SMW Workflow/BPM Integration

Joel Natividad
TCG
Sept 19, 2010
SMWCon Fall 2010
Amsterdam
SMW Workflow/BPM Integration

AND WHY THE SMW COMMUNITY SHOULD CARE

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groups somehow defined \backslash in \nother\text{-}test
make it familiar like LDAP, \add\nability to plug in LDAP

\textbf{ACCESS control}

- using groups
- namespace-based, 
  original instead base 
  permissions
- link at \textit{Extensible Access Control}

\textbf{workFlow}

- change in properly value leads to 
  other properties changing value
- change in access control
- \textit{email} notification

- \textit{Scheduled} automatic change to wiki pages
- \textit{Semantis Ticks} already be \textit{scheduled email notification}

- meetings

- create, save, or \textit{make a group}
- store a \textit{Forum}
- \textit{life cycle}
- more
SMW “Tech Day” Meeting
Nov 23, 2008

**Features**

- Implement standard ontologies into SMW (possibly through packages)
- SPARQL output within SMW

**Workflow**

- Tasks for editing templates
- Meta-model for data that outputs categories from templates
- Defining user groups through the wiki (syntactically)
- Customizable start pages for users

**Access Control**

- Creating groups
- Creating permissions: user-based, category-based, page-based,
  original-action-based
- Groups and permissions:
  - inheritance of permissions
  - change in access control
  - trigger notifications on email
  - change in group membership
  - change in access control

**Access Control**

- groups somehow defined within wiki text
- make it familiar, like LDAP, all in ability to plug in LDAP

**Workflows**

- Change in property value, link, etc.
- make it familiar like LDAP, all in ability to plug in LDAP

**Features**

- Save as CSV link in task query output
- Import XML into wiki pages
- Import RDF/OWL into wiki pages
- Show in triple store, independent of wiki text
- Categories as autocomplete in forms
- SMW using triple store as a data source
- Values in SF as a wiki store
- SMW using triple store as a data source
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- Implement standard ontologies into SMW (possibly through packages)
- SPARQL endpoint within SMW

**Workflow**
- Tools for editing templates
- Meta-model for data that outputs categories, forms, templates
  - Defining user groups through the wiki (semantically)
- Customizable start pages for users

**Save as CSV** link in `#ask` query output
- Import XML into wiki pages
- Import RDF/OWL into wiki pages
- Data in triple store independent of wiki text
- Conditional autocompletion in forms
- Categories as autocompletion values in SF
- Query results as autocompletion/dropdown values in SF
- OWISWIG support within SF

**Features**
- Semantic refresh on save
- Halo ontology browser popup from forms
- Nicer-looking forms created by `CreateForm`

**Access Control**
- SMW using triple store as a data source
- Rules in SMW (derive from SWRL)
- Halo annotation within a W3C/WG editor
access control

- using groups
- namespace-based, category-based, page-based, original-author-based, query-based permissions
- look at Extension: Group Based Access Control
- need “Can be read by group”, “Can be written by group” properties?
- SMW queries must respect this access control
- also, ‘recent changes’ page

workflow
- change in property value leads to:
  - other properties changing value
  - change in access control
  - email notification

meetings
- enable single action to modify a group of pages
- store a formalization of data lifecycle
- perhaps implement this through an external tool like Yahoo! Pipes

- scheduled automatic changes to wiki pages
- Semantic Tasks already handle scheduled email notification

- meet whenever possible at semantic etc. conferences
- twice-yearly dedicated meetings
- full & spring
- Europe & North America (Germany & U.S.)
1 year, 9 months, 26 days later...

The community has done well!
1 year, 9 months, 26 days later...

- SPARQL endpoint
- save as CSV
- import/export RDF
- triplestore connector
- access control
- several major releases
- and much, much more!!!!
Help:SMW extensions

This page gives an overview of extensions that have been specifically developed for SMW based on its semantic core functionality. An alternative list is given by the mediawiki_extensions page for all extensions, the respective authors should be contacted for support.

Contents [hide]

1 Adding and modifying data
   1.1 Semantic Forms
   1.2 SMW OntologyEditor
   1.3 Halo
   1.4 Rule Knowledge
   1.5 Collaboration extension
   1.6 WYSIWYG
   1.7 MetaVidWiki
   1.8 Semantic Forms Inputs
   1.9 Semantic Signup
   1.10 FolkTagCloud

2 Searching and browsing
   2.1 Enhanced Retrieval
   2.2 Semantic Drilldown
   2.3 Semantic Gardening
   2.4 SemanticQueryFormTool
   2.5 Semantic Treeview
3.2 Semantic Maps
3.3 Semantic Compound Queries
3.4 Semantic graph extensions

4 Storing data
4.1 Semantic History
4.2 Semantic Internal Objects
4.3 Triple Store Connector

5 Protecting data
5.1 Halo Access Control

6 Awareness and workflow
6.1 Semantic Notifications
6.2 Semantic Tasks

7 Importing data
7.1 Data Import
7.2 Data Transfer
7.3 External Data
7.4 Freebase
7.5 Rich Media

8 Exporting data
8.1 RDFa

9 Obsolete or discontinued extensions
9.1 Question API
9.2 Semantic Calendar
9.3 Semantic Gallery
9.4 Semantic Google Maps
9.5 Semantic Layers
hoe zit het met Workflow?
Why Workflow?

- Business Processes = Workflow
- Knowledge Formulation = Workflow
- Natural extension for SMW (forms)
- Accelerate corporate adoption
- Facilitates contributions
- Client$ require Workflow
• Clients require Workflow
Client’s Profile

• Major integrated healthcare provider in the US
• Recognized innovator in healthcare IT
• Creating a Next Generation Knowledge Asset Management System
• Currently has a hodge-podge of legacy systems “tied together with bailing wire”
• Preparing for the coming age of personalized medicine
Client’s Profile

• Major integrated healthcare provider in the US
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Current Knowledge Management Infrastructure

3rd Party Content
- NDDF
- HLI
- SNO-MED
- Zynx
- Micromedex
- Clineguide
  etc.

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  etc.

Manual Workflow Processes
- Meds KM
- Clinical KM
- LMR KM
- ACD
- Handbook

SOFTWARE

KM Databases
- Meds KM
- Clinical KM
- LMR KM
- ACD
- Handbook

KM Editors & Tools
Search, Retrieval, Update, and Reporting Services
- Meds KM
- Clinical KM
- LMR KM
- ACD
- Handbook

SOFTWARE

Dictionaries
Terminologies, Coding Systems, Ontologies, etc.

Templates
Ordering, Reporting, Documentation, Modeling (data), etc.

Rules
Alerts, Reminders, Smart Forms, Protocols, etc.

Reference
Manuals, Guides, Books, Summarized Evidence, etc.

Clinical Decision Support

Knowledge Link

Quality Data Management

Knowledge Repositories

Transaction Knowledge Repositories

Production Knowledge Bases

Services & Applications

Knowledge Portal
Current Knowledge Management Infrastructure

3rd Party Content
- NDDF
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Software

KM Databases
- 3rd Party KM
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Clinical KM Processes

eRoom Content Vetting and Collaboration Activities

Documentum

Clinical Decision Support

Knowledge Link

Quality Data Management Knowledge Repositories

Transaction Knowledge Repositories

Production Knowledge Bases

Rules
- Alerts, Reminders, Smart Forms, Protocols, etc.

Reference
- Manuals, Guides, Books, Summarized Evidence, etc.

Services & Applications
Current Knowledge Management Infrastructure

- 3rd Party Content: NDDF, HLI, SNO-MED, Zynx, Micromedex, Clineguide, etc.

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- Meds KM
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KM Editors & Tools
- Search, Retrieval, Update, and Reporting Services

SOFTWARE
- eRoom Content Vetting and Collaboration Activities
- Reference Manuals, Guides, Books, Summarized Evidence, etc.
- Templates: Ordering, Reporting, Documentation, Modeling (data), etc.
- Rules: Alerts, Reminders, Smart Forms, Protocols, etc.
- Dictionaries: Terminologies, Coding Systems, Ontologies, etc.

Data Import
- Documentum

Production Knowledge Bases
- Knowledge Repositories: Quality Data Management

Transaction Knowledge Repositories
- Partners Services & Applications

Clinical Decision Support
- Knowledge Link
- Knowledge Portal
If I had some duct tape, I could fix that...
Future: Knowledge Asset Management System

- Clinical Decision Support System+
- Clinical Knowledge Assets (clinical decision support rules, medication databases, etc.)
- 2009 - ran a PoC using traditional techniques
- doing a second PoC using the same use cases with semantic technologies (starting Nov 2010)
- based on results of bake-off, go forward with a reference system
Future: Knowledge Asset Management System

- Clinical Decision Support System
- Clinical Knowledge Assets (clinical decision support rules, medication databases, etc.)
- 2009 - ran a PoC using traditional techniques
- doing a second PoC using the same use cases with semantic technologies (starting Nov 2010)
- based on results of bake-off, go forward with a reference system
So what are these Knowledge Assets?
Clinical Guidelines for the Treatment of Type 2 Diabetes in the Non-Pregnant Adult

February 2009

This document contains the following:

- Criteria for Diagnosis
- Treatment Goals
- Recommended Frequency of Diabetes Care Components
- Glycemia Management for the Non-Pregnant Adult, Step 1
- Glycemia Management for the Non-Pregnant Adult, Step 2
- Glycemia Management for the Non-Pregnant Adult, Step 3
- LDL Management for the Non-Pregnant Adult
- Hypertension Management for the Non-Pregnant Adult

Therapeutic lifestyle changes, self-management education and ongoing monitoring by the patient and provider are important components of diabetes care. Healthcare providers should also be familiar with prescribing information for the medications identified in these guidelines. In addition to the statements above, important information pertaining to specific guidelines can be found on each page.

Disclaimer: These guidelines were established after careful review of current evidence and sound clinical practice and are endorsed by the Partners Diabetes Council. The recommendations serve to assist clinicians in the treatment of diabetes and do not seek to supersede the judgment of healthcare providers. Modifications may be appropriate in a given setting; particular relevant influences may include a given individual's abilities, co-morbidities, overall health and anticipated lifespan. The responsibility for individual patient care decisions rests solely with healthcare providers.

Diagnosing Diabetes or Pre-Diabetes in the Non-Pregnant Adult

Diagnostic Criteria for Diabetes
- Random glucose ≥200 mg/dl with polyurea, polydipsia or weight loss, or
- Fasting glucose ≥126 mg/dl in the absence of intervening illness or steroid use*, or
- Plasma glucose ≥200 mg/dl at 2 hours on an oral glucose tolerance test (OGTT†) performed with 75 gm glucose administered

*Requires confirmation on a separate day
† Routine performance of OGTT is not recommended
Diagnostic Criteria for Pre-Diabetes

- Fasting blood glucose of 100-125 mg/dl (Impaired Fasting Glucose – IFG), or
- Blood glucose of 140-199 mg/dl (Impaired Glucose Tolerance – IGT) at 2 hours on OGTT* performed with 75 gm oral glucose administered

As noted above, routine or common performance of OGTT is **not** recommended

First-line treatment of pre-diabetes is lifestyle modification (e.g. dietary modification and performance of regular exercise). Some clinicians recommend the use of metformin along with lifestyle modification particularly among individuals under age 60, with an elevated BMI or with additional risk-related concerns (e.g. metabolic syndrome or vascular disease).

**Major Goal in the Treatment of Diabetes in the Non-Pregnant Adult: Control the ABCs (A1c, Blood Pressure, Cholesterol)**

A. **A1c <7%**
   While recent studies demonstrate conflicting outcomes and some data remain preliminary, we recommend an HbA1c treatment goal of < 7% under most circumstances. Clinicians and patients should individualize treatment targets which balance risk and benefit when determining glycemic targets.

B. **Blood pressure ≤129/79 mmHg**
   Alteration in blood pressure goals may be appropriate based on relative systolic and diastolic blood pressure, age, orthostatic blood pressure and adverse effects related to medications.

C. **Cholesterol (Lipids)**

**Primary Goals**
- LDL <100 mg/dl in patients >40 years or in adults 30-40 years with additional risk factors for vascular disease
  - LDL <70 mg/dl in patients with co-existing, or extensive risk factors for, vascular disease (when reaching that goal is practical)

**Secondary Goals**
- HDL >40 mg/dl
  Niacin can effectively elevate HDL but its use may not be appropriate in a given setting as niacin can worsen glycemic control
- Triglycerides <150 mg/dl
  When elevated (e.g. >200 mg/dl), triglycerides will often decline in parallel with improvement in glycemic control, limitation of dietary carbohydrates and/or alcohol ingestion. Pharmacologic therapy (a
## Recommended Frequency of Diabetes Care Components

<table>
<thead>
<tr>
<th>Action</th>
<th>Frequency</th>
</tr>
</thead>
</table>
| A1c                                         | Every 6 months if controlled (A1c <7%) and therapy/clinical circumstances remain unchanged  
                                           | Every 3-6 months if uncontrolled (A1c ≥7%) and/or evaluating change in treatment |
| Blood pressure                              | At every visit                                                            |
| Lipid profile                               | Annually  
                                           | Repeat lipid profile 3 months after a change in therapy                     |
| Weight / BMI                                | At every visit                                                            |
| Review blood glucose logs or meter printout | At every diabetes care visit                                               |
| Urine microalbumin / creat                  | Annually*                                                                  |
| Serum creatinine and eGFR                   | Annually                                                                  |
| Dilated eye exam by eye care professional   | 1-2 years if most recent exam normal  
                                           | Increased frequency beyond yearly in setting of retinopathy as determined by eye care professional   
<pre><code>                                       | *(BC/BS pay-for-performance requirements call for annual dilated eye exam)*                         |
</code></pre>
<p>| Foot exam                                   | Comprehensive foot exam annually. If at a particular high-risk (i.e. neuropathy or PVD) inspect at every visit |
| Smoking cessation education                 | At every diabetes visit (unless non-use is assured)                        |
| Influenza vaccine                           | Annually                                                                  |
| Pneumococcal vaccine                        | Once before age 65 and once after age 65 with at least a five-year interval between doses |
| Aspirin therapy (81 mg/day)                 | For all patients &gt;40 years and those 30-40 years with additional risk factors for vascular disease |
| Review medication management                | At every diabetes care visit                                               |</p>
<table>
<thead>
<tr>
<th>Psychosocial assessment: Emphasis on assessment of unsuspected depression</th>
<th>As needed. Depression may be present in upwards of 20% of the diabetes population.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assess self-management skills: testing and insulin management; lifestyle habits; and overall diabetes knowledge</td>
<td>At least annually; more frequently when appropriate</td>
</tr>
</tbody>
</table>

* Some clinicians measure the urine microalbumin / creat on an annual basis (even after elevation is demonstrated) to titrate ACE/ARB dosing.
Knowledge Assets

• Clinical Decision Support Rules
• Electronic Health Records
• Medication Databases
• Medical Vocabularies (SNOMED-CT, RxNorm, UMLS, etc.)
• External Datasources (NDDF, Micromedex, Zynx, etc.)
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- Glycemia Management for the Non-Pregnant Adult, Step 3
- LDL Management for the Non-Pregnant Adult
- Hypoglycemia Management for the Non-Pregnant Adult

Therapeutic lifestyle changes, self-management education and ongoing monitoring by the patient and provider are important components of diabetes care. Healthcare providers should also be familiar with prescribing information for the medications identified in these guidelines. In addition to the statements above, important information pertaining to specific guidelines within this document are provided in the following sections.

Disclaimer: These guidelines were established after careful review of current evidence and sound clinical practice and are endorsed by the Partners Diabetes Council. The recommendations were developed with input from experts in the field of diabetes care and are subject to ongoing reassessment in the performance of daily clinical care. The guidelines are intended to provide a framework for the management of diabetes care. The information contained herein is not intended to replace the professional judgment of the healthcare provider. The responsibility for individual patient care decisions rests solely with healthcare providers.

Diagnosing Diabetes or Pre-Diabetes in the Non-Pregnant Adult

Diagnostic Criteria for Diabetes
- Random glucose ≥200 mg/dL with polyuria, polydipsia or weight loss, or
- Fasting glucose ≥126 mg/dL in the absence of intervening illness or stress

*Plasma glucose ≥200 mg/dL at 2 hours on an oral glucose tolerance test (OGTT) performed with 75 gm glucose administered

*Requires confirmation in a separate test

*Patients for whom OGTT is not recommended
EXISTING Knowledge Management System

- Keyword-based Search
- No easy way to annotate/collaborate
- File-centric, technology-centric
- Non-tech SMEs cannot participate effectively
EXISTING Knowledge Management System

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- Hypertension Management for the Non-Pregnant Adult

Therapeutic lifestyle changes, self-management education and ongoing monitoring by the patient and provider are important components of diabetes care. Healthcare providers should also be familiar with prescribing information for the medications identified in these guidelines. In addition to the statements above, important information pertaining to specific guidelines for adults without gestational diabetes should be consulted.
FUTURE
Knowledge Management Platform

- Inline queries
- Visualizations
- Semantic Search
- Semantic Social Knowledgebench
- Knowledge-centric, **NOT** file-centric
- Non-tech SMEs **CAN** participate & contribute effectively
- **INFERENCING!!!** (Ontobroker)
  - Synonyms
  - Validation
  - Auto-completion
  - Recommendation ("see also...")
  - Dynamic Overview Pages
- **LINKED DATA**
- **AND SO MUCH MORE...**
Future State: KM Platform and Components

KM Platform

Knowledge Repository

Content Management

Collaboration

Business Process Management

Service Integration Layer

Enterprise Clinical Services

Data Warehouse/Data Mining/Business Intelligence

Knowledge Management Portal

Legacy DBs
Arthur, a pharmacist from the General, enters a request for new medication “Diltiazem XR SL Strips” to be added to the enterprise medication dictionary.

June assigns herself as the point person for this request.

Has similar medication concept already exist in the enterprise medication dictionary?

Yes

New medication should be added to the dictionary

No

In Task of High Priority

Sarah completes the review. Upon seeing the updated record of the new medication, the task assigned to Sarah is marked as complete and the project plan is updated.

Notification to Sarah

New medication is ready for publishing.

New and/or revised rules have been added to the respective knowledge bases.

Message to June

New and/or revised rules have been added to the respective knowledge bases.

Has Task Completed

Notification to Angela

Angela makes all reference resources and rule prototypes available/accessible in the collaboration space in a user-friendly UI format.

New and/or revised rules and submit for review and approval.

Participant from affiliate institutions

Collaboration Facilitators

Medication Knowledge Engineers

Subject Matter Experts (SMEs)
Arthur, a pharmacist from the General, enters a request for a new medication: "Diltiazem XR SL Strips" to be added to the enterprise medication dictionary.

June Assigns herself as the point person for this request.

Has similar medication concept already exists in the enterprise medication dictionary?

If Yes:
- New medication should be added to the dictionary.

If No:
- Has all details to create the new medication.

Notification to Sarah.

Sarah completes the review. Upon seeing the updated record of the new medication, the task assigned to Sarah is marked as complete and the project is again updated.

Message to June.

New medication is ready for publishing.

Notification to Angela.

User friendly audit trail, and are automatically annotated with searchable metadata and process tags at each step.

Angela makes all reference resources and rule prototypes available accessible in the collaboration space in a user-friendly UI format.

Creates the new rules and submit for review and approval.

End.
Arthur, a pharmacist from the General, enters a request.

New medication "Diltiazem XR SL Strips" to be added to the enterprise medication dictionary.

Has similar medication concept already exists in the enterprise medication dictionary.

Has all details to create the new medication.

New medication should be added to the dictionary.

Request is added to a queue and assigned to Sarah to review and confirm the details of the new medication.

Thomas Collaboration Facilitator, monitor the progress of Arthur’s original request.

Is Task on High Priority?

Alert Email

Notification to Sarah

Sarah completes the review. Upon saving the updated record of the new medication, the task assigned to Sarah is marked as complete and the project plan is updated.

Sarah has completed her review and the new medication is ready for publishing.

Message to June

Task assigned to June is marked as completed and the project plan is again updated.

New medication is available and a new drug-drug interaction rule may need to be created.

Angela makes all reference resources and rule prototypes available/accessibile to the collaboration space in a user-friendly UI layout.

Creates the new rules and submit for review and approval.

New and/or revised Rules have been added to the respective knowledge bases.

Has Task Completed?

Notification to Angela

User friendly audit trail, and are automatically annotated with searchable metadata and process tags at each step.

End
Arthur, a pharmacist from the General, enters a request to add "Diltiazem XR SL Strips" to the enterprise medication dictionary. June assigns herself as the point person for this request and finds that a similar medication concept already exists in the enterprise medication dictionary. She has all the details to create the new medication. If the new medication should be added to the dictionary, it is added to a queue and assigned to Sarah for review and confirmation. Thomas, the collaboration facilitator, monitors the progress of Arthur's original request. If the task is on high priority, alert email is sent to Thomas, who updates the project plan with the revised expected dates of completion. Sarah completes the review and saves the updated record of the new medication, marking the task as complete and updating the project plan. The new medication is then available in the enterprise medication dictionary. A new and/or revised rule may need to be created. Angela makes all reference resources and rule prototypes available/access to the collaboration space in a user-friendly UI layout, creating new rules and submitting them for review and approval. New and/or revised rules have been added to the respective knowledge bases.
Arthur, a pharmacist from the General, enters a request for new medication "Diltiazem XR SL Strips" to be added to the enterprise medication dictionary. June Assigns herself as the point person for this request and determines that a similar medication concept already exists in the enterprise medication dictionary. She has all the details to create the new medication, but concludes that no new medication should be added to the dictionary. The request is added to a queue and assigned to Sarah to review and confirm the details of the new medication.

Thomas Collaboration Facilitator monitors the progress of Arthur’s original request and updates the project plan with the revised expected dates of completion.

Sarah completes the review, upon saving the updated record of the new medication, the task assigned to Sarah is marked as complete and the project plan is updated.

Sarah has completed her review and the new medication is ready for publishing. Thomas collaborates with the project plan and the revised expected dates of completion are notified to Sarah. Sarah completes the review and the new medication is ready for publishing. The task assigned to June is marked as completed and the project plan is updated.

New medication is now available in the enterprise medication dictionary.

New and/or revised rules have been added to the respective knowledge bases.

Angela makes all reference resources and rule prototypes available/accessible to the collaboration space in a user-friendly UI layout and creates the new rules and submits them for review and approval.

New and/or revised rules have been added to the respective knowledge bases. User friendly audit trail, and are automatically annotated with searchable metadata and process tags at each step.

End
SMW+

What is SMW+?

SMW+ is a semantic enterprise wiki that is distributed by ontoprise GmbH, Karlsruhe, Germany. SMW+ is well suited for organisations or teams dealing with complex and informal workflows. SMW+ offers a rich feature set to create, share, publish and re-use knowledge contained in wiki contents.

Ontoprise develops extensions to MediaWiki and carefully picks other useful extensions and, if having passed our rigorous quality assurance procedure, casts them into SMW+. Apart from a team work ontology, SMW+ includes Semantic MediaWiki, Halo Extension, Semantic Forms, a WYSIWYG editor and many more useful extensions.

Create and edit

- Create visually appealing wiki pages in the rich text editor and embed documents and rich media in your wiki
- Enter and tag data like sales figures, milestone dates and customer comments freehand or using forms
- Annotate contents with semantic tags leveraging organisation and retrieval of knowledge stored in your wiki
- Create logical rules with a graphical rules editor for stating complex interrelations

Learn more... ➜
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Workflow Alternatives

• Use existing extensions
• Use the project management system
• Build a workflow system inside SMW
• Build a workflow ontology in OntoBroker
• Hook up to an existing, off-the-shelf workflow system (JBPM, Drools, Yahoo Pipes, Galaxy, etc.)
• Other alternatives?
Workflow Alternatives

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- Other alternatives?
Future State: KM Platform and Components

KM Platform

Knowledge Repository

Content Management

Collaboration

Business Process Management

Service Integration Layer

Enterprise Clinical Services

Data Warehouse/Data Mining/Business Intelligence

Knowledge Management Portal
Let’s continue the
court conversation

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