k	~2400k	~1400k	~ neg. ~1400k
Proven	Yes	Lab	Lab	N/A