Division of Sexually Transmitted Disease Prevention

Business Process Management Model for STD Prevention

<u>Deliverables 4C, 4D and 6D</u>

Leading Practice Business Processes for STD Prevention & Gap Analysis

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Leading Practice Business Processes for STD Prevention & Gap Analysis

State and local health department representatives, along with sample of DSTDP staff and external partners, have outlined the future of STD Prevention for state and local health departments. The text below details their vision, discussing how project areas will conduct prevention activities and employ an integrated disease reporting and investigation system. It incorporates information synthesized from interviews, meetings site visits, and a two-day facilitated session with stakeholders. Participants were encouraged to think broadly, identifying all the ways in which technology could facilitate their work. They were asked to consider leading practices, but also to be cognizant of the varying needs of state and local health departments, and therefore potentially present a range of options. The future state process flows have been provided as an attachment to this document. The flows and the information presented here will inform the functional requirements for the NEDSS Base System (NBS) and the STD Program Area Module (STD PAM) and translate to a high level implementation plan for grantees, which is to be finalized in future phases of the BPMM initiative.

Information on leading practice is collected from two sources. First, some participants identified innovative and effective prevention activities that can be adopted by other project areas. Such leading practices include GIS mapping to identify jurisdiction, conducting interviews by phone or cross training staff to work in multiple disease areas in cases of outbreaks. Second, some leading practices are dictated by the use of an integrated application. For example, data should be entered at the point of collection activity and data collection elements should be consistent across disease areas to the extent possible. The information presented here is a combination of both inputs.

The Future State discussion includes a gap analysis of both process and technology. Process changes are steps required to adopt leading practice and employ the integrated disease surveillance system, such as receipt of electronic reporting information, monitoring of providers on screening practices and evaluation of outreach activities against burden of disease data. Technology gaps are system development needs; functional requirements to support leading practice that have not yet been developed in the NBS, or are not scheduled for development in the STD PAM. The gap analysis will be translated to a high level implementation plan in the next phase of work, along with more detail of training and communication needs for various stakeholders.

It should be noted that this document encompasses only the process and technology changes in the activities of state and local health departments. Much of the support for the migration to an automated system and corresponding augmentation of prevention activities will require changes in organizational culture, organizational design, technology support, partnership and potentially legislation. These larger, health department wide considerations are to be detailed in a complementary paper focusing on change management.

In addition, many gaps that exist are not fully documented here. For example, training, communications, materials, resources analyses, etc, will be required at each step. Full discussion will take place during the development of the implementation plan. Moreover the technology gaps were identified to the best ability possible, based on documentation

and the NBS prototype. It is likely that functionality will change over time, with gaps becoming less significant as development occurs. It is possible that some of the desired functionality is in development, but is not yet available.

Stakeholders employed the Business Process Management Model (BPMM) for STD prevention as the framework for their future state design. The BPMM is a taxonomy for organizing the current and future STD Prevention activities of state and local health departments. Stakeholders have collaboratively designed the BPMM over the past six months, and updated it slightly during the session to more comprehensively represent their work. The updated BPMM framework includes the following mega and major processes:

Mega Process	*Major Processes*
Programmatic Intervention	Outreach and Community-Based Services Clinical Services Partner Services and Counseling Improving Services with External Providers Treatment Assurance Other Data Collection
Information and Data Management	Receipt/Acquisition Processing and Consolidation Analysis, Access and Dissemination
Program Development	Program Monitoring Priority Setting Implementation/Evaluation

The following text uses this framework to organize the future major processes for STD prevention, gaps between current and future processes and gaps between current and future technology.

PROGRAMMATIC INTERVENTION

Outreach and Community-Based Services:
Conduct education, training, legislative activity, screening and communication within the community and build appropriate partnerships and coalitions to promote healthy behavior, quality care, testing and treatment

Background for Outreach and Community-Based Services
Stakeholders were tasked with identifying innovative ways to identify, conduct and track outreach activities. They were encouraged to think of new uses for data to promote leading practices, and ways in which outreach activities could benefit other services provided by health departments.

Although an electronic disease reporting and investigation system cannot incorporate all of the information required to provide education, external training, legislative activities, and media campaigns, stakeholders seek to inform and facilitate outreach programs through better collection and analysis of data.

Future State for Outreach and Community-Based Services
The main outreach activities will continue to be screening and treatment programs for high risk populations in current venues: jails, job corps, youth detention centers, homeless shelters, schools, mobile vans, bathhouses, bookstores and commercial sex venues. However, these activities will be augmented by better ability to identify the groups most at risk and the benefit of existing programs.

Therefore, the system will facilitate the collection of qualitative and quantitative information, and map it both on the client level (to case information) and on the community level (by demographic). In addition, it will support extraction and analysis of such information, through ad-hoc reports, standard reports, GIS and trending capability. For example, clinic and DOH staff could document how clients were referred for services in order to evaluate the effectiveness of outreach programs. Information could also be collected from contracted CBOs, such as total clients served, percentage at high risk, number screened or number treated. Data could then be compared to other DOH information, such as number accepting services or number pursuing referrals to identify effectiveness. Although such analysis does take place currently, it is usually documented in separate applications. Client data should all be housed in one application to the extent possible, in a consistent format to allow for cross-programmatic evaluation. Participants also desire the ability to track requests over time, so that they do not need to recreate reports and can ensure consistency in responses.

Stakeholders also plan to increase emphasis on policy development, media and legislative activities. In order to conduct this work, project activities and outcomes will be summarized into compelling information. Media and legislative work requires very brief synopses of specific STD prevention activities that work well and areas of highest risks that require focus, monies and/or assistance.

Moreover, the success of outreach and community based services relies on partnerships with external organizations. Therefore, information will flow in both directions. Not only will DOH's collect information from contracted organizations and partners, they will also provide summarized information back to these groups. They will have readily available

letters, summaries and responses for legislature. Information will be posted on DOH web sites, to make reports accessible for partners and to disseminate information via the HAN for internal and externals users.

Process Gap for Outreach and Community-Based Services

Because the NBS allows for standard fields, collaboratively defined fields and locally defined fields, projects will need to identify what they want to measure, and then create locally defined fields for inclusion in their STD PAM implementation. For example, if they are conducting an outreach activity with teens through a community partner and want to measure adherence to referrals, they will create the fields to track the referring agency on patient records, and compare an aggregate number of patients presenting with a referral from that CBO to the number of referrals given by the CBO.

In addition, stakeholders cite difficulty with legislative and media campaigns. Although they would like to conduct this work, they are mainly limited by resources and expertise. Better data interpretation, summarized briefly into main points of success and need is critical to such campaigns. The CDC could further facilitate this work by providing more training, media packages and summaries for legislative activities. However, projects need to customize summary data to local needs. In addition, the federal government emphasizes investigation and reporting activities with projects more than outreach programs, as reporting is required and outreach is not. With limited resources, projects must prioritize their work. Funding and reporting requirements often leave outreach, legislative activities and partnership building as secondary, even though these activities may be more beneficial in the long term.

Technology Gap for Outreach and Community-Based Services

The NBS focuses on case reporting and investigation. Therefore, it is not yet clear how external data from outreach and community-based services will be incorporated, at the client level (e.g., clinic records), at the community level (e.g., census data) or at the venue level (e.g., jails). Comparing data that is external to the NBS/STD PAM to data that is captured within the NBS/STD PAM requires mapping between the two datasets, in order to ensure consistency prior to any data uploads. Most likely, some of the activities will continue to be tracked in external analysis systems initially. Moreover, in the NBS, an 'investigation' is created each time a record is entered. That is, client level data from external sources that is not a potential investigation cannot be incorporated into the NBS. Therefore, it is unclear how screening and outreach data will be recorded.

Although the NBS does have some standard and ad-hoc reporting capability, the types of reports suggested here are not accommodated by the current version of the NBS. NBS data will have to be exported to external applications to accommodate ad hoc analyses. Consequently, local health departments with limited staff may have difficulty tracking and analyzing their own data.

As identified by participants, sharing information with partners is also critical. However, many projects do not have a portal (a secure intranet site for posting information for users) or a HAN (a health alert network for e-mailing information to users) to make DOH information easily accessible to external stakeholders. Therefore, projects may need to disseminate consistent communications, such as newsletters or e-mails. While these are a viable alternative, they are often more resource intensive.

Clinical Services:
Conduct STD screening, testing and treatment in public health clinics

Background for Clinical Services
Participants decided to separate clinical services from counseling and partner services in the process model to facilitate design, since counseling and partner services are fairly consistent throughout projects, but the extent of clinical services varies considerably. Moreover, clinical services are usually conducted by separate staffs and in separate settings from counseling and partner services.

It is not in the scope of this project to identify the components of the clinical module of the STD PAM, or to identify leading practices for clinical care. However, it is impossible to separate clinical services completely, as the activities and information derived in clinics drives STD Prevention work. From discussions with stakeholders, it is apparent that the integration of clinical information with investigation activities is paramount to the success of the implementation. Stakeholders discussed the possibility of interfacing with external clinical systems and the development of the STD PAM clinical module. The needs of a clinical module are sophisticated and only briefly outlined here. Although not explored, it should be noted that the most critical need in some clinical settings is the ability to record and track registration and billing/Medicaid information.

Future State for Clinical Services
There are three options for integration of clinical services with investigation: 1) Interface with external clinical/registration systems (or electronic data upload) 2) Use the STD PAM clinical module, to be developed later, or 3) Continue to use manual processes for inputting clinical information into the case reporting system. Leading practice offers the first two options, with manual re-entry or scanning less desirable but likely to be an intermediary step prior to availability of the clinical module of the STD PAM and during early phases of implementation.

For either electronic option, a robust set of data acquired in clinical settings would be available to DOH staff for investigation and contact tracing. A core set of data, potentially including components of the history and physical, diagnosis, signs and symptoms or patient intake, would be identified nationally, with projects able to augment the set based on their needs.

With an interface, the core set of data would be sent to the STD PAM from the clinical/registration systems. Some two-way interfaces will be developed (lab and NBS) although the governance and security concerns may limit two-way interfaces in other settings (external clinical systems and NBS). In instances without two way interfaces, clinical staff could have access to the STD PAM, but the clinical system would not be updated with information gathered during investigation activities. Staff could use case information collected during investigation, such as behavioral or risk information, to tailor service provision, but it would not auto-populate their clinical/registration system.

With implementation of the STD PAM module, integration issues are inherently addressed. Data collected in the clinical setting or by DIS are shared, based on security. DIS do not have to re-key information, data can be input and updated throughout the system (e.g. demographic information is only updated in one place, not in both a clinical system and a surveillance system). Staff members gain an ability to view both clinical

and case reporting information and to conduct robust analysis without having to merge data.

Providers benefit significantly as well. Instead of recording case information on paper, and conducting correspondence with the health department to provide treatment information, case data will be entered on-line, or automatically uploaded. Clinicians will also have the ability to track and update their cases through the system. In addition, Department of Health clinicians may have access to case reporting and investigation data for their clients. They can incorporate clinical information from HIV, or risk behavior information from earlier TB investigation to tailor their intake, screening or treatment process.

The STD PAM clinical module will include the ability to record the history and physical, intake information and upload lab results. Ideally the system will include clinical pathways which guide clinical management of a patient based on signs and symptoms, lab results, demographics and risk/behavior information. It would also provide diagnosis and treatment guidelines, algorithms to identify cases, alerts identifying priorities and out of range information and messaging between providers.

Process Gap for Clinical Services

A core set of data to be collected in a clinical setting and used during investigation and contact tracing has not yet been identified. These efforts should be conducted soon, so that projects can be proactive in their various development efforts. Otherwise, projects will create various definitions, confounding any cross-programmatic analysis. It is unclear how this process will be conducted and solidified on a national scale. In addition, local health department clinics will have to be incented to standardize. In some projects, the state has been successful in mandating definitions, but in many instances definitions vary somewhat by local health department.

DOH providers currently act similarly to external providers; they document case reports on forms and fax them, mail them or hand them over to surveillance staff. They generally do not use the surveillance systems for data analysis or for patient care. Information flows one way, from the clinics to the DOH, with only some summary reports disseminated back to the clinical areas. Further, some clinics do not have clinical or registration systems. For example, providers in Chicago's HIV/AIDS clinics document client information on paper only. Transitioning to on-line reporting will be cumbersome, as support staff may not be comfortable with computers, and venues may not have adequate infrastructure to support on-line reporting. In addition, without direction on how to use the data, the system and reports, they are likely to revert to existing practices.

Technology Gap for Clinical Services

Integration with external systems is complex, and the difficulty of building successful interfaces could confound project areas' ability to achieve leading practices. Ideally, information would be introduced in the clinical setting, and populate the STD PAM through automated upload, most likely through daily batch upload. It is the intention of CDC to place most of the responsibility for the development of interfaces on projects (e.g. development of ability to electronically import data from other applications, such as clinical or registration systems, to the NBS). This approach makes sense, since multitudes of different clinical and registration systems exist among grantees. However, projects to date have had significant difficulty developing this functionality since interfaces are extremely complex and require significant IT development and expertise.

For example, King County (Seattle, Washington) is attempting to build an interface between their main clinical and registration system, but it has not yet been successful. In addition, they key case information into their own application, and then send the case reports to the state for entry into STD*MIS. Chicago, too, has struggled to get electronic lab uploads into their clinical system (Global). They export case data to Access, and then once again to NETSS for submission.

It should be noted that current users piloting the NBS cite that the complexity of the NBS database design (platform, tables) makes integration difficult. They believe that creating interfaces to existing systems would be difficult for them to accomplish without significant support. Therefore, it may not be adequate to table the interface discussion based on the assumption that projects will develop their own interfaces. Projects may need support with integration to be successful. If this is not addressed, many projects will use the STD PAM in a similar way to the current use of STD*MIS: case reports will be created in the clinics and sent to another department for re-entry into the PAM. Not only is this re-work time consuming, the lack of integration falls short of the vision for STD prevention: improving prevention activities by using more clinical and intake data to guide follow-up.

The clinical module for the STD PAM is not currently in scope, and there is no timeframe for development. Since the STD PAM is slated to have all functionality of STD*MIS within the first PAM release, projects may be able to use the STD PAM for recording basic information in the clinical setting. However, a robust, true clinical module with the functionality described above (registration, billing, pathways, etc) is not likely to be developed in the near future. Although investigation/case management systems are complex, clinical and registration systems are significantly more so. DSTDP and CDC should consider carefully whether the necessary functionality can be successfully developed and supported as part of the NEDSS initiative.

The Division of Tuberculosis Elimination has identified that patient management, including registration, billing and case management, are best left to external applications. Although they are developing a PAM for TB, they are also conducting a vendor analysis of patient management systems for projects and encouraging them to incorporate external systems. DSTDP may consider a similar route for clinical functionality which should not significantly overlap with case management. Identifying some leading applications, and the core elements that must be transferred to the STD PAM (demographics, behavioral information, diagnosis, lab results, treatment information), could be the easiest and most effective route. In addition, narrowing the list of major vendors would help the CDC support integration of the STD PAM with external systems.

Counseling and Partner Treatment:
Provide counseling, contact tracing and partner services. Identify potential transmission and prevent additional spread of disease through referral for and provision of testing and treatment

Background for Counseling and Partner Treatment
As noted in clinical services, stakeholders opted to separate clinical services from partner services due to the variances in activities and staff required for each. Counseling and partner services incorporate much of the work conducted by local health departments. Yet participants recognize the need to re-examine investigation and contact tracing activities and identify new methods to automate, capitalize on additional data and capitalize on congruent activities related to other disease areas. Such improvements will allow them to better tailor activities to the specific needs of clients.

Further, stakeholders were asked to prioritize functionality for the system to support partner services. As expected, the most critical needs are the ability to record information currently documented in STD*MIS and give access to users to support transition from manual to electronic systems. New functionality to improve prevention activities promotes leading practices (e.g. messaging to providers, alerts to users), but is not critical for the first phases of implementation. Similarly, access to additional data and warehousing of external information is desirable, but not prioritized.

Future State for Counseling and Partner Treatment
An integrated system for disease reporting and investigation will inherently alter the activities of state and local health department staff. Once the system is in place, responsibility for data entry will shift to local staff members, many of whom currently record information on paper, for entry by the state. They will be tasked with recording client data directly in the system and will benefit from being able to search and view existing information across disease areas and jurisdictions, based on their level of security.

To support their provision of these services, stakeholders will be better able to assess the costs and benefits and measure the effectiveness of existing practices such as contact tracing for Chlamydia, as well as new activities, such as partner delivered therapy and phone counseling. They will also augment and improve their work by incorporating new types of client level data, such as clinical information and outreach data. For example, behavioral information on someone identified during outreach will guide counseling and contact tracing procedures. In addition, information from clinical and outreach services will help locate patients and provide more accurate demographic data. These data sources can also be crossed for validation and QA. Additional community level and qualitative data, such as research summaries and guidelines will be accessible as well, to guide overall strategy and prioritization.

Moreover, information will be shared with internal and external partners through communication tools to other staff and providers within the system. This includes access to clinical information, sharing of data across jurisdictions and disease areas, role-based security, out of jurisdiction transfer, messaging with providers and reports for quality assurance monitoring. System functionality will include work flow, such as work queues for staff based on pre-defined priorities and reassignment of cases based status (e.g. closed cases are automatically assigned to supervisors for review).

The system will guide staff in their work, helping them prioritize and identify next steps. Functionality in the system will include alerts identifying out of range and priority cases, algorithms to identify cases, GIS mapping, risk and behavioral information and pathways to guide follow-up activities based on diagnosis, case status, behavioral information. Ideally, staff will be able to access the system remotely, viewing, entering and updating information into tablets, PDAs or laptops.

The OASIS project provides significant insight of innovative collection methods and uses for data. Innovative projects allow for staff to assess co-morbidity, identify 'hot spots', identify associated risk factors associated with disease patterns, analyze patterns of re-infection and computerize 'chalk talks' (e.g. formalize documentation of behavioral/contact tracing information). This information facilitates tailored interventions based on demographics, risk factors, location and behavioral patterns. Pilot sites have also crossed case records across disease areas to clean and augment data, particularly demographics (address, county). CDC, projects and partners can continue to conduct such innovative pilots to map protocols for capitalizing on the integrated data and tools that will be available.

Process Gap for Counseling and Partner Treatment

Local health department staff members will perceive responsibility for entry of information as a burden, unless benefits can be immediately realized. In addition, many local staff members have not had training on computers and feel secure with their manual processes. Abandoning dual documentation (manual and electronic) must be phased in to ensure that staff members are comfortable with the process. This will be resource intensive during implementation and there is risk that local health departments will have difficulty conducting both sets of activities.

Since case reporting is mandated and state and local resources limited, projects will continue to prioritize contact tracing and treatment assurance for high risk groups (pregnant women, pre-congenital syphilis, etc). Few cost benefit analyses exist to help evaluate decreasing current efforts in favor of other work, or conducting activities differently. For example, some states pursue all cases of Chlamydia for follow-up, and others pursue only high-risk cases, and focus resources on other activities. Leading practice is not clear to projects to help guide programmatic decision making. Continued emphasis on examining new practices is vital.

Technology Gap for Counseling and Partner Treatment

The NBS encompasses most of the functionality described as 'critical' by stakeholders. However, much of the functionality required to support best practices in counseling and partner treatment has not yet been developed. The pathways, alerts, workflow, messaging, algorithms for case identification and specifics of contact tracing that guide users, functions through automation are not yet present. Although much of this functionality is considered to be in scope for the STD PAM, it has not been developed in the NBS. In addition, most of this functionality is dependent on integration of the STD PAM with external systems that vary from state to state (e.g. clinical systems, registration systems, registries). This may lead to confusion, as items that are 'in scope' will not fully function without significant work by the state health departments to develop interfaces and to incorporate external data. Moreover, the ability to which the system can incorporate external data at the community level (census), the case level (clinical) and the venue level (prevalence) is not fully clear at this point.

Enhanced functionality, beyond reporting, may not be critical to implementation, but it is critical to supporting leading practices and helping ensure user adoption of the new system. Although a disease reporting system can support the basic functions of projects, it should also automate the identification of potential outbreaks, encourage use of leading follow-up guidelines, support contact tracing, etc. Moreover, without full support for case management activities, projects will revert back to manual, paper-based systems. For example, if the ability to record demographic information exists, but does not extend to call attempts, DIS will continue to log everything on paper and enter the demographic information upon case closure.

Some local health departments have cited that they do not have access to on-line systems, and may not have the infrastructure to support multiple staff accessing on-line systems at once. A full technology assessment is being conducted as part of the NBS deployment process. However, it should be noted that grantees that lack adequate infrastructure will not be able to implement leading practice, as local staff will not be able to fully use the system.

In addition, although NBS users can now access the NBS via the Internet at any location, the ability to use the system while off-line has not yet been developed. Off line functionality will be necessary for field staff using PDAs and tablets to view and record data. Off-line use of a data-base requires replication with the system, synchronizing with diverging versions of the data-base. Regulations may also preclude downloading case report data.

Improving Services by External Providers:
Ensure that private providers comply with current recommendations, guidelines, training, and regulatory requirements related to the STD Program

Background for Improving Services by External Providers:
During the session, stakeholders expressed desire to better support external providers in STD Prevention activities. As many projects are decreasing direct clinical services, and looking to the private sector to provide screening, testing and treatment they aim to further the education, training and communications with providers, managed care organizations and provider associations to improve and augment this work. Participants clearly identified that they would have to partner with providers, providing incentive and tools for improvements, not just monitor this work, in order to be successful.

It should be noted that benefits of relationships with external providers are bi-directional. While the goal of the DOH is to improve patient care and prevent disease transmission, providers trained in screening, intake, testing and treatment guidelines benefit the DOH as well. Training will ultimately reduce the DOH follow-up activities necessary to document treatment. In addition, patients of providers trained by the DOH are less likely to need services in DOH clinics, as they have been adequately treated. Moreover, external providers often have great insight into possible outbreaks new populations of risk.

Future State Improving Services by External Providers:
Projects will need to identify and prioritize appropriate partners. They should access lists of providers (AMA, MCO, HEDIS), potentially targeting those who treat high risk clients (adolescent and HIV specialists), those who have reported before and those who are non compliant. Stakeholders will use the system to identify providers for partnerships (comparisons of case reports versus lab reports, analysis of HEDIS data), track activities (document number trained), and identify areas for targeting (analyzing high risk groups and associated providers). Building relationships with partners, increasing trainings, conducting more site visits and offering regular communications are vital to success.

Staff will then educate and train clinicians on reporting, screening, risk assessment and treatment by meeting directly with providers, offering learning sessions, disseminating materials, making materials available via the web or HAN. For example, Tacoma employs a full time nurse who meets with all reporting providers two times each year to review guidelines and protocols. They also distribute updated materials on practice guidelines. Additionally, the Prevention Training Centers (PTCs) offer services directly to clinicians. Localized Information garnered by DOHs will be incorporated in PTC materials.

Clinicians will be incented to use the system. They will report directly on line, view their own cases and run reports. They will also be able to generate letters from the system, access instructions and guidelines, hyperlink to key community partners or generate lists of programs and materials for patients. LA has an existing system offering this functionality and has conducted significant outreach training with providers on the benefits of its use, leading to improved practices. Moreover, offering information on leading practice clinical guidelines and ready to print information for clients promotes improvement. For example, PA NEDSS provides links to care guidelines directly on the system. PA cites that this has been paramount in the provider adoption process.

Process Gap for Improving Services by External Providers:
Stakeholders identified a number of gaps in their work to improve provider reporting, screening and treatment activities. First, although many participants advocated for legislation requiring electronic reporting, they recognized that such legislation is unlikely to be enacted and imposed in many states. In addition, they cited the need to improve communication and information sharing to illustrate the use and usefulness of reported information, regardless of legislation.

Second, little data exists or can be easily accessed to identify reporting priorities. Although HEDIS data identifies adherence to Chlamydia screening protocols, in most states it is not broken down to enough granularity to help identify specific providers. In addition, participants cited that they lack benchmarks to help prioritize provider activities. For example it is unclear if they should partner with low reporting physicians to increase reporting compliance or high reporting physicians to ensure screening compliance. Other participants cited that they do not have access to full lists of providers. Cost of purchasing lists may be prohibitive.

Third, most projects identified that they would like to conduct this work, but lack the staff and resources. Like outreach, the benefits of partnerships with external clinical providers on disease prevention are significant in the long run. However, In order to support this work some DOHs would have to decrease core surveillance activities.

Technology Gap for Improving Services by External Providers:
Without adequate incentives, it is unlikely that providers will adopt the system, let alone use it to improve their prevention activities. One of the most important incentives for physician adoption of the NBS is the ability to view and access case information once it has been entered. Similarly, any tangible benefits, such as the ability to streamline staff efforts or improve patient care, will help greatly with provider adoption. However, at this point, the NBS does not yet offer providers an ability to view data, does not link to clinical information, message for follow-up information, or help providers identify cases or follow up via algorithm. In addition, the NBS does not have a letter generation function. External software must be used to create materials for patients. Moreover, until the roll out of all the PAMs, on-line reporting will be difficult, as providers will need to send some reports manually, and others electronically.

Although some project areas have intranets for posting information for staff, few states referenced secure sites that host information for providers, such as guidelines, letters, reports and materials. In addition, few states have working HANs to relay immediate outbreak information to physicians. Employing e-mail lists to disseminate reports, materials, alerts, etc is cumbersome and not fully developed in most instances. These offer other challenges, such as maintaining a current list of recipients, and their functioning e-mail addresses.

Treatment Assurance:
Review case reports and clinical data, and conduct follow-up with providers and patients to ensure appropriate treatment

Background for Treatment Assurance
Treatment Assurance is a complement to the major process above, "Improving Services by External Providers," and was detailed by the same stakeholder team. While the process above involves the strategic activities to improve provider compliance, this process represents the tactical daily work to ensure that patients have been treated. Stakeholders cite that treatment assurance is a growing obligation, as reporting is increasingly conducted by external providers.

Future State for Treatment Assurance
Treatment Assurance activities will be largely streamlined through the use of an integrated system with advanced functionality. A case will be initiated by either a lab report or a case report, depending on which is reported first. The system will identify whether a case exists, via a defined algorithm for case investigation. The system will then push the initiated case to staff for follow-up. Work flow capability will exist to prioritize cases for staff, and help identify the necessary follow-up.

It is possible that the system could message the provider for follow-up information specific to that disease. In the event that messaging capability to providers does not exist, staff will review their cases and e-mail the provider for all missing data, such as treatment, demographic, intake or behavioral information. If possible, all information will be requested at one time, to avoid multiple correspondences. The provider will enter the information on-line via the web and will be given access to appropriate treatment guidelines during data entry, via attached information, messaging or guided entry. If the provider enters the information while the patient is on site (e.g. stat test or suspected case), he/she will have access to information to guide patient care immediately. If the provider enters the case information upon return of the positive lab results (e.g. after the patient has left the site), he/she will have information to guide follow-up care. Ideally, any correspondence from the DOH will have a link to the on-line entry form to reduce additional work.

In addition, surveillance and investigation staff will have access to increased clinical information from DOH clinical sites via the integrated system, which should greatly facilitate work. They could receive risk behavior or enhanced demographic information and potentially any information collected in the clinics could be mapped to the STD PAM. The required components will be received from the clinical setting via interface or be available in the system if the STD PAM is used in the clinical setting. This process will also significantly reduce duplication of efforts between clinical and surveillance staff, who often re-key information in separate systems and pursue information captured in earlier settings but not recorded or shared.

Process Gap for Treatment Assurance
Although legislation requiring providers to report cases exists, stakeholders cite that they often fail to do so. Therefore, staff members must track down information on patients that have already been treated, requiring a significant level of effort. Staff members are not necessarily ensuring 'treatment' as much as ensuring that patient treatment has been recorded. An automated system, even with all desired functionality, cannot force providers to submit case information.

Consequently, implementation of the system must be coupled with training for clinicians and their staffs. As seen in hospitals, providers have resisted transition to clinical systems and physician order entry. Without training, and incentives described above (e.g. on-line access to guidelines, ability to view cases and reports, etc), providers are likely to continue current processes: manual submission of information only when it is solicited. Incenting providers to change their reporting habits will prove to be challenging. Dissemination of easily accessible information, such as data summaries, newsletters, contact information for technical assistance, may also help the transition.

Technology Gap for Treatment Assurance

The current functionality of the NBS automates only some of this major process. Positive lab reports are uploaded on line, and provider follow-up information is received via browser. However, other critical functions remain manual, such as identification of whether treatment is adequate, identification of follow-up needs, documentation of contact with provider and documentation of follow up activities. Additionally, leading practices, including support for identification of appropriate treatment based on guidelines, are not accommodated at this point. Moreover, without a clinical module or interfaces to clinical systems, staff will not fully benefit from an integrated system, as they will not have access to the data collected in the clinical setting.

Presently, the algorithm for case identification, the messaging component and the work-flow needs identified above are not developed in the NBS or the pending PAMs. Development of the messaging component will be complex, as it requires integration with full directories of providers that will be updated on an ongoing basis, as well as an ability to identify the provider from the reported positive lab. Algorithms for case identification and workflow (e.g. pushing case to staff and prioritizing cases based on defined protocols) are in scope for the STD PAM, but the timing for inclusion of this is unknown. Developing these appropriate algorithms will require stakeholders to agree upon priorities for workflow, which may be defined at the state level. This may be a challenge for some states as needs and priorities may be different between local health departments. Moreover, as discussed above, development of interfaces to clinical systems will require significant effort, and will need to be supported primarily at the state level. This may be overwhelming to projects.

Other Data Collection:
Collect information specifically for research, outbreak investigation, sentinel surveillance or active surveillance

Background of Other Data Collection
Participants recognized that some data required for research, outbreak detection and sentinel surveillance may not be collected as part of regular programmatic activities. Therefore, they created this major process to ensure additional types of data and information are considered. The ways in which research, outbreak and sentinel surveillance data are collected, reported and used, makes it important to separate from other activities, as it is often different data sources, more detailed instruments and separate surveys.

Sentinel surveillance is described as the monitoring of specific populations or sites to garner increased information and data, beyond regular case reporting. Programs, such as the Gonococcal Isolate Surveillance Project (GISP), which monitors anti-microbial resistant gonorrhea, collect a pre-defined set of data from specific clinics sites throughout the country. Some program areas are also considering monitoring large sets of clinical, emergency or pharmacy data to identify outbreak patterns. This has not been fully discussed in this initiative, but may become desirable. As the federal government emphasizes sentinel surveillance programs such as Bio-Sense, examining large sets of hospital data for trends and patterns of outbreaks will become possible.

Future State of Other Data Collection
State and local health departments desire data from a variety of sources outside of the scope of daily activities. Depending on research and surveillance needs, they may seek information from hospital clinical systems, community organizations, other government agencies, pharmaceutical companies or emergency organizations. In addition, they often conduct their own short term data collection activities to support research, surveillance and outbreak investigation. Such disparate information in the form of surveys, on-line entry, data sets or even anecdotal information is collected and stored systematically. Locally defined fields are used to document information from such instruments.

Essentially, the functional needs of the system are similar to the others presented above; Locally defined fields, collaboratively defined fields, outbreak detection algorithms, alerts, messaging, pathways to guide entry, ad-hoc reporting, etc.

Process Gap of Other Data Collection
The activities that comprise outbreak investigation should be similar to counseling and partner services (e.g. interviews and contact tracing) on a more rapid time frame. However, detecting outbreaks requires a clear definition, which varies by population and demographics. Each project will have to define a set of ‘outbreak’ parameters, a level of burden of disease over which an ‘outbreak’ is occurring. Projects appear to have difficulty defining outbreak criteria, particularly because they rarely have prevalence data for entire populations. Although incidence data for STDs can indicate a problem to be further investigated, it cannot confirm an outbreak.

State and local health departments do not cite a significant focus on research or activities. Although some states and locals participate in research and sentinel surveillance, data is usually collected through existing information systems, such as

STD*MIS or clinical systems (e.g. King County, WA, Denver, CO). For example, many CDC sponsored programs use existing data (e.g. OASIS, IPP). However, research and outbreak investigation may require specific resources and skills. If such data collection does not take place in regular prevention activities such as clinic intake or counseling services, staff must be specifically tasked with the additional collection and trained as necessary. Without dedicated resources to conduct surveys, focus groups, etc., research often becomes second priority. In addition, the possibility, benefits and structure of sentinel surveillance programs has not been fully considered for STD prevention.

Technology Gap for Data Collection

The data for research or sentinel surveillance could technically be housed in the surveillance system, as fields can be locally or collaboratively defined. However, it is unclear how practical this would be for research projects. Patient level data cannot be entered into the NBS without creating an investigation. Locally defined fields could affect many users, not just those participating in the project. Since sentinel surveillance projects are ongoing, with a standard set of data elements, it is more likely that they can be accommodated by the surveillance system than research projects, which are short and often have changing data requirements.

Therefore, some research and surveillance data will continue to be tracked in separate applications. Projects will need to define protocols for the applications that can be used for research and incent staff accordingly. Often researchers prefer to store their data in their own databases as opposed to adhering to the standards of common databases. However, standard databases maintain security and offer an ability to share information. Moreover, national standards are requiring that staff not use stand alone databases for research (e.g. Access).

Outbreak detection algorithms are not fully developed in the NBS, but are in scope for STD PAM development. Functionally allowing local areas to modify the parameters in different algorithms for detection (e.g. increases in disease incidence or changes in program performance indicators) and then identify outbreaks through alerts and standard reports would greatly facilitate the identification of issues and therefore facilitate response. Without this functionality, staff must export data to external applications retrospectively to conduct analysis. Often state and local staff members do not have the ability to immediately conduct the necessary analysis in a short time frame. The system should be able to accommodate storage of large data sets from emergency rooms, pharmacies, etc. However, such functionality is not accommodated in the current version of the NBS.

INFORMATION AND DATA MANAGEMENT

Receipt/Acquisition:
Receive and acquire of burden of disease data, program operations data, programmatic services data, secondary data and contextual data from various sources takes place in disparate ways, by various staff

Background of Receipt/Acquisition
Session participants changed 'collection' to 'receipt/acquisition', pointing out that data is passively received, not actively collected in this major-process. Activities of collection actually take place during programmatic intervention. For example, data is collected in clinic settings, during interviews and surveys or during investigation. Therefore, this major process focuses on receiving electronic and manual data of all sorts. The group also categorized data in new ways, considering case reports, prevalence data, external qualitative data and external quantitative data. They seek to standardize the receipt process and desire a system that clearly guides entry, so that significant training is not required.

Future State for Receipt/Acquisition
Leading practice for case reporting will be the automated upload of case reports and lab data to the integrated system via interfaced batch upload. Although case reports may be sent electronically from some large hospitals, most providers will input case information via browser entry. The process will also allow providers to continue to fax, phone or mail case information to either the state or locals for manual entry. Providers who continue to report cases via paper will use standard forms provided by the state, to ease data entry activities for DOH staff. On-line forms will mimic paper forms and be customizable to match with individual state reporting forms.

Once a positive lab report is received, the system will message providers for follow-up information (treatment), using a provider database and cross-validation with reports of lab accession numbers. Browser entry will guide providers and users through a pathway based on demographic and disease information as it is entered. Projects will define required fields only allowing submission if core elements are present. The system will have business logic checking, to check completeness, accuracy, form and structure based on local requirements. It should message providers and users for additional information as well as store and prioritize problems on a log and forward them to staff for follow-up. All transactions should be logged with each updated version available for reference and assurance of version control.

In addition, the system should allow for integration with various other types of quantitative information at the case level (clinical information), the community level (census data) and at the venue level (prevalence data). Moreover, it must be flexible, able to accommodate new data sources. Technology should also be a conduit for receiving qualitative information (surveys, guidelines). Projects seek to remove the current disparate, ad-hoc processes and standardized methods for collecting all types of information so that it can be easily processed, disseminated and made available for use and analysis.

Process Gap for Receipt/Acquisition
Process gaps pertain to standardizing data elements and processes across projects and locals. Stakeholders recognize that standardizing data elements is vital, as it supports

analysis, research and streamlines entry across disease areas. At present, it is unclear what defines a case or different outcomes of interest, what case-associated data elements mean, and how they will be standardized and then analyzed and updated. The public health data model provides the potential elements, and the NCSD work group is critical to defining the data elements for the STD PAM. However, with an integrated system many elements must be defined across disease areas. States piloting the NBS have cited that definitions are not readily available. An accountable body of state, local and CDC representatives must create definitions, policies and procedures and an evaluation program implemented to ensure adherence. Moreover, ensuring standardization from external sources (clinical information, outreach statistics) is even more complex.

Participants also recognize that locals may need their own definitions to support their work and longitudinal tracking. This presents the similar level of complexity, agreement between the state DOH and local DOHs, as well as external partners. Therefore, flexibility is vital to success, an ability to adapt and update both data sources and fields. A system should strike a balance between standardization and flexibility as these goals are generally mutually exclusive.

Technology Gap for Receipt/Acquisition

NEDSS development focuses on case data, with mechanisms for collection of other types of data not yet fully explored. Electronic upload and interfaces with labs have been prioritized, with NBS pilot states all automating acquisition of lab data. Electronic upload from large hospitals is in scope, but is not yet taking place. The current functionality allows clinical providers to input case data on line. Although there are a few required fields for data entry, most can be skipped. There is currently little validation or logic checking beyond ‘date’ fields. Therefore the mechanisms to ensure complete or accurate entry are currently in their infancy. Additionally, pathways to guide entry, messaging to prompt completion, and messaging to prompt for follow-up data once lab results are received have not yet been addressed or developed. Required functionality for data entry at the health department level is similar to that for providers.

Collection of other data and information types for inclusion into the NBS is being discussed, but functionality has not yet been developed. Theoretically, any client-based data can be incorporated into a record, if the fields are present. Clinical data can be input once the fields are agreed upon. Ability to incorporate community and venue based data (census, prevalence) is being explored but functionality has not yet been developed. Users have identified the need to post and access qualitative data for analysis and evaluation. However, many projects do not have sites with secure access for posting information.

Processing and Consolidation:
Validate data, compare with existing information and enter/log data into the system

Background for Processing and Consolidation
Participants considered how guided entry, alerts, messaging, etc., could improve the quality of information received. In addition, they discussed how the system could create reports of inaccurate or incomplete data and missing case reports to be pushed to staff for follow-up. They seek two core benefits from improved data processing capabilities: 1) increased accuracy and completeness of information received, and 2) standard reports and work flow to facilitate staff follow-up activities.

Future State for Processing and Consolidation
There will be automated collection, including guided entry, alerts for out of range data, messaging for follow-up information and electronic logging, making the processing and consolidation of information significantly less taxing. Processing is comprised of QA (e.g. examining lists of cases reports missing jurisdictional information which require follow-up prior to dissemination to investigation staff) de-duplication, and transforming external data and information into a standardized format that can be logged onto the system.

It should be noted that de-duplication will be more complex, as providers are entering without the ability to view existing cases, labs and providers are inputting simultaneously, and local health department staff may not be able to fully search beyond their jurisdiction prior to entry (depending on security parameters). Therefore, the system identifies duplicates, automates de-duplication and record merging and then prepares reports of potential duplicates for staff to review and merge.

Processing external data is even more complex, as it will be received in various formats. It may be electronic data sets, paper forms or electronic MS Word or Excel files. To incorporate data sets, data elements must be pre-defined for partners, so that files be merged and uploaded appropriately. Prevalence data, survey data and community data can be made available for users, but unless consistent definitions are used, it cannot be easily incorporated for analysis or linked. For example, projects seek to link data, including patient based data (comparing clinical and investigation data) community data, (comparing CBO and outreach data) and venue data (comparing prevalence to case reports), which all require standardized elements and definitions.

Process Gap for Processing and Consolidation
Processing case reports and information submissions manually is quite different than with electronically entered data. With manual processes, data are acquired via fax/mail, then staff must identify missing information, contact the sender, obtain completed submission and log that information.

With an integrated system, data elements can be imported/uploaded from labs, providers and external partners. However, this requires agreement on data elements so that interfaces can be created and data sets combined. As stated in other sections, agreement on data elements and definitions across locals and projects has proven quite difficult. For example, agreement on the extended interview record and standard performance measures has been time and resource intensive. Moreover, in order to

facilitate processing, providers and labs must use standard forms for reporting. Projects cite often that providers do not report on required data or use given forms.
NBS pilot sites also cite that forms printed from the NBS do not mimic the entry screens. Processing of such reports can be difficult.

Technology Gap for Processing and Consolidation
As discussed in other sections, the NBS currently supports on-line data entry, and electronic upload of lab data and reporting functionality to identify cases requiring follow-up. Additionally, the NBS currently has a complex set of algorithms for identifying potential and likely duplicate records and an ability to generate reports for incomplete case entry requiring staff follow-up and record merging. However, it does not have the messaging, alerts, etc. that will decrease the likelihood of incomplete/inaccurate entry. In addition, leading practice would incorporate algorithms to automatically identify cases needing follow up and proactively alert staff, functionality that is not yet developed.

In addition, since, the NBS/STD PAM development focuses on case investigation, development has not fully considered the breadth of external data sets, qualitative data and prevalence monitoring discussed by participants in their definition of a 'leading practice' system.

Analysis, Access and Dissemination:
Allocate cases to DIS, send pre-defined reports to the CDC and make data and information available to staff

Background for Analysis, Access and Dissemination
Participants considered how all types of data and information would be made available to both internal and external stakeholders. They identified that standard reports and analysis would be addressed here, and then created a routine process for this work. The Program Monitoring major process, also addressed by this group, encompasses the interpretation of the information disseminated here.

Participants recognize that local health department staff members require easy to use, menu driven reports. They seek the ability to create reports based on any field, easily within the system. Exporting to SAS, or Crystal or other standard tools for reports is often not an option for locals with limited staff. Ability to access information at the local level will be paramount to the success of the system.

Future State for Analysis, Access and Dissemination
Stakeholders will use the STD PAM to facilitate dissemination and decision making. Surveillance data, clinical services data, program performance data and other data will be transformed into reports for CDC, summaries, ad hoc reports and data for program action. Information will be pushed to recipients, via work queues or messaging. Work flow functionality will automate assignment of cases to appropriate staff and supervisors. Other information will be made available via secure portal, or are e-mailed/mailed to partners.

In order to facilitate this work, the system will allow for standard and ad-hoc reports with restricted access to these functions, based on security and permission sets. Moreover, the system will push reports or case data to staff for program action via messaging (reports) or workflow (cases). It will have directories identifying recipients, and then business intelligence that identifies where information should be routed. Lastly, much of the information will be made available via a portal or a HAN. Although this is out of scope for NEDSS, a common repository, with multi-level security, allowing users to access existing information and create reports is desirable. Similarly, stakeholders desire the ability to push information via a HAN, using a directory that is common to NEDSS.

Process Gap for Analysis, Access and Dissemination
Many reporting needs require analysis beyond those that can be derived from the NBS. For more extensive reports, staff must export the data to SAS, and then conduct analysis. Since many locals do not have staff trained on SAS, they rely on the state to create the reports and post them to the server, which can be cumbersome for local health departments who need reports for daily operations. Additional training on SAS, and then on the system reports, once they are developed, will be required.

The current version of the NBS allows for case assignment, but does not have extensive workflow. Therefore, a central staff member must review lists of cases that cannot be allocated to a jurisdiction because information is inadequate, and then follow-up with the reporting agency. In addition, a staff member in each jurisdiction must also assign cases to their own local staff, once the full list is received in an ‘in box’. These will be new

activities for many state and local staff, requiring changes in responsibilities and job structure.

Technology Gap for Analysis, Access and Dissemination

The NBS offers some standard reports (including line lists, state map distribution of cases, and other common views of case report data) and some ability to run ad-hoc reports, based on limited fields. Ultimately, developers would like to create the ability to run ad-hoc reports based on any fields and offer more extensive pre-defined reports. However, extensive menu driven reports do not currently exist. In addition, external users (clinicians, partners) cannot access data or reports within the system.

Business intelligence, such as the ability to identify case allocations to staff based on disease, the ability to route cases to supervisors, and the ability to push priority cases for follow-up has not yet been developed. In addition, comprehensive data analysis will require data from years prior to the NBS implementation. Ideally, legacy data will be migrated to the NBS/STD PAM, to facilitate longitudinal data comparison.

PROGRAM DEVELOPMENT

Program Monitoring:
Compare actual program outcomes to planned outcomes, performance measures, and performance through on-going data review

Background for Program Monitoring
Stakeholders seek the ability to easily analyze their own data, comparing it across local health departments and disease areas and to existing benchmarks. They aim to then use the analysis to inform programmatic decisions. They envision receiving standard reports on a daily/weekly/monthly basis and ad-hoc reports, either menu driven or from an external application for complex, retrospective analysis. The process of running the reports is described in "Analysis, Access and Dissemination". The process of interpreting those reports takes place here.

Future State of Program Monitoring
Monitoring activities, regardless of the type of data, follows a similar process. For example, interpreting burden of disease data is essentially the same as interpreting productivity data, wherein there must be some aggregation and then evaluation. Stakeholders will receive requested reports and first examine whether more data is necessary, or if an alternative report is needed for desired interpretation. If further data is required, programmatic staff members will be contacted with revised protocols/requests. If alternative reports are requested, staff members will be contacted to run additional analysis. If all data is present, the outcome of the reports will be compared to programmatic goals and objectives to identify next steps. Immediate issues or small adjustments will be implemented immediately. Larger adjustments will be filtered through the Priority Setting process.

Program goals and objectives must be clearly documented to facilitate appropriate collection, analysis and interpretation. Users will identify the information they are seeking and the benchmarks against which they are comparing. Some benchmarks will be national (performance measures) and others will be local (productivity, outbreaks).

To facilitate these activities, technology will accommodate the analysis, visualization and reporting requests. This includes standard reports, ad hoc reports within the system and an ability to export data to external systems. Various types of data, across programs, should be held within the system including burden of disease data, programmatic data, outreach data, operations data, etc. External data will be available for comparison. Other types of analysis include GIS, trending, graphics and alerts to identify out of range data and priorities.

Process Gap for Program Development
Local health departments often cite that they do not have the skills or staff to conduct analysis even if they have access to adequate data. In addition, they are not certain about what type of analysis to conduct, or how to use the information. They look to the state to conduct not only the technical component of the analysis, but also to provide appropriate benchmarks and guide them on how to use the reports.

In addition, the CDC and state and local health departments struggle to define and agree upon benchmarks. However, agreement across levels of the public health system, no cross-program/cross-health department interpretation can take place. One local

stakeholder mentioned that they were willing to accept new metrics, even if it meant losing the ability to compare their own longitudinal data, if it allowed them to compare across health departments and states. In order to facilitate this work, the CDC must be committed not only to collaboratively identifying benchmarks and standards, but also to implementing and monitoring them via the cooperative agreement. Support from CDC, NCSD and the State health departments is critical to this work, including technical assistance on data sources and uses as well as data interpretation is needed. In addition, the current functionality does not allow for measurement of all metrics required for evaluation (e.g. performance measures, NCSD guidelines, performance monitoring goals).

Technology Gap for Program Development

The NBS incorporates some standards reports, and incorporates some ad-hoc reporting capability, based on limited set of data elements. Data in the NBS can be exported to SAS, or other standard applications. States can extract the data and make it available via secure server for locals who do not have the expertise to pull the information. However, ad hoc reporting capability and the set of standard reports will have to be augmented to facilitate work. The STD PAM developers aim to include all STD MIS reports, and augment this list with additional reports. However, the full set of desired reports has not been finalized. Additionally, developers aim to create robust ad-hoc capability, but this has not yet been developed.

The functionality of alerts for identifying priority and immediately actionable tasks has not yet been developed. In addition, the ability to monitor against benchmarks will not take place within the system, as the system does not house goals and track deviation from goals.

Priority Setting:
Identify changes required in each program to further health outcomes, create implementation plans for changes, and communicate needs for changes

Background for Priority Setting
Although a flow is provided here, stakeholders describe the approach as essentially being an iterative process. Staff members receive trends, summaries and suggested areas of improvement during the monitoring process described above. They then use this information to prioritize improvement opportunities, considered against resource availability, internal goals, external guidelines (e.g., political considerations, policies, public concerns) and leading practices. A key component of this work is consultation with stakeholders, to ensure decisions are congruent with need and that they are realistic for implementation. Session participants also recognize that while some components of Priority Setting will be facilitated by a disease reporting system, other requirements are external to this initiative, requiring external project management applications and manual evaluation.

Future State for Priority Setting
While flagged areas of immediate need and clear updates to regular program activities will essentially skip the long term priority setting process, larger programmatic changes require more analysis. Therefore, staff will examine interpreted data during a Priority Setting process, to fully evaluate implementation possibilities and document next steps. Priority setting will take place over a variety of time frames. Some changes may be assessed monthly, and others yearly, based on the timeframe of the Cooperative Agreement or other major funding sources such as external grants. In other cases, priority setting may occur on a day-to-day basis as supervisors prioritize their staff's tasks for the day.

Prioritization should not be thought of solely in the programmatic context. There are many updates and improvements that pertain to operations, technology, staffing, etc. For example, the same process is used to identify new outreach activities as is used to identify technology improvements. In either case, staff members identify performance measures, review aggregate analyses, identify a problem or area for potential improvement, prioritize the need based on goals and resources, review possible solutions and choose one solution for implementation. Again, these improvements could range from the definition of a new data element to hardware updates, new community partners or better staff monitoring activities.

Because this work is iterative and often subjective, the process cannot be automated. However, some of the information required to make data-based decisions will be tracked electronically (e.g. disease trends, GIS mapping, risk factors) to support the human process of identifying needs and monitoring progress. Reports, summaries, trends and external data will be congruent for comparison. Staff members will compare their data to their goals, to CDC's goals and to external leading practices. Again, this requires some level of standardization and longitudinal analysis across departments, local health departments and states.

In addition, this process requires knowledge of resource constraints and cost benefit analysis, including cost versus available resources, level of effort, time for completion, existing tools for re-use and skills assessments. It is not in the scope of this initiative to map out administrative and financial tools. However, local and state health department

staff members seek to make informed decisions as they implement programmatic changes, which require an ability to understand financial and programmatic trade-offs. Analyses of cost, effectiveness and benefits of programmatic activities would serve projects well. Documented leading practices, and an ability to share information across projects and local health departments through a web-based repository will also facilitate this work.

Process Gap for Priority Setting

The NEDSS initiative can facilitate the collection, analysis and presentation of information. However, developing the ability to analyze data across projects and disease areas will require significant efforts to standardize data elements. Therefore, stakeholders must be committed to updating, agreeing upon, and documenting definitions (e.g. case definitions, data elements) in conjunction with the implementation.

Session participants state that one person within the project area must be accountable for implementation planning, with inclusion of input from local health department staff in iteration and finalization. This is often difficult to implement and will require support from CDC and state health departments in the form of technical assistance in facilitation, technology support, evaluation and strategic planning. Moreover, commitment and follow-through in developing standardized programmatic goals, and tools for cost benefit analysis, are critical to the success of the initiative. Again, data will only be useful as it facilitates longitudinal analysis and comparison across programs, to assist resources in making and acting upon informed decisions.

Technology Gap for Priority Setting

As discussed above, NEDSS includes some reporting capability for programmatic and operations data, including a set of standard reports, some ad-hoc reporting capability and an ability to export data to external applications for analysis. While planned functionality will facilitate immediate decision making through alerts and pathways (e.g. items for immediate action), and it will be able to assist with items such as resource analysis by incorporating financial and resource productivity information, participants recognized that the priority setting capabilities described here are most likely not within scope for the NBS.

Implementation:
Enact changes to programs identified during priority setting. Alter program goals, methods, administration and staffing as necessary

Background for Implementation
Participants cite that the success of the BPMM initiative will be demonstrated by the ability of state and local health departments to implement improvements and programmatic augmentations based on the real data within their program. Collecting more data, or even higher quality data, is not beneficial unless it can be acted upon. Moreover, once actions have taken place, success must be measured. Metrics for the measurement of progress and success should be identified during implementation, so that changes can be measured and updated based on findings. This is a cyclical process, with continual analysis, comparison to expected goals, adjustment of focus, implementation of improvements and gathering of data to monitor implementations. Again, participants recognize that decision making can be facilitated by information derived through a disease investigation application, but it cannot be automated.

Future State for Implementation
Like priority setting, implementation cannot be automated, but it can be informed by improved data quality and quantity and business intelligence that guides stakeholders based on standard and local programmatic and operations goals. Supporting functionality that facilitates easier entry and tracking of goals, outcomes, and measurements can also further enable it. Participants recognize that most program modifications do not require formal implementation planning. However, they describe a structured method for implementation for those more significant initiatives that do require formal planning. For example, re-allocation of cases due to unequal distribution between staff does not require planning, but it is implemented. Development of a new outreach program requires both planning and implementation.

Recommendations/change plans identified during priority setting will be actualized into programmatic and operations changes via updated training materials, communications, protocols, data elements, staffing, etc. Again, operations and system changes are no different than programmatic modifications. Priority setting may identify the need for more outreach staff, a new education program with providers, different data definitions or more hardware. Regardless of change, participants cite that ongoing communication with stakeholders will be critical. The formality of these communications will vary depending on the formality of the implementation planning itself. In most cases, updates will not require formal implementation planning and therefore communications will occur on a more informal basis within the existing network of stakeholders (e.g. updates during staff meetings). Formal implementation plans may be supported by formal communications, as it is appropriate for a given project area and the dynamic with their local stakeholder groups (e.g. meetings, newsletters). The same is true for training and policy updates identified through initiative implementations.

For those formal implementation initiatives, an implementation plan will be developed, along with a timeline and an accountable party for each component of the plan. In addition, metrics to monitor changes will be established. Implementation is iterative and must be assessed to ensure success. In many cases, the system will facilitate evaluation. For example, new outreach programs can be assessed based not only on the number of people reached, but also on the burden of disease with that specific population. Similarly, functionality updates might be measured through project areas'

capability to achieve faster response times or improved compliance with on-line documentation practices.

The ability to monitor is paramount, and requires the collection, analysis and dissemination of versatile data sources illustrated in other major processes. Similarly, business rules and logic, or guidance within the system, will facilitate monitoring. In addition, alternative technologies could facilitate project management, including comparison of findings to expected benchmarks, which will help in measuring success.

Process Gap for Implementation

Participants describe resource constraints as the primary barrier to implementation in the current state. However, the group identified resource assessment as an activity that should take place during priority setting, so that implementation plans are immediately actionable.

They also cite a lack of clear program objectives and evaluation metrics. Hence, they have difficulty assessing success and monitoring improvements. Therefore, it is not only necessary to make data available, but to identify metrics of success prior to implementation so that progress can be measured.

Technology Gap for Implementation

As stated in earlier sections of the 'Program Development' major process, programmatic change is facilitated by access to various types of information. Therefore, participants seek the ability to electronically store and extract case data as well as aggregate data from other external and internal sources (e.g. census data, clinical data). Again, some standard reports exist, which would help measure changes to current activities. After implementing changes health departments should re-evaluate the program (e.g. productivity or incidence by demographic) to assess projected versus realized benefits. Presently, this specific analysis requires export to external databases.

While implementation and project management can be facilitated through technology, they do remain a resource-intensive activity. In addition, project management, implementation tracking and evaluation functionality will most likely not be in scope for the NBS. Although external project management applications exist, they are rarely used in public health settings to measure planned goals versus outcomes. Instead, stakeholders often conduct analysis (e.g. comparing actual versus expected incidence in a given population) and log the results in an ad hoc database. Use of data analysis software for such purposes makes sharing information difficult, and often leads to rework each time there is a desire to evaluate programs. Rework occurs primarily because staff may not be aware of previous analysis activities. A centralized mechanism for logging ongoing measures would benefit both state and local health departments, and help streamline the resource time required for these tasks.

Conclusion

The information above represents a detailed future state vision for STD Prevention for DSTDP grantees and local health departments, as described by representatives from a sample of grantees, local health departments, external stakeholders and DSTDP. They considered leading practice along with the varying skills and ability of the various projects, in an attempt to identify prevention processes that meet the needs of most or all grantees.

The materials presented here, along with accompanying process flows, will be detailed to inform implementation, communications and training materials, as well to inform the NEDSS/STD PAM development process. It will also be translated to functional requirements documents, to further guide development. Because the functional requirements document leading practice, they identify all desired capability from an integrated electronic disease reporting and investigation system. Therefore, the requirements will be prioritized, as not all are necessary for reporting and investigation and not all are possible for development (e.g. messaging to providers for follow-up information would be leading practice, but is not necessary to conduct required activities). The development team will work with stakeholders to ensure prioritized requirements are integrated into the first version of the STD PAM, and that a timeline is designated for other functionality.