A cloud-based semantic wiki for user training in healthcare process management

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Drive and drawbacks in healthcare

- The goals in healthcare are the following:
  - reduce cost and
  - improve quality.

- Requirement: enhanced cooperation and collaboration among disparate healthcare units.

- In many circumstances, a lack of patient care coordination and teamwork is identified.

- Well-defined healthcare processes and interoperable health IT will enable virtual care teams to cooperate in the care of patients across organizational boundaries.

- Users are required to think of their activities as constituents of healthcare processes.
Need in healthcare delivery

- **NEED** -> DEVELOPMENT AND MANAGEMENT OF VALUE-ADDED HEALTHCARE PROCESSES
- **HOW** -> FOSTER ACTIVE USER PARTICIPATION
- **AIM** -> INCORPORATE KNOWLEDGE AND EXPERTISE OF HEALTHCARE PROFESSIONALS INTO HEALTHCARE PROCESS DEFINITIONS
- **RESULT** -> HIGH QUALITY OF HEALTHCARE DELIVERY.
Designing the training material

- The active user participation requires an effective user-to-analyst interaction.

- This calls for a suitable and adaptable training content to be made available to user anytime and from anywhere.

- Extensive and continuing education of healthcare professionals is required.

- The aim of training is to get staff up to speed with basic healthcare processes, so they can work effectively.

- Properly designed user training material should enable users:
  - understand process-oriented healthcare delivery,
  - visualize the inter-organizational healthcare processes,
  - assimilate the logic underlying existing processes and
  - identify areas where redesigning existing processes is required
  - understand the requirements of the environment and
  - participate collaboratively in its development.
Sample cloud-based ePrescribing Service & Ontology

- We consider a scenario of the implementation of a cloud-based ePrescribing service.
- A physician uses an ePrescribing application which is interfaced to an EPR system.
- To obtain formal specifications of the specific scenario we used an ePrescribing process ontology.
A prototype training system

- We use a semantic wiki to develop and provide the training material, which highlights the relevant knowledge expressed by a domain ontology.

- The prototype system to support training in healthcare process management consists of the following modules:
  - An **LMS system** (JoomlaLMS)
  - The **Semantic MediaWiki** (SMW)
  - The **OntologyEditor** extension of SMW
  - The **Halo extension of SMW**
  - The **Halo Access Control extension of SMW**.

- The training system is implemented onto the Amazon cloud infrastructure, in order to be available on demand.

- Users collaborate using the same shared datastore for storing and retrieving the semantic annotations.

- Amazon Simple Storage Service (S3) provide a highly durable storage infrastructure.
A cloud-based semantic wiki architecture

- Amazon S3 security determines how, when, and to whom have to be exposed the information stored on the cloud.
- Amazon Virtual Private Cloud (VPC) uses a VPN with industry-standard encrypted IPsec VPN connections.
- The training system is accessed only by users with specific IPsec VPN connections.
Results - Advantages

- With regard to the creator of the training material
  - content reusability.

- From the trainee’s point of view
  - semantic search and knowledge or conceptual navigation
  - knowledge dissemination and
  - ease of use without further education and training
  - ability to share standardized medical protocols.

- Regarding the use of cloud computing solution
  - cost saving,
  - accelerated time to delivery,
  - offloaded maintenance and management to the cloud,
  - elastic resources,
  - redundancy and scalability
  - always available training content to authorized users.
Concluding Remarks

- A process-oriented view of healthcare delivery contributes to cost containment and quality improvement.

- Healthcare professionals need an effective training aid that facilitates their participation in the (re)design of healthcare processes.

- Thus, a prototype approach to structuring training content in healthcare process management is proposed.

- The approach is based on a semantic wiki implemented on a cloud environment:
  - It defines a general ontology
  - It refines the general ontology by adding all ontology constructs required
  - It implements the semantic wiki infrastructure into a virtual private cloud.
Thank you for your attention