Resource and Capacity Assessment Workgroup Report

Executive Summary

The Resource and Capacity workgroup was charged with articulating the resources needed to implement local/state ELR. To satisfy this charge, the workgroup developed a set of working documents to serve as a roadmap for states, territories, and other public health jurisdictions choosing to plan, implement, and/or maintain a functional Electronic Laboratory Reporting (ELR) system. The documents are intended to be used by states to self-assess their current progress, gauge the level of effort needed for each phase of ELR implementation, and identify needed resources. Through use of the documents, states will be able to articulate to leadership the key milestones and costs, including personnel, to support ELR activities during any phase of progress. The roadmap produced by the workgroup is comprised of a process checklist, a resource list, resource estimates, and an accompanying set of state profiles.

The workgroup consisted of a small group of state and local experts with a broad array of experience in ELR.   Participants represent jurisdictions with integrated ELR and electronic disease surveillance system solutions, as well as ELR systems that are stand-alone. Some solutions were built on Commercial off-the-shelf (COTS) products, or customized COTS products and others were built in-house.   The number of resources applied to ELR varied considerably across jurisdictions and implementation and maintenance costs varied as well. Jurisdictions used a variety of implementation architectures. In some cases, a Health Information Exchange (HIE) collected and directed data to public health. In one case, the HIE was part of the public health system. For some jurisdictions, data were sent from a hospital's electronic health record (EHR) system, and in other cases it was sent from the Laboratory Information System (LIS) component of a hospital's EHR.   However, in general, large national and regional labs (e.g., ARUP, LabCorp, Quest Diagnostics, and Mayo) accounted for a significant portion of test results sent to public health.

Participants were in agreement that strong support and backing from agency leadership made for successful ELR.

The roadmap artifacts are:

Process Checklist
(http://www.cste.org/webpdfs/elr/ELRRoadmapProcessChecklista.pdf)
The Process checklist is divided into six phases of implementation. Each phase is broken into functional groupings of steps to be taken. The phases and associated functions are:

- **Plan**
  - Executive sponsorship
  - Update policy and law
  - Define scope of Information Technology (IT) system development / enhancements
  - Training
  - Communications
- **Engage**
  - Manage trading partners
  - Conduct training
  - IT system development and enhancement
- **Connect and Test ELR System**
  - Initiate ELR implementation with trading partners (aka data providers)
- **Validate**
  - Validate content and structure of message
- **Operate**
  - Validate content and structure of message
  - Alerting
  - Manage IT
- **Process Improvement and Growth**
  - Conduct operational analysis
  - Supporting ongoing changes
  - Implement and evaluate metrics (assess ELR coverage)

Each function in the process checklist is broken into steps and each step is explained by a basic description, workflow frequency (e.g., one time, periodic), participants involved, if the step is recommended or optional, and deliverables typically resulting from the step.

Neither the phases, nor the functions indicate a strict order of execution and it is recognized that they could sometimes occur simultaneously. The process checklist represents the group's best effort to provide the main steps toward implementation of ELR. It is recognized that the checklist is not all-inclusive and additional steps certainly exist.

Resource / Skills List
*(*http://www.cste.org/webpdfs/elr/ELRRoadmapResourceChecklist%20Skills.pdf*)*

The Resource / Skills List outlines the roles involved in ELR and provides the skill set associated with each role. Skill sets are indicated as primary or secondary. Roles and skill sets were collaboratively defined by the participants after it became apparent that each health department had its own job titles and associated skill sets. This list of common roles and skills allowed participants to estimate how much of each resource's time was needed during startup, engagement, and maintenance of ELR, and for those estimates to be compared across jurisdictions. This estimate of resource effort became the final artifact from the workgroup and is described in the next *section*. The complete list of roles is included in the Resource / Skills List, but the subset of resources that make up the estimates of effort are:

- ❑ Project Manager / Director
- ❑ Program Sponsor
- ❑ Program Manager
- ❑ Info Systems Support Specialist
- ❑ Systems Analyst
- ❑ Business Analyst
- ❑ Data Analyst
- ❑ Database Administrator (DBA)
- ❑ Integration Analyst
- ❑ IT Program Manager
- ❑ Developer (IT)
- ❑ Informaticist
- ❑ Epidemiologist

- ❑ Surveillance System Manager
- ❑ ELR Coordinator
- ❑ Laboratorian
- ❑ NEDSS Coordinator
- ❑ Help Desk (ELR Coordinator)
- ❑ SME (LOINC® / SNOMED)
- ❑ Data Modeller
- ❑ Network Security
- ❑ Quality Assurance Tester
- ❑ Trainer
- ❑ State Legal Counsel

Resource Estimates and State Profiles
(http://www.cste.org/webpdfs/elr/ELRRoadmapStateCostSummaryandGraph.pdf)
Participants estimated human resource costs for the startup, engagement, and maintenance phases of ELR.   Each participant estimated the percent of time required for each role for each phase and the percentage was converted to hours. Hours were multiplied by an average cost of $75.00 per hour to derive cost estimates, and the total was then annualized. The average cost by population size, for the startup, engagement, and maintenance phases of ELR is below:

	Startup	Engagement	Maintenance
Small	$297,375	$221,000	$221,500
Medium	$405,000	$338,250	$233,250
Large	$600,000	$633,500	$458,000

The sample size was small, with only nine jurisdictions; however jurisdictions represented a range of population sizes. Jurisdictions that fell below the 50th percentile in total state population were classified as small, those above the 50 and below the75th percentile as medium, and those above the 75th percentile as large. Participants indicated that a number of factors influenced the variance in cost in specific phases of their ELR system:
o Using the NEDSS Base System (NBS) – estimated startup cost of $200k-250k if the jurisdiction uses an Application Service Provider (ASP) model where the ASP vendor subsumes the cost of hardware, software, and technical support. If the jurisdiction does an in-house implementation, allocation is divided between personnel resources and hardware/software costs. This cost does not include jurisdiction-sponsored personnel (e.g., project officer [NEDSS coordinator], SME from programs, or IT liaison).
o Partnering with a vendor in exchange for discounted costs.
o Differences in laboratory report volume.
o The architectural model of the state – do providers direct data through an HIE, does the state's solution use an ASP model, or are Health Information Service Provider (HISPs) leveraged as part of the overall solution.
o Whether ELR was part of an integrated system or was standalone.

Finally, profiles are included for states that participated in the workgroup. The profiles complement the resource estimates and provide context about the state's overall ELR system, their architecture, volume of cases/reports[1] received, number of reporting entities, and estimates on the number of hours spent in the engagement process for key messaging functions. State profiles are captured as worksheet pages in the Resource Estimates workbook.

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[1] Jurisdictions provided information about the volume of cases or reports received depending on their system's ability to capture this information

All three workgroup artifacts are posted on the CSTE website, www.cste.org, under the Surveillance / Informatics - Program and Activity. Additional intermediate documents can also be found at this location. It should be noted that these data are not based on a formal study, but are instead the culmination of iterative work over a period of months by a small set of experts in the area of ELR. The estimates are exactly that, and a more comprehensive examination across jurisdictions would be required to refine them.

Method

In August 2010, the Resource and Capacity Assessment workgroup co-chairs, Dan Pollock (CDC) and Lauri Smithee (OK) invited select local, state and federal representatives to participate in the workgroup. Meetings were held on a weekly basis over a period of months. This was augmented by a face-to-face meeting in Atlanta, GA on May 23-24 with workgroup members and representatives from several additional jurisdictions who had experience in implementing ELR.

Participants represented eight states, one municipality, and one public health lab. Jurisdictions varied in stage of ELR implementation from those trying to ramp up for ELR to those with mature, well established implementations. Participants represented jurisdictions small, medium, and large in population size.

From May 2011 to July 2011, the roadmap and resource checklists were administered to all of the workgroup participants (N=10).

Results

Nine of the ten participants completed the checklists. Based on participant input, the total number of hours for all roles ranged from 2,300 to 16,500 for startup; 1,920 to 15,600 for engagement; and 2,200 to 11,900 for maintenance. The number of hours was multiplied by an average hourly rate of $75 to arrive at an estimated cost for personnel resources to implement ELR.

The participants identified technical resources (e.g., business analyst, programmer, informaticist) requiring the greatest number of hours (or level of effort) in each of the phases. A greater level of programmatic resources (e.g., ELR coordinator, epidemiologist, and quality assurance) was identified in engagement and maintenance of ELR infrastructure compared to start up.

Lessons Learned

Meeting participants shared a wealth of information borne from their experiences in implementing ELR. Some of those key points are below:
- Executive sponsorship is critical. A *Business Needs* document for ELR is important for articulating the benefits of ELR and garnering support from management.
    - o When management changes, support from the new management must be obtained.
    - o The executive sponsor may be a team or an individual. This could be the State Epidemiologist, Deputy Commissioner, Associate State Health Commissioner or others who promote ELR within the state, and help to identify and secure funding.
- States have had success following standard processes to articulate the benefits of ELR, secure sponsorship, and obtain funding.
    - o Start with a project charter (mission, objective, cost-benefits analysis, risks, scope of work, high-level alternatives analysis, stakeholders) that is

presented to the project sponsor who in turn presents it to the leadership team.

- o When requesting funding, present the big picture, but ask for funding for the current phase.
- o Keep championing ELR regularly, but yearly at a minimum, to ensure funding is available to support maintenance, enhancements, and expansion.
- o Public Health Emergency Preparedness (PHEP) grant funds contribute up to 50% of NEDSS-related activities in the states, which include ELR.
- o This years' (2010/2011) ELC Cooperative Agreement Guidance includes language to support ELR – there will be differences in the approach to ELR from state to state.

- Where ELR is required by law or governed by internal legal guidance the level of detail on what is included varies from state to state.
  - o Some states identify the diseases, timeframe and method of reporting for each disease in their statute or regulation, and others include that level of specificity elsewhere such as in the trading partner agreement, state specific implementation guides, or lists managed under a designated authority.
  - o Avoid over-regulation – was a lesson shared by participants:
    - ▪ Do not include the list of reportable conditions in statute or regulation, instead reference the list so it can be updated to quickly adapt to emerging diseases and public health emergencies.
    - ▪ Do not include specific reporting criteria by condition in regulations.

- Organizational differences within / between the states impact internal ELR processes and procedures. Items such as managerial sponsorship and support, funding and staffing resources / structure also affect ELR.
  - o An example given was an infrastructure where a public health lab is physically located within the health department and may even share IT infrastructure versus where the public health lab is external and may even be affiliated with a local university. This is pertinent where public health labs send ELR.

- A Project Plan helps organize and track the steps toward implementation. The plans should:
  - o Include deliverables for each step.
  - o Address cost, dependencies, and schedule.
  - o Indicate where "one time" functions are truly iterative.
  - o Include adequate resources to handle the surge of on-boarding new providers / partners.
  - o Leverage ELR to coordinate with other activities (e.g., partner with HIE, immunization, syndromic surveillance).

- Both a long-term plan (enterprise strategy) and current implementation phase plan should be developed. These represent what is needed, and what we plan to do, respectively.

- When planning your project team, include expertise from IT management and staff at the beginning of the process. Their input can help guide the direction that is chosen and result in a better integrated approach.

- Strong communications between all the involved parties is critical.

- o Communications should include epidemiologists, IT, informatics, management, partners, and data providers.
  - o Communications will start before the project, will continue through the life of the project, and beyond.
- Plan for maintenance costs. The cost for maintenance over a period of years often exceeds initial start-up costs.
  - o Maintenance costs include expenses for fulltime and contract staff, software and hardware licenses, updates and changes to implemented software, on-boarding new trading partners, and monitoring existing ELR flows.
  - o Keep in mind that whatever system you design should be redesigned and upgraded in six to seven years.
- Clearly distinguish between what is reportable from a lab versus what is reportable from a provider.
- Provide information to labs and providers regarding which tests and results are indicative of reportable conditions, as well as the reporting criteria and reporting requirements. The lab and provider requires this information to filter data sent to public health.
  - o The filtering could be done before the lab report is sent to public health or after it is received by public health, and this varies from state to state.
  - o The advantage of laboratories and providers filtering data before providing to public health is that public health manages a smaller number of reports better targeted toward reportable conditions.
  - o The advantage of filtering data after it is sent to public health is that public health has the superset of data to support a broader basis of public health investigations (e.g., SARS, H1N1).
  - o The CSTE/CDC ELR Task Force has worked with the public health community to update the Reportable Condition Mapping Table (RCMT). This mapping table provides the initial level of filtering for tests and results potentially indicative of a reportable condition. RCMT is available through PHIN VADs at (https://phinvads.cdc.gov/vads/ViewCodeSystemConcept.action?oid=2.16.84 0.1.114222.4.5.274&code=RCMT)
  - o Several jurisdictions and private companies have mapping tables similar to RCMT.
- The reporting burden on data providers could be reduced if public health programs in a jurisdiction develop a consistent set of reporting requirements for data providers. This has been a challenge since funding silos have resulted in programs independently asking providers for program-specific reports.
- Meaningful Use has acted as a catalyst for ELR adoption by healthcare providers. In turn, public health departments must build capacity to receive additional data that will become available. In addition, public health must ensure their systems have functionality to receive and consume HL7 2.5.1 messages for ELR. This can require considerable effort and come at substantial cost.
  - o Meaningful Use requires use of HL7 2.5.1 for ELR and most health departments must make changes to accommodate this message version.

Changes could be required to the underlying database, additional or revised mapping, and updated vocabulary to support LOINC test codes and SNOMED result codes[2]. Health departments who cannot receive and or consume HL7 2.5.1 messages will need to add this capability.

- o Jurisdictions are looking to CDC for support and guidance on alternatives and best practices for implementation that align with Meaningful Use and tools and services to streamline response to questions.
- o Most jurisdictions reported an inadequate number of dedicated resources for ELR.
- o Vendors (labs, EHRs) might need regulation deltas to comply with / support public health requirements.
- o In one state, since 2007 when ELR was mandated, almost 98% of their labs were compliant. With the new meaningful use requirements, they have to re-certify every lab for HL7 2.5.1.
- o Increasing constraints in the structure and content of a message may lengthen the on boarding process.

- When prioritizing providers to implement ELR, get assurances they are planning to continue through to production.
  - o The provider's message should be electronically produced by their system and not manually constructed with the intent of satisfying testing requirements with public health and qualifying for incentive payments.
  - o Certification by an Authorized Testing Body only ensures the sender can create a message in accordance with the required message structure. The message content is not certified to meet the needs of public health.
  - o Considerable effort and expertise on the part of public health should be allocated to help labs map local codes to standard codes.

- Jurisdictions should develop and provide clear documentation to potential trading partners.
  - o Consider developing a webpage dedicated to electronic data provision including data flow diagrams, checklists/milestones, data use agreement templates, and state-specific implementation guidelines.
  - o Clearly defined jurisdictional contacts and contact information.

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[2] The use of SNOMED-CT in ELR is not cited as required per 45 CFR Part 170 (http://hitechanswers.net/wp-content/uploads/2010/08/ONCStandardsFinal.pdf) but is referenced in the ELR HL7 Version 2.5.1 Implementation Guide: Electronic Laboratory Reporting to Public Health (US Realm), Release 1.