

Understanding User Needs for Interoperability: Standards for Use Cases in eHealth

Save to myBoK

By Anna Orlova, PhD; Karima Bourquard, PhD; and Charles Parisot

AHIMA, in collaboration with Integrating the Healthcare Enterprise (IHE) International, has been publishing the findings of the Use Case Task Force in a series of articles in the *Journal of AHIMA's* Standards Strategies section. The first article in this series, published in the June 2017 issue of the *Journal*,¹ provided definitions for the concepts that define user needs for the adoption of health information technology (HIT) to support HIT systems interoperability and information sharing across systems.

Task Force Tackles Use Case-Driven Approach

In computer science, a use case-driven approach is the foundational methodology for documenting user needs. This has been adopted by national and international HIT efforts to support HIT systems interoperability and information sharing across systems. Breakthrough areas, business cases, use cases, realization scenarios, technical use cases, and storyboards are concepts used to document user needs.

These concepts are used differently by different projects, which create confusion among HIT users and implementers about how the user needs have to be supported. To enable harmonization of various concepts, Integrating the Healthcare Enterprise (IHE) International partnered with AHIMA to form the Use Case Task Force. The task force objectives are to define these concepts and their relationships to facilitate better understanding of the standards-based technical solutions specified in the IHE interoperability standards (profiles) across users, thus facilitating the adoption of these standards in eHealth interoperability projects.

These concepts are business cases (breakthrough areas), use cases, realization scenarios, and technical use cases. The second article, published in the July 2017 issue of the *Journal*,² presented the hierarchy between concepts, illustrated the hierarchy using the examples of assembling the artifacts in the domain of clinical imaging, and described the approach and standards for building the business cases. This is the third article in the series, which presents another example of applying the concept hierarchy in the domain of e-prescribing and medication dispensing, and describes the approach and standards for building the use cases and realization scenarios for information exchange in healthcare.

Figure 1: Illustration of the Hierarchy of Concepts

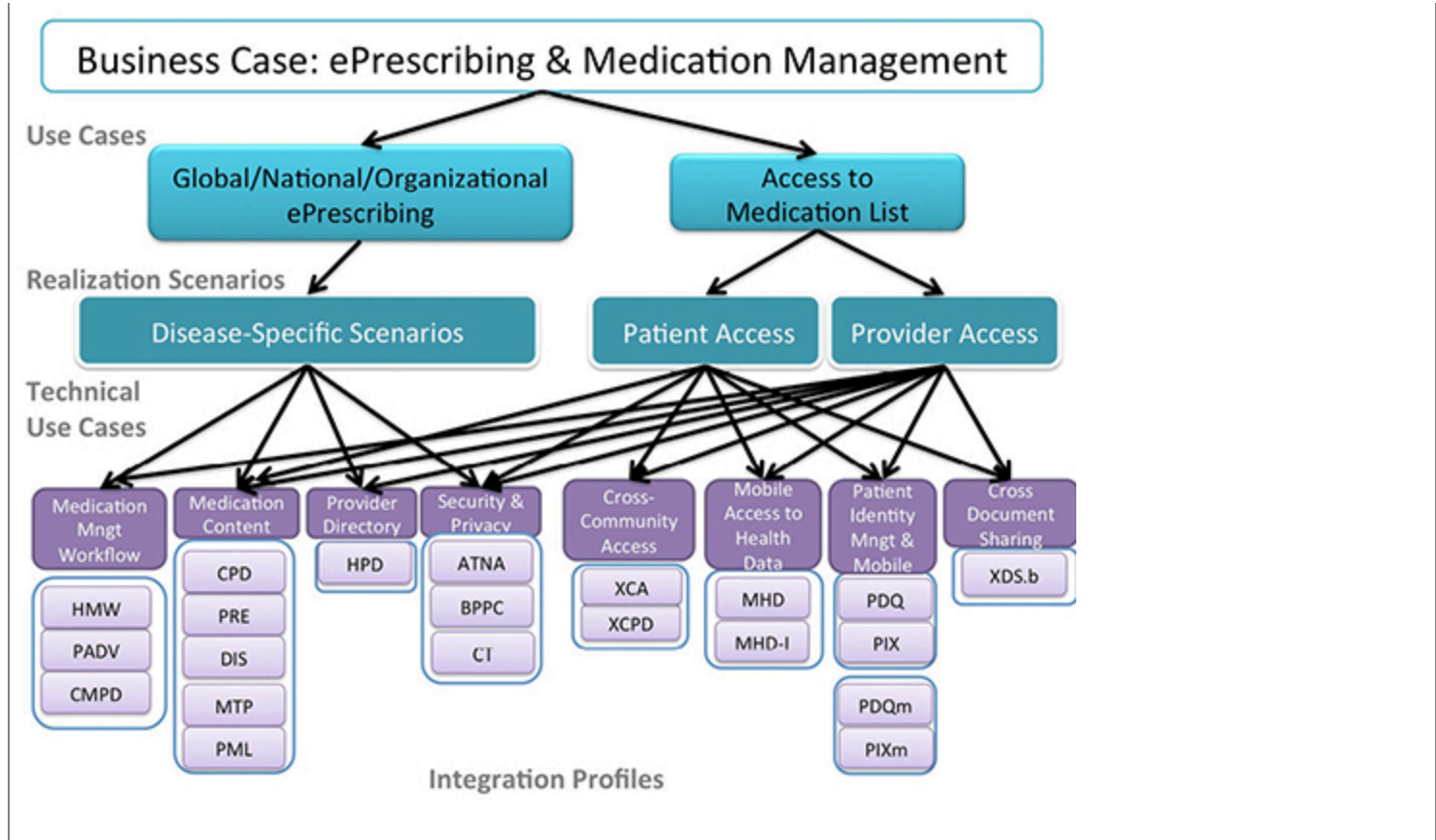
Level 1 - Business Case: ePrescribing and Medication Management

Level 2 - Use Cases: Global/National/Organizational ePrescribing and Dispensing and Access to Medication List

Level 3 - Realization Scenarios: Disease-Specific Scenarios, Patient Access to Medication List, and Provider Access to Medication List

Level 4 - Technical Use Cases with examples of Implementation Integration Profiles: Medication Management Workflow, Medication Content, Provider Directory; Security and Privacy; Cross-Community Access, Mobile Access to Health Data, Patient Identity Management, Cross Document Sharing

Please note that the full names of the IHE Integration Profiles can be found at www.ihe.net/Technical_Frameworks/#pharmacy and https://www.ihe.net/Technical_Frameworks/#IT.



Hierarchy of Concepts

The second article of the series illustrated the hierarchy of the concepts (business cases/breakthrough areas, use cases, realization scenarios, technical use cases with implementation options (IHE integration profiles)) with specific instances of these concepts using examples of the clinical imaging business case. Contained in this third installment is [Figure 1](#), above, which further illustrates the hierarchy with the example of ePrescribing and Medication Management business case.

Comparison of the hierarchies for the Clinical Imaging (as shown in the July 2017 *Journal* article's Figure 2) and ePrescribing and Medication Management ([Figure 1](#)) business cases shows that the technical use cases on workflow management and content were built using domain-specific profiles (i.e., medication content versus imaging content). In both business cases, however, the technical use cases for information infrastructure include reusable sets of implementation options (IHE integration profiles) for provider directory, security and privacy, cross-community access, mobile access to health data, patient identity management, and cross document sharing.

This demonstrates that the standards-based technical interoperability infrastructure needed to securely share information between an electronic health record (EHR) system and picture archiving and communication system (PACS), EHR and pharmacy information systems, and a patient's and provider's HIT applications is reusable for different business cases (health domains).

The authors of this article envision applying the hierarchy to describe other business cases that the AHIMA Standards Task Force has been working on in collaboration with IHE. They include "AHIMA Business Case on Patient Visit with the Use Case on Patient Registration" and "AHIMA Business Case on Information Integrity with the Copy and Paste Use Case." Standardization of business cases, use cases, and realization scenarios in which users describe their needs for information capture, management, sharing, and use is as important as standardization of technical infrastructure components (i.e., hierarchy's level four (technical use cases) with various implementation options (integration profiles)).

Building Use Cases and Realization Scenarios

Interoperability Use Cases and Realization Scenarios are the second- and third-level artifacts in defining the need for HIT application in a healthcare organization from user perspectives. They are aligned with the organization's operation (i.e., functional standards). Use cases and realization scenarios are built based on the functional requirement analysis and documented in the functional requirement analysis document (or requirement analysis document).³ The requirement analysis (elicitation) is the first step in the information system design. It is usually conducted by the system analyst from the vendor's company or IT department. There is a critical need for the users themselves to understand and lead the process of specifying their requirements for the information systems they need.

Similar to a business process described in the July 2017 *Journal* article, functions in the Use Case or Realization Scenario are also defined as a series of specific activities and logic that form a repeatable pattern. There are five user functions that information systems do support. They are:

- Collect data (input)
- Manage data
- Integrate data
- Analyze data
- Generate output (i.e., orders, results, summaries, reports, etc.)⁴

Use Case and Realization Scenarios specify activities (actions) performed by the users (business actor) and information systems (technical actors) in supporting these functions. Thus they specify the user's functional requirements for the information system. Use cases and realization scenarios are related to the design of the interoperability architecture explaining which actors and transactions are needed to build the complete view of interoperability. The latter leads to the selection of profiles as shown in [Figure 1](#).

Table 1: Functional Requirement Analysis Document (FRAD) Outline Components⁵

Outline Component	Definition
Use Case Name	Title given to a use case
Introduction	Description of a health problem/domain to be addressed using the means of HIT
	Overview and scope of the proposed information system (i.e., realization scenarios within the use case)
	Goal of the proposed information system
	Objectives and success criteria of the project
Actors	Business actors (people)
	Technical actors (information systems)
System Requirements	Functional and interoperability requirements
	Non-functional requirements
Systems Models	Use case/realization scenario description (workflow and data flow)
	Use case/realization scenario diagrams (UML* Diagrams)
	High-Level System Architecture with systems components (i.e., medical device to EHR communication, enterprise-wide communication (within organization), cross-enterprise communication (between organizations))
Hardware and Software Requirements	Description of the hardware and software needed to support user needs for information capture, management, sharing, and use
Testing / Evaluation Plan	Test strategy, test plan, test scenarios, test scripts, and test tools for testing information technology applications and evaluation metrics to validate that the information system meets user needs
Project Development Timeline and Documentation	Project management timeline with the specific documentation developed at each phase of the project (i.e., requirement analysis document at the requirement elicitation phase, design document at the design phase, etc.)

Table 2: Requirement Analysis Document Outline Components⁶

Use Case Name: Patient Access to Medication List		
Actors	Business actors (humans): provider, patient, pharmacy staff, etc.	
	Technical actors (information systems): EHR, pharmacy information system, health information exchange (HIE), patient mobile phone, patient portal, etc.	
Workflow Step #	Workflow Step Description	Data Collected by Workflow Step
1	Provider orders medication prescription in EHR	Patient/provider/visit demographics
2	EHR sends order to pharmacy system directly or via HIE	Medication prescription
3	Pharmacy notifies patient via mobile phone that medication is ready for dispensation	Notification of medication readiness for dispensing
4	Patient picks-up medication from the pharmacy	Acknowledgement of medication pick-up and dispensing information
5	Dispensation information is sent from pharmacy system to EHR directly or via HIE	
6	Medication list is updated in EHR system	Updated medication list
7	Patient can view the updated medication list via patient portal or mobile phone	
Entry Condition	EHR contains updated medication list	
Exit Condition	Medication list is available for viewing in the patient portal	
Timing Requirements	Within 24 hours after updating the medication	

[Table 1](#), above, presents the outline of the functional requirement analysis document developed by users as the result of the requirements analysis process.

Formal description of the workflow and dataflow is conducted in the System Model Component of the FRAD in a tabular format as well as using UML diagrams (i.e., activity diagrams). [Table 2](#), above, presents the template for the user's description of the workflow and dataflow in the use case/realization scenario using the example of Patient Access to Medication List ([Figure 1](#) and [Table 1](#) System Model Component of the FRAD).

Standards for Defining Use Cases

Similar to business cases, standardization efforts have been employed to formalize the description and modeling of use case and realization scenarios. Built from the computer science approach to document user needs during the requirement analysis process ([Tables 1](#) and [2](#)), they have been applied in healthcare as well. For example, in the United States, the FRAD outline ([Table 1](#)) and use case description template ([Table 2](#)) have been successfully used in documenting user needs in the functional requirement analysis documents of the interoperability specifications at the Health Information Technology Standards Panel (HITSP)⁷ in 2006 to 2009 for various business cases (breakthrough areas) including medication management, electronic laboratory result reporting to EHRs, transfer of care, public health surveillance, clinical research, and other (see the *Journal's* June 2017 article, Table 1). In 2010 to 2012 this approach was successfully used as well by the Public Health Reporting Initiative (PHRI), Standards and Interoperability (S&I) Framework, Office of the National Coordinator for Health IT (ONC).⁸

The AHIMA Standards Task Force is currently using these artifacts in the development of use cases/realization scenarios for the health information management (HIM) practice standards (i.e., AHIMA's Patient Registration and Copy and Paste Use Cases).

The International Organization for Standardization (ISO) Technical Committee 215 (ISO/TC215) Health Informatics (www.iso.org/committee/54960.html) is a leading international standard development organization (SDO) with over 75 member countries and liaisons representing millions of healthcare stakeholders worldwide. ISO/TC215 is working on the technical report (TR) entitled "ISO/TR 19669 Re-usable component strategy for use case development."⁹ Built from the US ONC use case approach described above, the report offers a methodology for use case development that discovers common components of use case scenarios, then establishes a component catalog for subsequent reuse and repurposing of those

components in new use case scenarios. This leads to uniformity in, and optimization of, requirement specification, standards and implementation guidance, software development, testing and certification, and, ultimately, implementation of HIT products.

For more information about the AHIMA-IHE collaboration, please contact Anna Orlova, PhD, via e-mail at anna.orlova@ahima.org.

Notes

- [1] Bourquard, Karima, Anna Orlova, and Charles Parisot. "Understanding User Needs for Interoperability: Defining Use Cases in eHealth." *Journal of AHIMA* 88, no. 6 (June 2017): 42-45.
- [2] Orlova, Anna, Karima Bourquard, and Charles Parisot. "Understanding User Needs for Interoperability: Standards for Business Cases in eHealth." *Journal of AHIMA* 88, no. 7 (July 2017): 34-37.
- [3] Bruegge, Bernd and Allen H. Dutoit. [*Object Oriented Software Engineering Using UML, Patterns, and Java*](#) (Third Edition). Upper Saddle River, NJ: Pearson Prentice Hall, 2010.
- [4] Orlova, Anna. "[Overview of Health IT Standards](#)." *Journal of AHIMA* 86, no. 3 (March 2015): 38-40.
- [5] Bruegge, Bernd and Allen H. Dutoit. *Object Oriented Software Engineering Using UML, Patterns, and Java* (Third Edition).
- [6] Ibid.
- [7] [Health Information Technology Standards Panel \(HITSP\)](#).
- [8] Office of the National Coordinator for Health IT. "Standards and Interoperability (S&I) Framework, Public Health Reporting Initiative (PHRI). Use Case: Provider-Initiated Report from EHR System to Public Health Agency System." 2012.
- [9] Office of National Coordinator for Health IT. "[S&I Simplification](#)." June 8, 2017.

Anna Orlova (anna.orlova@ahima.org) is senior director, standards at AHIMA. Karima Bourquard (karima.bourquard@in-system.eu) is engineer-consultant at IN-SYSTEM, France, director of Interoperability IHE-Europe, Belgium, and co-chair of IHE-France. Charles Parisot (charles.parisot@ge.com) is manager, standards and interoperability, at GE Healthcare, and chair, IHE-Services at IHE-Europe, Belgium.

Article citation:

Orlova, Anna; Bourquard, Karima; Parisot, Charles. "Understanding User Needs for Interoperability: Standards for Use Cases in eHealth" *Journal of AHIMA* 88, no.9 (September 2017): 40-44.

Driving the Power of Knowledge

Copyright 2022 by The American Health Information Management Association. All Rights Reserved.