Scope of the Tolven Open Source Solution

The Tolven open source solution enables data from disparate systems - a Hospital Information System, laboratory, radiology, physician office and Personal Health Record solutions, etc. - to be securely stored, normalized and made available to Tolven and third party applications. The Tolven solution is specifically designed to act as the primary repository for all clinical and administrative data for an enterprise. Tolven serves as the primary repository for the creation of the longitudinal electronic healthcare record by enabling data from existing systems (or messages) to be mapped to the Tolven repository structures, obviating the need for 3rd party data stores, record locator services or standardization in message formats.

The electronic Clinician Health Record and Personal Health Record Applications

Tolven is releasing two open source applications, the electronic Clinician Health Record (eCHR) and the electronic Personal Health Record (ePHR) solution. Key attributes of the Tolven solution include the following:

- The eCHR and ePHR are designed so that data collected by those applications can be readily integrated with data from legacy systems, affording comprehensive patient or population-centric data views
- Tolven applications are web-based, and therefore do *not* require application software to be downloaded to the device; the sole user requirement is internet connectivity from a browser on a personal computer or Macintosh device
- The Tolven applications have been designed with mobility and accessibility in mind; therefore a subset of the eCHR and ePHR applications are being made available on cellular devices
- The eCHR and ePHR have an intuitive user interface that requires minimal end user training during deployment to consumers, patients, care providers or healthcare administrators
- Additionally, the Tolven application user interface is metadata driven, providing the end user with the ability to customize the layout and content of displays

Clinical Archetypes

Data collection in the form of **clinical archetypes** drives the functionality available within the eCHR and ePHR applications. *Clinical archetypes are collections of data that specify the way that data should be captured and represented to ensure consistency and accuracy of the data capture process.*

The Tolven clinical archetypes are being developed in conjunction with the open source and clinical communities, thus ensuring the completeness and acceptability of these clinical archetypes by the users.

The Tolven application design enables a user to capture an individual observation (i.e., an archetype) as part of a simple data capture process. For example, a patient's pulse can be captured using a single data input screen that enables both mandatory (e.g., date and rate) and any number of additional optional attributes (e.g., location of pulse, patient position, stress test, etc.).

In addition to capturing an individual observation, such as a patient's pulse, a single observation can be combined with any number of additional observations to create a comprehensive assessment, such as a *vital signs assessment*. (In the case of a vital signs assessment, a user is prompted to capture the patient's pulse, as well as other relevant observations as part of a single interaction with the applications, e.g., respiration and temperature.)

Each clinical archetype (e.g., pulse) is mapped to a specific concept using an appropriate terminology (e.g., SNOMED, LOINC or ICD9), thus ensuring the data captured is immediately, seamlessly and accurately coded.

The Tolven solution enables any number of clinical archetypes to be defined and combined in such a way that they can reflect any number of healthcare business processes (e.g., clinical assessments, patient questionnaires, physician order entry, medication management, etc.). *This approach provides Tolven users with the ability to support almost all clinical business processes in the consumer, patient and care provider environments.*

Information Views on Tolven Applications

The Tolven eCHR and eCHR both provide summaries of clinical information that allow the user to organize personal views tailored to their specific needs. Extensive use of menus permits users to quickly summarize critical clinical information in a variety of formats, including graphs, for longitudinal review of the clinical record. Rather than insisting that there is a "single best" view of summarized clinical information, Tolven's *menu data* driven approach allows users to configure information rich views that can be changed over time without having to unravel application and database code.

Tolven's rules-based data transformation facilitates the presentation of information in rational graphic metaphors from a variety of sources (a Hospital Information System, laboratory, radiology, physician office and Personal Health Record solutions, etc.).

Tolven Application Functionality

The application functionality that will be made available as part of the first release of the Tolven solution supports the following areas; *Access and Account Management*, *Consumer-Focused Functionality* and *Clinician-Focused Functionality*.

1. Access and Account Management
    a. The account management functionality supports the creation and management of user accounts; the creation of accounts uses secure email for authentication of an individual during the account creation process
    b. The security model employed within the eCHR and ePHR enables a user to electively and *selectively* share information associated with their account with other users (or group of users)

2. Consumer-Focused Functionality
    The consumer (patient) functionality enables the following data to be captured, updated and selectively shared with a care provider:
    a. Provider and Insurance Information
    b. Examination and Test Results
    c. Medications
        i. New Orders
        ii. Prescription Renewals
        iii. Over the Counter Medications
    d. Medical History
    e. Family History
    f. Problems
    g. Allergies
    h. Alerts and Reminders
    i. Appointment Schedules
    j. Completion of Self Assessments
    k. Completion or Review of Questionnaires

3. Clinician-Focused Functionality

The care provider (clinician) functionality enables the following data to be captured, updated and selectively shared with another care provider or the patient:

a. Clinical Summary
b. Examination and Test Results
c. Medications
    i. New Orders
    ii. Prescription Renewals
    iii. Over the Counter Medications
d. Medical History
e. Family History
f. Problems
g. Allergies
h. Protocols and Pathways
i. Alerts and Reminders
j. Appointment Schedule
k. Completion of Clinical Assessments
l. Completion or Review of Questionnaires

Future Application Development Strategy

The application functionality available in the Tolven open source solution will continue to be expanded over the coming months by both direct development and controlled collaboration with other open source projects.

The next Tolven releases of the Tolven open source solutions will support the storage and retrieval of multimedia content, additional archetypes, assessments and integration to other commercial healthcare products.