PANORAMA

Pan-Canadian Public Health
Communicable Disease Surveillance & Management Project

Communicable Disease Surveillance and Management
An Industry Leading Communicable Disease Surveillance and Management System for Public Health Professionals

Public Health professionals require an operational support system to help manage day-to-day public health responsibilities as well as a method to effectively detect and manage health problems such as SARS, Tuberculosis, Influenza, and other communicable diseases, all of which may pose an outbreak threat. Panorama has been designed by health professionals to meet these specific needs.

Panorama is the name of a new Communicable Disease Surveillance and Management system. It was designed and developed for implementation and use by provincial and territorial jurisdictions across Canada. The system provides public health professionals with integrated tools that assist in monitoring, managing, and reporting on public health. Panorama provides both front-line service providers and public health decision makers with critical information and reuses centralized data where possible. It improves client health outcomes and results in cost-savings.

The system collects the information for both clients and non-human subjects that is critical for the effective management of health problems, which could potentially pose an outbreak threat. Early outbreak detection and intervention are critical and Panorama will help to manage outbreaks through early detection, rapid verification, and appropriate response to epidemic-prone and emerging diseases.
Panorama provides public health professionals with the tools to collect, share, and analyze health information as diseases and outbreaks move across and throughout geographic regions.

Panorama also offers robust “in application” and ad hoc reporting as well as “screen flexibility” functionality that allows an end-user to create and to customize data collection forms.

This document provides an overview of this new Public Health system and its main components, common services, architecture, and technology.
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System Overview

Panorama is organized as seven major components that assist public health professionals in monitoring, managing, and reporting on public health. Panorama provides both front-line service providers and public health decision makers with critical information and reuses centralized data where necessary.

Figure 1: From Information Sources to User Information - Panorama System Overview
Investigation Management provides tools to assist public health professionals in identifying, investigating, and managing cases of communicable diseases, which will assist in containing a disease and reducing risk to the public. It provides a longitudinal view of a client or non-human subject's public health record and is designed to act like an "index file" by providing summary information with the ability to "drilldown" for additional detail.

Outbreak Management supports the needs of Investigation, monitoring, management, analysis, and reporting of a Communicable Disease Outbreak at both the client support and surveillance levels.

Immunization Management provides tools needed to create and manage immunization schedules and determine eligibility. This component can also assist users in planning, delivering, and keeping track of immunization sessions, including adverse reactions, precautions, contraindications, and exemptions.

Vaccine and Materials Inventory Management helps to maintain appropriate levels of vaccine and other materials at locations where they are needed. By improving distribution and the process of identifying aging product, millions of dollars could be saved each year. This component manages vaccine and supply inventories, supports vaccine cold chain maintenance, and supports sharing and transfer of vaccine in the case of an outbreak.

Family Health supports a single record for multidisciplinary holistic care. It is a comprehensive primary care record with customized screening and assessment and long-term care planning tools.

Notifications Management provides three types of notifications to support the communication needs of public health professionals:

Jurisdictional Notifications are unstructured messages that can be created and posted to a specified group.

Threshold Notifications are system-generated messages to specific users or groups when a particular set of rules is met (e.g. inventory, number of Cases). Threshold Notifications can be created and edited by Panorama end-users and the thresholds have the capability of monitoring any change or addition of data over a defined period within a jurisdiction.

Client Alerts serve for the protection of the Client (e.g. drug allergies) or the Public Health worker (e.g. potential Client site visit risks such as aggressive dogs).

Work Management helps to ensure the quality and effectiveness of the business processes for the analysis and management of investigations, outbreaks and immunizations by enabling users to electronically manage the allocation of work, monitor the status of work items and report on workloads and volumes.

Panorama also offers numerous Common Services to support day-to-day activities and public health emergencies, all of which are described further in this document.
Benefits

The six key benefit areas of Panorama

1. Improved prevention of disease through accurate immunization records
2. Ability to customize the application using sophisticated User Defined Forms and ongoing Reports
3. Improved productivity and effectiveness of public health workers through central work management and central client records
4. Improved accuracy and cost effectiveness by automating application tasks for health service providers, as a by-product of their client charting
5. Improved management of disease and major outbreaks through case management features, outbreak identification, vaccine management, and communications management.
6. Improved cost effectiveness through effective vaccine inventory management*

*The World Health Organization estimates that the total spoilage and waste from inefficient vaccine inventory management is currently 10% of total vaccine expenditures. In Canada, this amounts to approximately $40,000,000 per year.

Additional Benefits

Panorama has solved other complex public policy problems such as medical terminology management, user defined assessment tools, and complex privacy and consent management. As well, Panorama provides the following functional improvements and advantages over today’s public health practice systems (both computer-based and human practices):

- Built-in functionality to assist health care professionals in forecasting Immunizations, determining vaccination needs, and validating immunization records
- Family health management component that summarizes all non-disease related health activity including Primary Care and Care Planning management
- Case classifications through use of automated case definitions
- Comprehensive Outbreak management tools to detect, manage, and analyse incidences of a particular disease above what is expected for a particular time and place
- Investigation management features to assist in managing health problems such as SARS, Tuberculosis, Influenza, and other communicable diseases
- Inventory tracking to the local level with automatic decrement by immunization for real-time tracking
- Integrated communications and work management
- Ad hoc reporting and data extract tools

- Immunizations can be managed in a mobile and disconnected state
**Flexibility**

Panorama consolidates the needs of public health professionals into a single Web-based application with a flexible design that can evolve with Public Health practice, policy, and research. The system offers a high degree of configuration options and is capable of multilingual support.

A key component of Panorama’s flexibility is the availability of User Defined Forms. User Defined Forms provide a mechanism for end-users to enter new and unique information into Panorama by providing a way to create and customize data collection forms to meet jurisdictional, program (e.g. early childhood, newborn and post partum, audiology) and situational (e.g. outbreak) needs.

Panorama also provides authorized users with ad hoc reporting and data extract tools by leveraging Panorama’s Business Object Universes. These universes provide the capability to address any unforeseen epidemiological or legislative need, but require internal administrative controls for access. The Business Objects tool is an enterprise-strength query and reporting application that helps users ask questions about Panorama data and create clear reports in an easy to use “drag and drop” manner. The results can be exported to CSV or Excel format for import into SAS, EPIINFO, or other tools.

**Privacy**

The privacy of a client’s medical information can be protected in accordance with local privacy legislation. Panorama’s security features enable each instance to be implemented with security settings that comply with a particular region’s specific legislation.

In the event of an epidemic, there is the possibility that a person’s information could be shared between jurisdictions; however, this will only occur under clearly specified and legally binding conditions such as data sharing agreements. The team developing Panorama will never have access to personal health information.
**Investigation Management**

Panorama’s Investigation Management component provides tools to assist public health professionals in identifying, investigating, and managing cases of communicable diseases, which will assist in containing a disease and reducing risk to the public. It provides a longitudinal view of a client or non-human subject’s public health record and is designed to act like an “index file” by providing summary information with the ability to “drilldown” for additional detail.

**Investigation**

The Investigation record is the focal object of Investigation Management. It includes information on Reporting Source Details, Disease Classification, Investigation Disposition, Investigation Status, Responsible Organizational Unit Authority, and Investigator assigned.

**Encounters**

An Encounter is a point-of-service event for a subject, which is defined by date, location, and the organization that performed the service. Encounters are always associated with a Subject and are secured by an Encounter Group that allows controlled data access to the record. An investigator can associate Encounters to Investigations, Episodes, and Notifications wherever appropriate.

Related Encounters can be grouped into an Episode. Episodes are an effective tool for monitoring chronic or recurring Investigations as it involves the same subject with the same disease.

**Exposures**

Panorama has robust functionality to manage Exposures for both client and non-human Subjects. The system allows a user to create Exposure links within an Investigation between Acquisition Events (AE’s) and Transmission Events (TE’s).

An Acquisition Event (AE) describes details of a Subject’s exposure to a potential source of a communicable disease. The Subject in this situation may be a human Contact, or a non human subject such as a food/water sample, or fomite that is contaminated with an infectious agent. AE’s may or may not be linked to TE’s since the source of the disease may be unknown.

A Transmission Event (TE) describes the details of a Subject’s potential transmission of a communicable disease to another Subject. The transmitting Subject in this situation may be a human; a non-human Subject such as an animal, food/water, fomite; or a vector capable of transmitting a disease agent. Multiple Investigations may be linked to a TE if they share common Exposures (AE’s).

The generalized Exposures described above enables the Investigation of person-to-person as well as food/waterborne, fomite and vector borne exposures. This functionality can be used for Traceback Investigations.

**Interventions**

An intervention is an action to resolve a public health issue or concern, which may include:

- Medical (prescriptions, treatments, hospitalization)
- Informational (education and counselling activities)
- Regulatory (inspections, boil water advisories, food product recalls)
- Sanitation Activities (facility cleansing)

Interventions can be recorded for both human and non-human subjects.

Panorama also has functionality to recommend a particular Intervention based on the disease recorded in the Investigation record.
Prescriptions

Panorama’s prescription functionality allows a user to create prescription scripts and supports the filing of prescriptions. As well, the Prescription module includes the following functional areas to assist in Client monitoring:

- View Prescription History
- Prescription Adherence
- Directly Observed Therapy (DOT)
- Adverse Drug Reactions (ADR)

Case Definition

Panorama supports user-maintained Case Definitions for individual diseases and/or Outbreaks. There is the ability for several different Case Definitions to be applied simultaneously to the same Investigation (e.g. Regional Case Definition, Outbreak Case Definition, World Health Organization Case Definitions, etc.).

After a user enters information relating to a particular disease, Panorama will compare that information to the Case Definition rules and suggest a possible Case Classification. The primary investigator can then accept or decline each suggested classification and priority.

Laboratory

Panorama’s Investigations Management component provides Laboratory functionality, which allows a health care provider to:

- Receive electronic Lab Results or manually record Lab Results
- Request that a Laboratory Test or Diagnostic Imaging exam be performed for a client or non-human subject

Test Requisitions can be created in real-time by a health care provider, by data entry clerks acting on behalf of a health care provider, or prior to a Screening Event requiring a single or mass Requisition(s).

Test Results can be entered manually or received electronically either through unsolicited Result Notifications or via a Result Query.

The key components of the Laboratory component are:

- Individual Laboratory Requisitions
- Mass Requisitions
- Results

Individual Laboratory Requisitions

Panorama’s Laboratory functionality allows a health care provider to create a lab requisition for a client or non-human subject. These Requisitions may be linked and unlinked to Encounters, Investigations, and Outbreaks. The Laboratory component supports the notion of single tests as well as Test Panels (individual tests grouped together for a single selection).

Mass Requisitions

Panorama’s Laboratory functionality allows for Mass Requisitions. The maximum limit for creating Mass Requisitions for Clients is determined jurisdictionally. For Mass Testing Events, such as Outbreaks, Immunization Events, Screening Encounters, and Research Studies where the Client Cohort is unknown,
Clients can be entered after the fact or even be excluded. A user can specify the number of Requisitions to be generated and enters the Requisitions details. The user can choose to print detailed Requisitions or labels with the core data populated and the Subject information blank.

In the situation where a group of Clients has been identified, the Cohort can be used to generate Mass Requisitions. This capability assumes that all Test/Requisition data is identical, except the subject information. All Requisitions will have the same data for all the clients within the cohort.

**Results**

Test Results may be received by Public Health via fax, phone, mail, email, or in-person delivery. Additionally, where HL7 messaging is in place, results may be received electronically. Results may be associated with a Requisition already in the system but may also be received and associated with a Client even when the test was not requisitioned from the system. For each of the situations, the system supports entering, viewing, updating, and withdrawing Test Results. Results received on paper can also be scanned and attached as a document to the Requisition. The Maintain Human Test Results functionality can be initiated through a Client, Encounter, Investigation, Outbreak, or Immunization Management.

**TB Skin Tests**

A TB Skin Test is a point of service test provided for a human client, and includes the Test Administration and Test Results Reading, which may be performed by more than one Provider. Skin testing may be performed real-time by a health care Provider and/or entered after the fact by data entry clerks acting on behalf of a health care Provider, or prior to a Screening Event for single or Mass Requisitions. Skin Tests may be entered on their own or as part of the Mass TB Test Event entry process. Panorama documents the two distinct steps of TB Skin Testing: the Test and the Results, and in addition allows an integrated capture and display of Interferon Gamma Release Assay (IGRA) Lab Test(s), and it allows the user ease of navigation to create manually entered IGRA Test Results. This further testing is performed when the results of the skin test are suspect.

**Close Investigation**

Once a user determines that an Investigation is complete, that user can begin to close the Investigation. Panorama helps investigators by validating the Investigation by identifying any incomplete mandatory fields and data that do not pass the specified validations.

**Additional Components**

Panorama’s Investigation Management module contains additional components that help to complete a detailed Investigation record. Some of these features are as follows:

- Disease Information including Classification
- Basic Assessment,
- Medical History
- Notes - Physician Narrative
- Investigation Details
- Signs and Symptoms
- Incubation and Communicability Information
- Treatment Profile
- Risk Factors
- Investigation Outcome and Complications
- Immunization History Interpretation
Investigation Management Process

The purpose of communicable disease Case management is to identify, investigate and manage Cases and Contacts in order to reduce the risk to the public’s health from instances of communicable disease.”

1. Clerk
   - Receives lab report

2. Clerk
   - Log into system
   - Find and select client
   - Update client report

3. Coordinator
   - Record lab result
   - Suggest case classification
   - Identify Disease
   - Notify designated Investigator

4. Coordinator
   - Reviews team workload
   - Assigns case to Investigator

5. Investigator (Public Health Nurse/Environmental Health Officer)
   - Assessment/review of disease and episode history

6. Investigator
   - Investigate Case, record exposures, risk factors, complications/outcomes

7. Investigator
   - Manage case/intervention, excludes from work/school, isolation, more lab tests

8. Investigator
   - Reviews for api links, records outcomes, notifies PHAC
   - Close case

Panorama supports all the tasks depicted here:
Lab results
Notification and Assignment of Cases
Client index & Case Management Reporting
Outbreak Management

An Outbreak is a rise in the incidence of a disease above what is expected for a particular time and place. Panorama’s Outbreak Management component allows a public health professional to create an outbreak record and to assign any associated Investigations, Exposures, Interventions, and Case Definitions with that outbreak for management and analysis.

The Outbreak Management component is broken-down into the following areas:

- Outbreak Details
- Outbreak Team
- Outbreak Subject Summary
- Case Definitions
- Outbreak Communications
- Outbreak Linking
- Outbreak User Defined Forms

Outbreak Details

Once an outbreak is declared, a Panorama user will create an outbreak record in Panorama using the Outbreak Management component. The user will immediately enter key information such as an Outbreak Name, Responsible Organization(s), Encounter Group, and Outbreak Status. Any related Investigations that exist in Panorama can then be associated to the Outbreak record and new outbreak Investigations can be created. Users can also use the Outbreak Details module to add and update suspected disease and causative agents.

Outbreak Team

Outbreak team members are assigned to an outbreak and are granted access to any related information for that outbreak. This may extend their functional permissions and data access beyond their daily access. Outbreak team members can receive notifications based on their role in the outbreak. Non-Panorama users can also be included in outbreak teams and will receive notifications and messages by e-mail.

Outbreak Subject Summary

The Outbreak Subject Summary allows a user to manage Investigations within an Outbreak. An Outbreak may have identified Investigations and/or unidentified Investigations. Because additional information is unavailable, Panorama only maintains an aggregate count of unidentified Investigations.

Outbreak Subject Management allows a user to:

- View a tabular summary of the total number of Investigations in an Outbreak, stratified by Outbreak Group and Outbreak Case classification
- View and maintain a list of Investigations associated with an Outbreak
- View and maintain a list of Outbreak Groups associated with an Outbreak
- View and maintain counts of unidentified aggregate Investigations

Case Definitions

After a user enters information relating to a particular disease, Panorama compares Case Definition rules against the diseases in the outbreak. The system then suggests a case classification and then specific rules are applied to suggest classification and priority. The primary outbreak investigator can then accept or decline each suggested classification and priority.

Outbreak Case Definitions can be created and updated within an Outbreak. Default Case Definitions are included in an Outbreak based on the disease selected for the Outbreak. A list of Case Definitions that are associated to the Outbreak are also displayed. All relevant Case Management Case Definition functions are available from the Outbreak.
**Outbreak Communications**

All communications associated with an outbreak such as notifications, notes, reservations/meetings, attached files, etc. can be accessed from within the outbreak. Communications can be directed to the outbreak team or to other Panorama groups within the same region or to other regions by using Notifications.

**Outbreak Linking**

Outbreak linking allows multiple related outbreaks to be linked to a “parent” outbreak. This supports a business situation where an Outbreak crosses regional boundaries or when an Outbreak is to be managed by multiple organizations. By linking an Outbreak to sub-Outbreaks (parent and child/children), a health jurisdiction can coordinate the management of the Outbreak while a sub-jurisdiction handles the collection of information for its specific local Investigations.

Nominal or non-nominal information can be displayed at the parent Outbreak level and all data entered into the sub-Outbreaks is aggregated and displayed in the Outbreak record for the larger jurisdictional-level to view and analyze.

The degree of data sharing between regions is controlled by each Panorama instance’s data access rules.

**Outbreak User Defined Forms**

User Defined Forms make it easy for users to enter Outbreak information into Panorama by providing a way to customize Panorama to meet jurisdictional and situational needs. If specific information needs to be gathered (e.g., an enteric outbreak), a system administrator user can create a new form to capture detailed information. Information will then be gathered during an investigation using a UDF, which then is entered into Panorama. This will improve consistency and will result in high quality data for reporting purposes. User Defined Forms can also be designed to show historical responses where a history exists, for real time trending and follow-up. User Defined Forms can be used when connected to the network, or off-line in the field.
What is Outbreak Management?

The purpose of the outbreak management is to identify, investigate, manage and control an outbreak of a disease.

Panorama Investigations
- Investigators use Investigations Management Application to manage day-to-day Cases
- When an Outbreak is detected, it means several Investigations have similar characteristics within Panorama

Regional Epidemiologist
- Groups cases
- Runs case definition
- Identifies Outbreak characteristics
- Alerts CIOSC

CIOSC
- Alerts jurisdictions
- Provides updates
- Support coordination

Outbreak Team
- Associate cases
- Creates Outbreak definitions
- Searches for related cases
- Develops questionnaires for further inquiry
- Contact clients
- Orders lab tests
- Manages interventions

Confirming Lab tests ordered

Clients
Immunization Management

Panorama provides public health professionals with the tools to create and manage immunization schedules and accurately calculate eligibility. The Immunization Management component can also assist users in planning, delivering, and keeping track of immunization sessions, including adverse reactions, precautions, contraindications, and exemptions.

Immunizations can be delivered to individual clients, or to groups of clients. They can be recorded on-line with system automation or off-line in a disconnected mode to support travelling health service providers’ access.

Users can also use the Immunization Management component to view immunization history for individuals and populations as well as lists of clients who are eligible or overdue for vaccinations by vaccine of interest, demographics, and/or risk factors.

The Immunization Management module component is broken-down into the following areas:

- Immunization Recording
- Mass Immunizations
- Immunization Scheduling
- Adverse Events
- Reminder Recall
- Immunization Repository

Immunization Recording

Data fields are pre-populated with default information to assist the user with rapid data entry for one or many clients. Some of the data collected may include:

- Administered immunizations
- Skin tests to identify susceptibilities/immunities
- Special considerations, such as contraindications, exemptions and precautions
- Record consent or refusal of consent
- Allergies and other risk factors

Mass Immunizations

Panorama provides tools to help public health professionals plan, prepare and deliver mass immunization services such as school-based programs. Immunizations can be created either on-line or in disconnected off-line mode. By assessing immunization coverage for specific groups, public health professionals can determine where these clinics will be most effective.
**Immunization Scheduling**

Schedules for entire populations can be created based on National Advisory Committee on Immunization and jurisdictional guidelines. Panorama can report on immunization coverage for entire populations against the schedules to determine the success of immunization programs. Users can view individual client records to check their status against the schedules. For each client record, Panorama shows which immunizations are completed, due, eligible or overdue.

**Adverse Events**

Adverse events following immunization can be recorded and linked to specific immunization events. Those adverse events requiring assessment by the Medical Officer of Health can be automatically forwarded to obtain a recommended treatment and follow-up. Events can also be automatically reported to the Public Health Agency of Canada to help with managing the safety of the vaccine supply in Canada.

**Reminder Recall**

Panorama supports the on-going monitoring of a specified population, which are usually groups of clients who are due, overdue, and eligible for selected immunizing agents. Panorama’s Reminder Recall allows targeted communication to the resulting client set, such as issuing reminders for overdue immunizations, advance notice of upcoming immunization dates, and requests for consent for immunization. In addition, in some jurisdictions, the Reminder Recall provides an escalation of letters resulting in suspension from school if no immunization records are provided. When a communication (e.g. letter, postcard) is sent to a client, it is recorded against their client record for tracking purposes.

**Immunization Repository**

Panorama’s Immunization component also includes an Immunization Repository that provides a generic framework for integrating Panorama with external point-of-service applications using HL7 messaging.

All details about immunization events, which are recorded elsewhere are sent to Panorama’s repository using HL7 messaging and are stored in the Immunization Repository. The Immunization Repository records and stores all Immunization event records for a health jurisdiction.
School Immunization Events

1. Contact school, attain class list for the new year
2. Validate list prior to upload process
3. Upload list & create the cohort
4. Associate the cohort to the school's mass imm event
5. Data exported to laptop for disconnected use at school
6. Nurse immunizes the children & updates their records in the disconnected mode
7. Data from event is uploaded back into Panorama database

Clerk

Public Health Nurse
Panorama’s Vaccine and Materials Inventory Management component helps public health professionals to maintain appropriate levels of vaccine and other materials at locations where they are needed. By improving distribution and the process of identifying aging product, millions of dollars could be saved each year. The World Health Organization estimates that the total spoilage and waste from inefficient vaccine inventory management is currently 10% of total vaccine expenditures. In Canada, this amounts to approximately $40,000,000 per year.

Additional capabilities of this component include:

- Planning, requisitioning, receiving, and distributing immunizing agents, medications, and consumable materials
- Collection, storage, and retrieval of information about product characteristics, manufacturers/suppliers, requisitions, and the distribution network
- Support and maintenance of the vaccine “Cold Chain”
- Maintenance of inventory storage locations and attributes that define which products can be appropriately stored in each

The system also tracks the value of items in inventory to support insurance requirements and other reporting requirements.

The Vaccine and Materials Inventory Management component is broken-down into the following areas:

- Define Inventory System
- Maintain Inventory Level
- Requisition Product from Inventory
- View Product Inventory
- Contract Maintenance

**Define Inventory System**

A single configurable inventory catalogue is used across each instance of Panorama. The catalogue includes lot records for vaccines and other materials. It supports users from a common stockpile perspective all the way down to an individual health unit. The Inventory system also allows auto-decrement of inventory for real-time tracking quantities on-hand. Users can manage contracts and orders with manufacturers, as well as requisition support of all public health
distributors for both public health funded and non-funded products as required. Panorama can maintain information on manufacturers and suppliers of catalogue products and maintain profiles on each inventory holding point such as facilities (refrigerated lockers/freezers etc.), replenishment source, delivery schedule, insurance coverage and maximum stock levels, etc.

**Maintain Inventory Levels**

Public health professionals can use this functionality to plan replenishment for each product and to generate forecasted demand quantities and replenishment values for inventory items. Product can be ordered from suppliers and weighted average cost of inventories can be automatically recalculated for all stock on-hand.

**Requisition Product from Inventory**

Requisitions can be created for products to be distributed within a health jurisdiction. Requisitions can be approved and inventory can be committed through either an automatic process or a manual approval process at the replenishment source. “Pick lists” for the requested products and shipping documents can be printed from within Panorama. The movement of an inventory item between storage locations can also be recorded.

**View Product Inventory**

A snapshot of the current inventory status can be viewed, and the amount of individual items can be counted. Users can adjust stock quantities to reconcile for any losses and gains.

**Contract Management**

Supplier contract agreement details such as planning renewals, tracking products, maximum order quantities, credits, and return policies can be recorded in Panorama for reference purposes.
Family Health

Panorama’s Family Health component supports a single record for multidisciplinary holistic care. It is a comprehensive primary care record with customized screening, assessment and long-term care planning tools. Family Health encompasses the following public health programs:

- Immunization
- Newborn
- Early Childhood Growth and Development
- Post-partum
- Speech and Language
- Hearing Dental and Vision Screening
- Breastfeeding
- Youth Sexual Health
- Audiology
- Prenatal and Parenting Education
- Nutrition

Screening

The Family Health component allows public health professionals to customize a series of User Defined Forms to assist in the screening of pregnant mothers, newborns, and children and youth for various program areas. These User Defined Forms can be customized by end users to meet specific program area needs, jurisdictional requirements, or any other desired information need.

The Family Health User Defined Forms can also be modified to automatically create a client-specific focus area based on responses not expected and findings during the client screening process. Identified focus areas are entered into Panorama and can be monitored over time as the Family Health component has the functionality to view time phased screening information on one screen. If required, focus areas can be managed using Panorama’s Care Planning functionality.

Based on the trend of a particular client focus area, a Care Plan and associated narrative notes may be created to assist in the long-term treatment and resolution of the associated health issues.

Group Events

The Family Health provides health care professionals with the ability to schedule and record group events, which are generally educational sessions for large groups of individuals such as classrooms.

No information is collected as to who attended the event; however, information relating to the time, place, and presentation content is recorded.

Off-line Functionality

The Family Health component allows users to synchronize a portable computer with data from an on-line Panorama instance and bring a functioning application to a remote community without Internet connectivity. Family Health related User Defined Forms and client information are available in an off-line state. These can be synchronized with the on-line instance once Internet connectivity is available.
Notice of Birth (Hospital Delivery of Healthy Baby)

Step 1
- Mother delivers baby
- Hospital staff fills out hospital birth documentation
- Hospital staff sends birth documentation to public health unit
- Public Health Clerk receives and reviews birth documentation

Step 2
- Search for client – Mother (maternal record)
- Create newborn record (interact with Client Registry)
- Link mother and baby (via relationship links)
- Link other family members listed on doc.
- Record NOB information (contained in the hospital birth doc.)
- Prepare new mom/baby info package
- Create new mom/baby referral for Public Health Nurse
New Mother and Baby Contact

**Step 1**
- Create info package for home visit
- Create referral for nurse to contact Mother
- Review Newborn record and NOB
- Review siblings records
- Review Mother's records
- Call Mother to discuss any current issues
- Record Phone Call as an Encounter and any details discussed
- Nurse determines a home visit is required
- Schedule home visit

**Step 2**
- Collect info package
- Travel to mother and baby's home
- Perform Newborn Assessment (take paper notes)
- Perform Postpartum Assessment (take paper notes)
- Give information package to mother
- Receive info package

**Step 3**
- Return to office
- Search for client (mother)
- Record Encounter/Service
- Enter Postpartum Assessment details and Care Plan
- Create referrals (optional)
- Switch to client/baby via relationship
- Enter Newborn Assessment details and Care Plan
- Create referrals (optional)
- Schedule follow-up appt. for Mother and/or Baby

Schedule follow-up appt. with Nurse
Work Management

Panorama’s Work Management components help to ensure the quality and effectiveness of the business processes for the analysis and management of communicable diseases, outbreaks and immunizations. It enables users to electronically manage the allocation of work, monitor the status of work items and report on workloads and volumes.

Panorama provides a robust appointment setting and workload distribution system, and reports on resource usage and work activities by providing tools described in the following sections.

Wait Lists and Follow-ups

Users can create wait lists that identify clients who are waiting for an appointment, to assign priority levels, and to create reservations when a timeslot becomes available. Panorama also maintains wait queues that are linked to scheduled reservations.

Client follow-ups can be created, indicating that a client has been reminded of an upcoming appointment (e.g. phone call) and/or an email reminder to the client can be initiated.

Reservations

Reservations (appointments) can be recorded and modified in Panorama using different views (day, month, year, and open timeslots). A unique series of reservations can be created; for example, a client can be scheduled for a tuberculin skin test, a reading 48 hours later, a radiology appointment, and an appointment with a physician one week later.

Schedules and Workloads

Timeslots can be managed according to a user’s availability (e.g., vacation) or according to an organization’s schedule (e.g. clinic days).

Public health workers can also be assigned to support the activities of an event and the coverage for that event reviewed.

Tasks and appointments can be balanced for individual users and users within a group. Highly urgent tasks, completed tasks and unassigned tasks can be reviewed. Throughout Panorama, events trigger the assignment of tasks so that work is queued appropriately; for example, the initiation of a new investigation triggers the establishment of a task on the primary investigator’s work list.

Wait Queue

Once a client arrives at the designated service location for a scheduled appointment, that client’s charts can be virtually “pushed” to the Wait Queue of one or more health service providers. A health jurisdiction may have several wait queues depending on service offerings. For example, Immunization nurses, environmental health officers, dental staff, STI clinics, TB Skin Test Clinics, etc., may all have their own Wait Queues in Panorama.

Communication Event Logging

Users can keep track of incoming and outgoing communications using a communication log. This function is useful for contact tracing, outbreak situations and for fulfilling medical legal requirements.
Client Appointments (Process)

1. **Client**
   - Calls Health Unit to schedule an appointment

2. **Clerk**
   - Receives call
   - Logs into system
   -Create the appointment using work management module to find next available appointment
   -Schedule Appointment
   -Establish reminder method
   -Reminder Email sent to client

3a. **Clerk**
   - Client goes to clinic

3b. **Clerk**
   - Searches for client in the system (not in system)
   - Creates client record
   - Checks them in
   - Links appointment to client as 1st encounter
   - Client in virtual wait queue
Notifications Management

Panorama has three types of notifications to support the communication needs of public health professionals:

- Jurisdictional Notifications
- Threshold Notifications
- Client Warnings

Jurisdictional Notifications

A Jurisdictional Notification is an unstructured message that can be created and posted to a specified group. A Jurisdictional Notification may be sent to Panorama groups, individual Panorama users, and non-system users. Users who do not have access to Panorama receive Jurisdictional Notifications as e-mails. Notifications may have links to other system information such as clients, investigations, or outbreaks.

As well, Panorama allows jurisdictions to retrieve or send notifications to other jurisdictions as required in certain circumstances such as a multi-jurisdictional outbreak.

Threshold Notifications

A Threshold Notification is a system-generated message to specific users or workgroups when a particular set of rules is met (e.g. inventory, number of Cases). Threshold Notifications can be created and edited by Panorama end-users and the thresholds have the capability of monitoring any change or addition of data over a defined period within a jurisdiction.

Some common Threshold Notifications are:

- To notify users of an increase in instances of a particular disease over a set period of time in a geographic location
- To notify users that the current on-hand inventory of a specific vaccine is near or below the recommended minimum inventory level

Client Warnings

A Client Warning is a Client-specific comment that should be viewed by the Public Health worker prior to providing services to a Client. Based on system-wide information, these warnings can serve for the protection of the Client (e.g. drug allergies) or the Public Health worker (e.g. potential Client site visit risks such as aggressive dogs).
Common Services

Panorama offers numerous cross-component features, which are available at various points throughout the system. Some of the key common services are detailed in the following sections.

User Defined Forms

User Defined Forms (UDF) make it easy for users to enter information into Panorama by providing a way to customize Panorama to meet jurisdictional, program (e.g. early childhood, newborn and post partum, audiology) and situational (e.g. outbreak) needs. If new information needs to be gathered (e.g., a Smoking Cessation questionnaire), a system administrator user can create a new form to capture it.

Information gathered using a form is entered into Panorama, which will result in high quality data for reporting purposes. They can be designed to show historical responses where a history exists, for real time trending and follow up. User Defined Forms can be used when connected to the network, or off-line in the field.

The Family Health module expands on the UDF functionality and provides additional functionality in the following areas:

- Birth Events
  - Maternal Birth Event
  - Newborn Birth Event
- Communication Event Logging – Event tracking – incoming and outgoing

For additional information regarding this expanded UDF functionality, please refer to the Family Health section on page 18.

Document Management

Panorama provides users with the functionality to add, update, delete, and search for documents. Documents are defined as any electronic attachment and may include Microsoft Word Documents, PDF’s, images, etc. Depending upon the type of document, a user can also view properties such as versions and status and can view, add, and delete comments associated with documents. Documents may be associated with a particular Client, Investigation, Encounter, Outbreak, or action within the system and can be shared within a workgroup.

There are two types of documents within Panorama. Context-specific documents are associated with a particular record and General documents that are available from any area of the system. Examples of general documents are form letters, treatment protocols, and governmental reports.

Common Terminology Service

The Common Terminology Service (CTS) is a Web-based tool for managing healthcare terminologies. It supports the implementation of Code Systems defined by standards bodies (e.g. Health Level 7, Public Health Agency of Canada, and the World Health Organization). Each code system can be used by Panorama to build value sets that are assigned to data model attributes and drop-list contents. One of the key code systems supported by CTS is SNOMED CT, the Systemized Nomenclature of Medicine - Clinical Terms.

The CTS tool is available for use in clinical charting, messaging, and communication.
Ad Hoc Reporting

Panorama provides users with ad hoc reporting and extract of data by leveraging Panorama’s Business Object Universes. This advanced reporting functionality provides the capability to address any unforeseen epidemiological or legislative reporting needs. The Business Objects tool is an enterprise-strength query and reporting application that helps users ask questions about Panorama data and create clear reports in an easy to use “drag and drop” manner. The results can be exported to CSV or Excel format for import into SAS, EPIINFO, or other tools. Reports can also be saved in PDF format. As well, Business Objects can create graphical representations of data models in a powerful reporting environment so users can easily access and analyze Panorama data.

Data Extraction

Panorama uses the Business Objects Reporting Tool to allow the authoring of configurable queries that retrieve data from all the major sub-systems within the application. This includes supplemental data added through User Defined Forms. Panorama’s entire data model is not available for extraction; however, a significant portion is accessible through the Reports Solution.

A data extraction user interface allows a user to specify data elements, output format, and selection criteria (such as date ranges) for data to be extracted from the system and downloaded to the user’s computer. This tool will only return data according to the user’s role-based security. If data is removed from the system as an extract, jurisdictional policy will control the usage of the information.

Panorama is structured with a separate reporting database to prevent performance impact on the production environment. This was done to isolate the expected significant resource impact of ad hoc reporting and data extraction from the operational system. The reporting database is updated frequently.

Recent Work

Panorama’s Recent Work function provides the user with the ability to see a list of up to six recent work items. Users have the ability to access any of their last six client record interactions or recent work items to allow quick retrieval of client records, as well as real-time reminder of tasks performed. Some of the recent work items that can be displayed are:

- Subject – Subject Summary
- Investigation – Investigation Summary
- Encounter – Encounter Details
- Immunization – Immunization Summary and View/Add Details
- Outbreak – Outbreak Summary
- Cohort – Cohort Details
**Architecture**

Panorama was developed through extensive consultation with public health experts to support day-to-day operations as well as public health emergencies such as Outbreaks. The result is a highly integrated product with seven key components and numerous supporting features and technologies.

**Core Components**

Panorama’s functionality is broken-down into seven main components:

- Investigation Management
- Outbreak Management
- Immunization Management
- Vaccine and Materials Inventory Management
- Work Management
- Notification Management
- Family Health Management

*Figure 2: Panorama Architecture Overview*
**Other Technical Components**

Panorama’s reports are triggered from a custom developed Report Launch Page that is integrated within the Web application. In additional, Panorama also supports a robust ad hoc query environment where sophisticated user defined queries can be graphically constructed and reused.

User Defined Forms (UDF) are Web-based data collection tools that Panorama users can customize to “extend” the core data model with supplemental data captured in questionnaires. These questionnaires or Forms are rendered for on-line data entry from within the Panorama application. They are also available off-line and can be printed to support manual data capture.

Panorama offers users and clients robust Consent management. Consent management refers to a series of client-controlled settings related to the collection and disclosure of client data. The consent module supports a number of configurable Consent directives types that allows directives to be targeted to a specific entity-level of client data with an override process. Consent also integrates with Audit to ensure important privacy events are logged.

Panorama can be integrated with other Essential Public Health Business Applications. Existing business applications that provide public health functionality as independent components can be integrated with Panorama and used as an automated information system to reduce data entry.

Panorama offers a number of common services that need to be implemented by the application framework for the system to function efficiently and satisfy the non-functional requirements, which include:

- Domain services such as Java APIs to support business flow integration between applications
- Common business services to support functions that are used across many Panorama functional domains
- Common Technical Services to support non-functional or management aspects of the system

Panorama supports different classes of external integration such as:

- HL7 messaging and web services through the Enterprise Service Bus via HTTP;
- Reports that are distributed beyond the Jurisdiction;
- User mediated file-based uploads and downloads
Technology

Panorama can be installed into a variety of technological environments. It can operate on different brands of hardware, using any one of four common operating systems (AIX, HP-UX, Solaris, or Windows).

Panorama is a Web-based application and a user only requires a current computer running a Web browser, such as Internet Explorer, and a wide area network connection to Panorama. Access is provided with secure access technology and the system is capable of running over low-bandwidth lines (e.g., phone lines) with some performance limitations.

Other health information systems can exchange information with Panorama using HL7 or Web Services.

Methods of Access

Web Browser

- Standard Web Interactions: Panorama provides a secure web-based user interface
- Upload: Panorama provides upload of delimited text file with validations
- Disconnected Use: Panorama provides export and import of immunization events and client demographics with a disconnected use application

Messages

- HL7 Messaging: Panorama can use HL7 V3 to communicate with external systems, such as regional immunization systems, prescription drug registries and other applications (e.g., inspections systems).
- User Provisioning Web Service: Panorama can communicate with other jurisdictional provisioning services using standard XML messages, such as Service Provisioning Mark-up Language (SPML).
- Vaccine Inventory Web Services: Panorama can communicate with external Inventory management and financial systems using standard XML messages. These web services include synchronizing product requisitions and returns, and upload of contracts
Context

This context diagram depicts the business environment within which a typical instance of Panorama will operate. The context will vary in each health jurisdiction that implements Panorama.

A Panorama instance is populated, managed, and accessed by a variety of participants using various methods and tools to submit, access, and receive data. Depending on specific business needs and preferences, participants can choose to use available Web-based functionality to develop and implement electronic interface capability.

Panorama will be installed and run within a Jurisdictional environment where it can interact with a number of external applications. Interactions may include Laboratory systems sending lab order requests and receiving Lab test responses, and Public Health Offices receiving patient Immunization profile responses.

Jurisdictions can also interact with other external jurisdictions and other contact points through external notifications such as e-mails, fax, and phone services. Jurisdictions can also manually trigger reports such as adverse events reports following immunization and distribute to other Jurisdiction systems.

Figure 3: Panorama Context Overview