

Meaningful Use and the 3M™ Healthcare Data Dictionary

Now, a few years into the HITECH Act, healthcare organizations and providers are discovering that EHRs and standard terminologies may not fully meet meaningful use needs. In fact, they can introduce new and unexpected obstacles into an EHR implementation.

Executive summary

As part of the American Recovery and Reinvestment Act (ARRA), the 2009 Health Information Technology for Economic and Clinical Health (HITECH) Act has the goal of using electronic health records (EHRs) to promote patient safety and interoperability between and within healthcare systems. The initiatives outlined in the HITECH Act are known as “**meaningful use**” (MU), which contains three key components:

1. Use of a certified EHR to meet improvement and efficiency goals
2. Electronic exchange of health information to improve outcomes
3. Electronic submission of clinical and quality measures

Over the past few years, as healthcare organizations and providers have focused intently on implementing or enhancing their EHRs and documenting MU, many began the process with the belief that their EHRs would handle all of the MU and interoperability challenges they would encounter. Other organizations assumed that implementing the necessary clinical terminology standards required for collecting and sharing patient data would also be enough to achieve their MU objectives.

Unfortunately, EHRs and standard terminologies may not fully meet an organization’s MU needs. In fact, they can introduce new and unexpected obstacles into an EHR implementation. This paper describes several challenges that healthcare organizations have encountered on their MU journey, such as: discovering that an EHR does not support a critical standard terminology; failing to collect and integrate data enterprise-wide; and realizing clinical quality measures (CQMs) cannot be accurately reported from the EHR. Fortunately, this paper also describes viable solutions available today.

3M Health Information Systems approaches EHRs, MU and standard terminologies from a unique perspective: We believe in delivering the tools and services that not only support your EHR and prepare you for MU today, but also anticipate your organization’s long-term needs. A sustainable approach to achieving and maintaining the interoperability of your clinical data from many and varied information systems means you can have what you need going forward for advanced analytics, decision support, coordination of care, business intelligence, and other data-driven processes. MU is here today and must be addressed, but other requirements and opportunities to use clinical data are on the horizon. Far-sighted preparation now will build a stronger and more extensible foundation for the future.





Introduction: The role of standard terminologies in meaningful use

Meaningful use (MU) attempts to establish a more effective means of capturing and using structured and computable healthcare data to improve management of healthcare outcomes and reduce costs. This is achieved through collecting standardized data so that it is comparable across organizations and facilities. MU aims to accomplish this goal by using standard terminologies to report on core and menu set objectives.

A standard terminology is one that has wide industry acceptance or use. Standards are derived as a result of various efforts, cover different domains of clinical and non-clinical content relevant to the electronic health record (EHR), and serve many purposes. Examples of standard terminologies include:

- **Systematized Nomenclature of Medicine–Clinical Terms (SNOMED CT®)** is a comprehensive clinical terminology. In 2003, the U.S. federal government purchased a perpetual license for the core SNOMED CT®, which is maintained by the International Health Terminology Standards Development Organisation (IHTSDO).
- **Logical Observation Identifiers Names and Codes (LOINC®)** is a terminology for describing laboratory tests, results, and clinical observations. It is developed and maintained by the Regenstrief Institute.
- **RxNorm** is a reference terminology for clinical drugs that is maintained by the National Library of Medicine (NLM) and distributed via the Unified Medical Language System (UMLS).
- **Current Procedural Terminology (CPT®)** is a proprietary standard used to encode medical services and procedures. CPT is maintained by the American Medical Association (AMA).
- Examples of classification systems that are considered standards for billing and reimbursement include the **International Classification of Diseases, 9th and 10th Editions, Clinical Modification (ICD-9-CM and ICD-10-CM)**, **ICD-10 Procedure Coding System (ICD-10-PCS)** and several different **Diagnosis Related Group (DRG)** systems.
- Standards are also developed by consensual industry effort, such as the terminology authored and distributed by **Health Level 7 (HL7)** to support the HL7 version 2.x and version 3 messaging standards.

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Many terminologies are needed to support the EHR and MU

Currently, no one terminology or classification system contains everything that is needed for the EHR, so encoding patient data for MU requires multiple standards. The **Office of the National Coordinator for Health Information Technology (ONC)** has adopted an initial set of vocabulary standards to support the proposed requirements of MU, shown in **Table 1**.

Table 1. MU standard terminologies¹

MU objective	Adopted code set
Demographics	ISO 639-1, OMB
Problem list	SNOMED CT®, ICD-9-CM*
Clinical summaries	SNOMED CT, ICD-9-CM*, LOINC®, RxNorm
View and download personal health information (PHI)	SNOMED CT, ICD-9-CM*, LOINC, RxNorm
Lab test results	LOINC, SNOMED CT

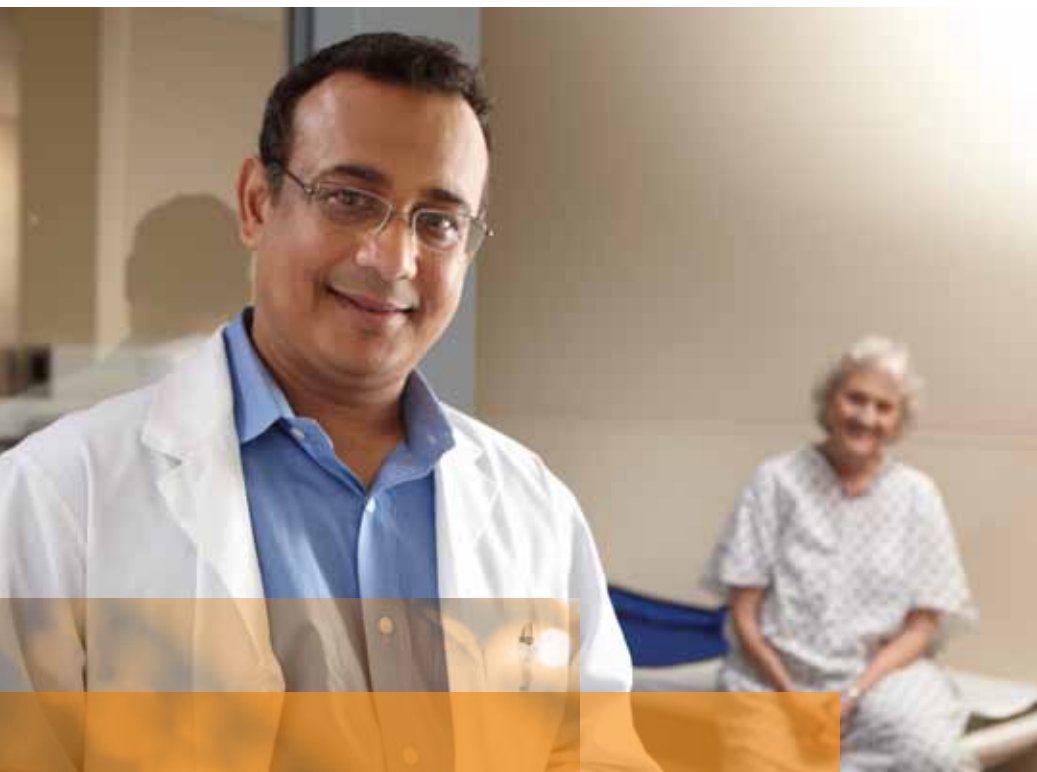
* Transition to ICD-10-CM and ICD-10-PCS

¹HITSC Implementation Workgroup, 2011.

The challenge: Implementing standards

Compliance with the MU standards creates a predicament for many organizations because the coding systems and terminologies themselves have complex characteristics, and there is no recommended, comprehensive implementation strategy to follow. The following characteristics introduce both implementation and management complexity:

- **Heterogeneity:** Standards have content that differs in areas of focus (laboratory versus pharmacy), granularity (level of detail), terminology model, structure and organization, and even digital file format (text delimited, spreadsheet, database, etc.).
- **Content changes:** Semantic “drift” or “shift” both signify a change in the meaning of a code—the identifier for a concept in a terminology. *Semantic drift* describes a change that happens gradually over time, while a *semantic shift* is a significant change in meaning at a single point in time. Moreover, codes can be re-used or deleted, and the result is encoded data that can no longer be interpreted.
- **Versions:** Standards have different formats and releases, and the changes in each subsequent version have to be reconciled with the content of previous versions, potentially impacting encoded data. At a minimum, significant effort is required to manage updates.
- **Coverage:** In many cases, a standard terminology or coding system cannot provide all the content needed to encode data in a target domain. Reasons include changing medical knowledge and events; content that is truly local in nature, such as locally compounded medications; granularity differences between the data collected and the concepts available in the terminology; immature standards, etc. Consequently, there is always data collected for which there is no standard code available or identified in the MU measures.
- **Historical compatibility:** Many EHRs and other health information systems use local and proprietary internal codes or free text to collect and store patient data that is not interoperable with newer data encoded using standard terminologies. Ironically, in some situations an organization can achieve semantic interoperability with the outside world but lack interoperability within its own legacy data and systems.



Top 10 reasons why standards are not enough

Reason	Examples
10. There is not a single standard terminology that covers all domains of health care in sufficient detail	<ul style="list-style-type: none"> • LOINC® for laboratory data mapping • HCPCs for procedure mapping • SNOMED CT® for clinical charting
9. There isn't a single standard terminology that meets all use cases	<ul style="list-style-type: none"> • ICD-9-CM does not contain medications
8. Standard terminologies are lacking in particular domains	<ul style="list-style-type: none"> • Limited standards exist for medication dosing frequency
7. Standard terminologies are too big to easily implement	<ul style="list-style-type: none"> • A SNOMED CT search for "frequency" returns over 180 terms
6. Standard terminologies are difficult to understand	<ul style="list-style-type: none"> • LOINC lab result 2823-3 is Potassium:SCNC:PT:SER/PLAS:QN:
5. Standard terminologies may be used inconsistently among different users who make different choices	<ul style="list-style-type: none"> • SNOMED CT recognizes: <ul style="list-style-type: none"> – Aspirin as a pharmaceutical product – A different aspirin as a substance
4. Standard terminologies have different architectures, formats and release schedules (versions), and they are subject to change	<ul style="list-style-type: none"> • RxNorm releases monthly full versions and weekly updates in rich release format (RRF) • SNOMED CT releases in January and July each year, currently in release format 2 (RF2)
3. Implementing and maintaining standard terminologies can be time- and resource-intensive and costly	<ul style="list-style-type: none"> • Establishing a terminology subject matter expert team with sufficient experience and expertise to manage the standards requires a large resource commitment from an organization
2. Standard terminologies do not have the local variations that may be needed	<ul style="list-style-type: none"> • Facility- or organization-specific concepts are not found in standard terminologies
1. Patient data already encoded using legacy terminologies is not interoperable with new data encoded using standard terminologies, so historical data is lost to use	<ul style="list-style-type: none"> • A diagnosis for hypertension: <ul style="list-style-type: none"> – Legacy data may represent this as HTN – SNOMED CT represents hypertension as 38341003: hypertensive disorder, systemic arterial (disorder)

The challenge: Managing local or proprietary codes

It is not uncommon for today's EHR systems to use local, vendor-specific, and proprietary internal codes or free text to collect and store patient data. These local terminologies consist of widely variable codes that have not been mapped to standard terminologies, and they also lack the framework for integrating with other health information systems. Often these types of local interface terminologies pose the types of problems shown in **Table 2**.

Much depends on how the local terminology was created, how it is maintained, and how an organization's information systems are using it. Local codes are generally stored within tables referred to as **master files**, which are referenced by applications to encode and decode data. If the codes are hard-coded into the systems, replacing the terminology requires rewriting the software.

Another layer of complexity arises when an organization begins to implement standard terminologies and then must determine how to maintain backward compatibility with data stored using a local terminology.



The challenge: Creating an implementation plan

Without an established roadmap for standards implementation, organizations must ask themselves:

- What data must be encoded using standards?
- Which standard should be used for each type of data?
- Can a link be created between local terminologies and the standards through mappings, or can the standards be used directly?
- How does the organization maintain and establish a governance policy with regard to this content?

Once these questions have been answered, each organization can then evaluate the following with regard to their implementation plan:

- **Interoperability with legacy data and systems**—Is it necessary to maintain compatibility with data previously stored using non-standard codes or with systems that produce or depend on non-standard codes?
- **Cost/effort to implement standards**—Different approaches require very different costs and effort to implement. Are the expected immediate or long-term benefits of the approach worth the additional cost?
- **Cost/effort to stay up-to-date and maintain mappings**—If the organization decides to map between local and standard terminologies, what are the maintenance requirements and how can the effort be optimized?
- **Flexibility and extensibility of approach**—Is the approach scalable, and how adaptable is it to changing requirements?

Table 2. Obstacles to managing local and proprietary terminologies

Problem	Explanation	Example
Not concept-based	Various valid and invalid terms are being used to represent the same concept	Dyspnea vs. shortness of breath vs. dispnea vs. SOB
Code removal or re-use	Codes for deleted or inactivated terms or concepts are reassigned to new terms	"1" used to mean "Magic Mouthwash," but has been changed to signify "Laxative of choice"
Lack of version control	No rigorous mechanism for versioning or standard maintenance protocols	<i>Ad hoc</i> updates
Ambiguous content	Unclear description and no formal definition	"See Below" in a specimen domain

Introducing the 3M™ Healthcare Data Dictionary solution

The 3M Healthcare Data Dictionary (HDD) is a terminology solution for implementing MU-designated standards. Not only does it integrate multiple standards and local terminologies into a single repository, but it also provides meaning and structure to the clinical content, and ontology to support queries and analytics.

Using this approach, legacy information systems can continue to collect data using local codes because the local terminology is linked to standard terminologies via concept mapping achieved with the 3M HDD. The 3M HDD content is organized to support the MU measures, linking the local content to the measures through standards and “value sets,” which are the named lists of codes specified by the MU requirements. With the 3M HDD in place, the appropriate data can be collected regardless of how it has been represented in the legacy systems. This approach has the following key advantages:

- **Interoperability with legacy data and systems**—Since a reference mapping between the local and standard terminologies is maintained, new data is interoperable with legacy data
- **Cost/effort to implement standards**—Mapping effort is centralized, providing significant economies of scale over point-to-point mapping
- **Cost/effort to stay up-to-date and maintain mappings**—Each mapping between the source and the integrated terminology can be maintained separately without impacting other mappings
- **Vendor “neutrality”**—The 3M HDD can be used across EHRs because it is not associated with any specific vendor, so organizations can move to a different EHR even in the middle of a reporting period without disruption
- **Responsive to changes in MU requirements and value sets over time**—When reporting requirements and value sets change, the 3M HDD tracks and maintains the measures and value sets, offloading the burden from the EHR and the organization
- **Flexibility and extensibility of approach**—Using the 3M HDD’s approach means:
 - Control over the integrated terminology that is referenced by internal systems
 - The ability to compensate for semantic drift or shift in terminologies
 - The ability to encode local data that does not appear or belong in the standard terminologies

How the 3M HDD meets the challenges of implementing standards

- **Heterogeneity:** Regardless of the format in which a standard is originally distributed, 3M can use processing techniques to get the code sets into a format such that they can be uploaded into the 3M HDD database and mapped to the terminology content.
- **Content changes (semantic shift and drift):** The 3M HDD content is organized as a concept-based terminology. Each concept is assigned a unique, meaningless “numeric concept identifier,” or “NCID.” The meanings and definitions of these concepts do not change over time. If a standard code happens to change its meaning (“code re-use”), 3M manages that situation by changing the mapping of the code and “moving” it to the corresponding 3M HDD concept, not by changing the meaning of the 3M HDD concept to which the code was originally mapped. Thus, data encoded as NCIDs will preserve their meaning consistently and can also be “translated” to the correct, up-to-date standard code.
- **Versions/code deletions:** Concepts are never deleted from the 3M HDD. If a standard code happens to be deleted, then 3M simply changes the status of the mapping to “inactive.” Therefore, data encoded as NCIDs preserve their meaning.
- **Coverage/lack of comprehensiveness:** If an organization requires representation of a concept that has not previously existed, it can simply and immediately be created in the 3M HDD as a new concept. Similarly, new names/descriptions and relationships of existing concepts can be created for an organization’s use.
- **Historical compatibility:** Through its mapping process, the 3M HDD allows organizations to continue using their historical/legacy codes and also remain standards-compliant.

MU example: Developing an enterprise data warehouse (EDW)

The 3M HDD can help an organization normalize data from disparate systems into an enterprise data warehouse (EDW) for more accurate and complete MU analysis.

For example, an organization may want to analyze its laboratory and medication data coming from two different EHRs, leveraging the 3M HDD to normalize this data in the EDW. First, the laboratory and medications codes from the two EHRs are mapped into the 3M HDD, and all local codes with the same meaning are mapped to the same concept in the 3M HDD. In addition, each concept in the 3M HDD is defined by both a human-readable text description and an assigned, unique, numerical identification, referred to as an “**NCID**” (“Numeric Concept Identifier”). The NCIDs act as the normalization mechanism for the data.

But the 3M HDD also organizes the concepts in a rich semantic network of relationships that can be leveraged for queries. In addition to the comprehensive domains (hierarchies, subsets,

value sets, and other linkages) managed and maintained by the 3M HDD, custom domains can be created to support an organization’s specific reports. For example, the 3M HDD maintains a domain of “statins,” one of the MU value sets. New statins are added to the domain and obsolete statins removed in regular updates. A report on all statins prescribed can be run against the NCID for statins using the domain relationships to retrieve all current statins dynamically. Without the 3M HDD, all statins would need to be enumerated in the query, and the query would have to be revised each time a new statin is added.

For convenience, an organization can choose to store NCIDs in addition to the original EHR identifiers in the EDW (**Figure 1**), but it is not mandatory. Because the local codes from the EHRs are mapped in the 3M HDD, the queries can use the 3M HDD to retrieve the local codes for searching the EDW and retrieving relevant data.

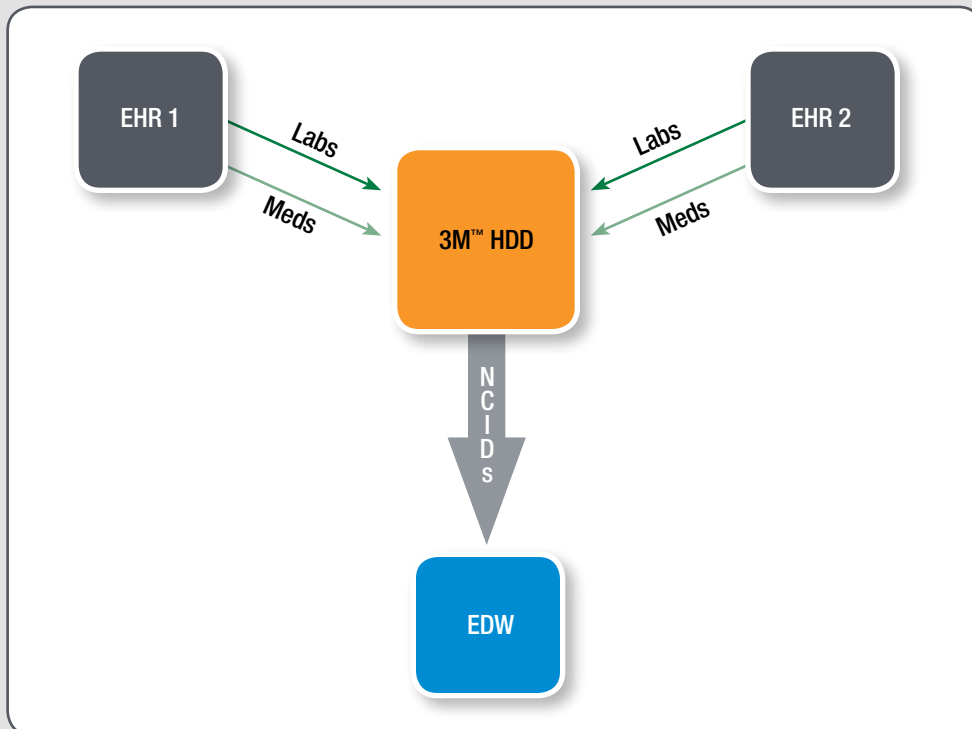
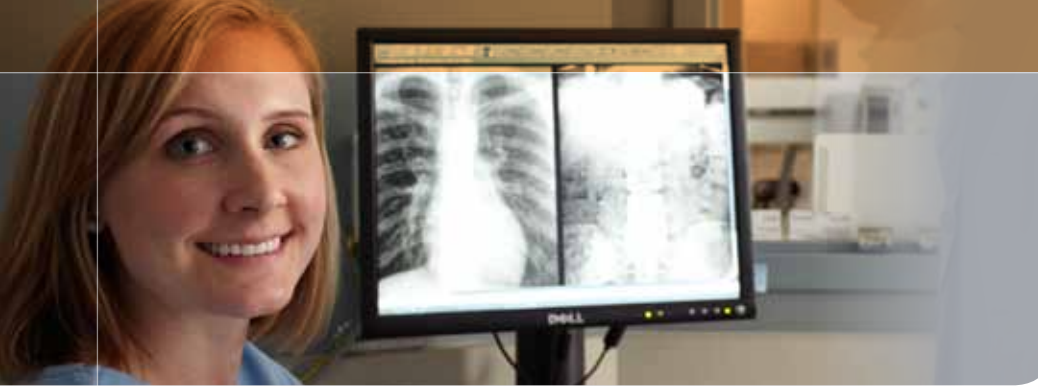


Figure 1. How the 3M HDD can facilitate an enterprise data warehouse (EDW)



The 3M HDD advantage: Stay current on the standards

The list below shows some of the current standard terminologies housed in the 3M HDD and the frequency at which they are updated by their respective organizations:

- ICD-9-CM — Annual release (effective each fiscal year) with April updates
- ICD-10-CM — Annual release
- ICD-10-PCS — Annual release
- DRG — Annual release (effective each fiscal year) with interim updates
- CPT® — Annual release (effective each calendar year) with quarterly updates
- HCPCS — Annual release (effective each calendar year) with quarterly updates
- APC — Annual release (effective each calendar year) with quarterly updates
- SNOMED CT® — Semi-annual releases, January and July
- LOINC® — Semi-annual releases
- RxNorm — Monthly releases with weekly updates

Once a release or update is available, it is immediately implemented into the 3M HDD by the **3M team of clinical content experts**.

MU example: LOINC® terminology and the laboratory domain

To meet MU requirements, an organization must be able to receive and store LOINC codes. In some cases an organization using a certified EHR has discovered that the EHR simply contains empty fields where the LOINC codes should appear.

The organization must then attempt to map their laboratory codes to the LOINC codes on their own, and there may not be time or internal resources to accomplish this task. Using the 3M HDD, 3M Health Information Systems helps clients comply with the LOINC standard. 3M not only provides the initial mappings of local laboratory codes to LOINC, but can also maintain them, so any changes coming from the client and any changes in the LOINC standards are recognized and appropriate changes to the mappings are made, as illustrated in **Figures 2 and 3** on page 9.

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The 3M HDD advantage: Reporting on clinical quality measures (CQMs)

The Centers for Medicare & Medicaid Services (CMS) states, “In order to report clinical quality measures (CQMs) from an electronic health record (EHR), electronic specifications must be developed that include the data elements, logic and definitions for that measure in a format that can be captured or stored in the EHR so that the data can be sent or shared electronically with other entities in a structured, standardized format, and unaltered.”² Data elements can be a one-coded item, such as “birth date,” or point to a value set (a list of codes).

To support the HITECH Act, the Department of Health and Human Services (HHS) tasked the National Quality Forum (NQF) to retool 113 NQF-endorsed CQMs from a paper-based format to electronic “eMeasures.” Forty-four eMeasures were included in Stage 1 of HHS’s MU EHR Incentive program.

In January 2012, the NQF released the full set of 113 retooled eMeasures. Each measure is represented in a spreadsheet

that holds the value sets for the measure. This is a mapping and maintenance nightmare. To report on all 113 eMeasures would require the maintenance of over 1,700 value sets from more than 10 terminologies (Figure 4). Maintaining these value sets consumes extensive staffing resources and is very costly for an organization.

Fortunately, the 3M HDD can assist an organization in collecting and managing CQM-related data, and also resolve the common obstacles encountered in reporting on CQMs. Table 3 (on page 10) illustrates the situations, implications and 3M HDD solutions around CQMs.

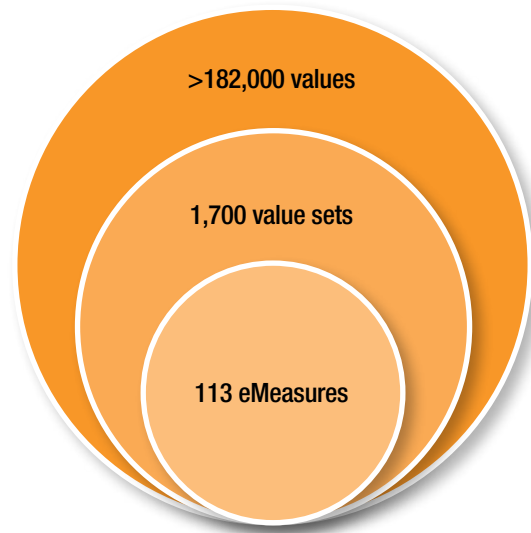


Figure 4. The implications of reporting on all 113 NQF eMeasures

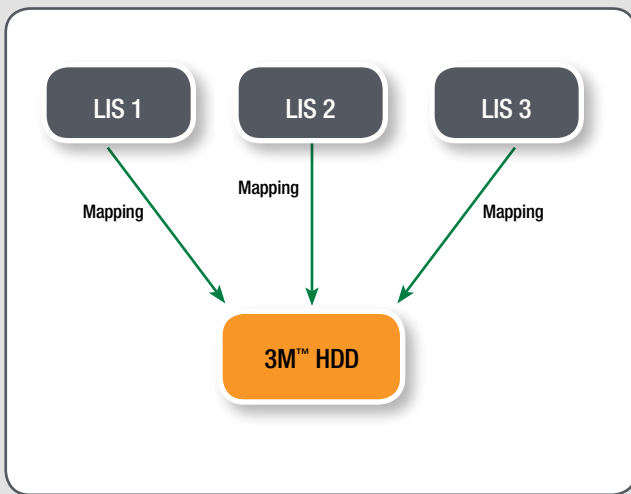


Figure 2. Mapping each laboratory information system (LIS) to the 3M HDD

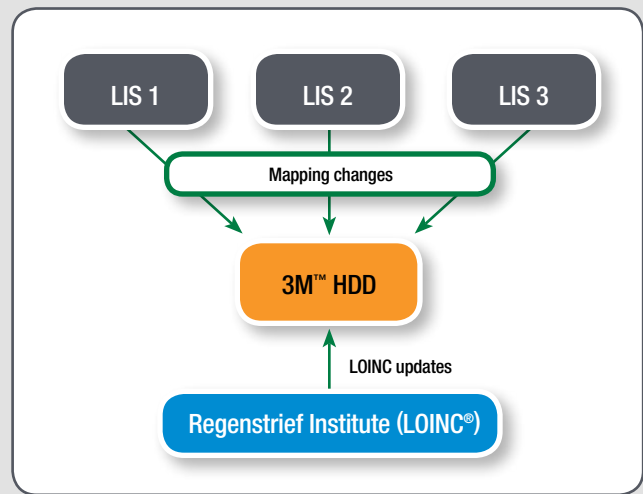


Figure 3. Terminology maintenance in the 3M HDD

²The CMS “Electronic Specifications” are described on https://www.cms.gov/QualityMeasures/03_ElectronicSpecifications.asp.

Table 3. CQM obstacles and the 3M HDD solutions

Situation	Implications	3M HDD solution
Certified EHRs “hard-wire” clinical quality measures (CQMs)	System-wide updates are required for CQM modifications	3M HDD manages and maintains all current CQM value sets, offloading the burden from the EHR
CQM value sets are static (not coordinated with releases or updates of the standard terminologies)	CQM value sets do not contain the current standard codes	3M HDD incorporates up-to-date versions of the standards and preceding versions
EHR data is inconsistently or inaccurately mapped to standards	Inaccurate reporting of CQM may result in decreased reimbursement	3M HDD can map and integrate legacy codes to standards, facilitating complete data capture
CQM value sets do not reflect emerging procedures or medications	EHR-generated CQMs can produce false negative results if new treatments or medications not represented in the static value sets are prescribed	3M HDD organizes concepts by domain, so applicable treatments and medications are dynamically included in the value sets
CQM extraction is costly and time-intensive	75 percent of the cost to implement MU occurs with CQM reporting ³	3M HDD’s centralized mapping is cost-effective and efficient

MU example: CQM terminology

Consider the value set challenge in reporting on the **Asthma Assessment (NQF 001) measure**. This measure is done “to report the percentage of patients aged five through 40 years old with a diagnosis of asthma who were evaluated during at least one office visit within 12 months for

the frequency (numeric) of daytime and nocturnal asthma symptoms.”⁴

The **Asthma Assessment Chart** below shows the value sets required to calculate this single measure. Note that a value set labeled “GROUPING” contains child

value sets from two or more standard terminologies. The chart also makes it clear that an organization needs to have eight different terminologies within their system to which they will need to map their local codes (if they are even storing them) to 387 unique values.

Asthma Assessment Chart: The data elements and terminologies used for NQF 001

Data element	Terminology	Number of values
Asthma GROUPING	SNOMED-CT®, ICD-9-CM, ICD-10-CM	87
Encounter office and outpatient consult value set	CPT®	117
Birth date	LOINC®	1
Asthma symptom assessment tool value set	SNOMED-CT	2
Asthma daytime symptoms value set	SNOMED-CT	2
Asthma nighttime symptoms value set	SNOMED-CT	3
Asthma daytime symptoms quantified value set	SNOMED-CT	5
Asthma nighttime symptoms quantified value set	SNOMED-CT	3
Gender value set	HL7	3
Race value set	CDC	8
Payer value set	Source of payment typology	156
Totals: 8 terminologies		387 values

³Paul Tang and George Hripcsak. HIT Policy Committee, Meaningful Use Workgroup, Presentation to HIT Policy Committee, Nov. 9, 2011, p 8. The 75 percent estimate is cited from the Summary Findings from an Oct. 5, 2011 Hearing on *Clinical Quality Measures (CQM)*.

⁴Description comes from the NQF 001 quality measure, which can be downloaded at: http://www.qualityforum.org/Projects/e-g/eMeasures/Electronic_Quality_Measures.aspx#t=2&e=1&s=&p=

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The right expert services can save time and money

The 3M HDD team is a seasoned group of medical informaticists and clinicians who have been working with clinical terminologies for the past 16 years. When an organization lacks internal experts or sufficient resources, the 3M HDD team can provide:

- Centralized mapping of standard and local terminologies to a single terminology solution
- Management of ongoing updates from standard terminologies as well as local additions and changes from source systems
- Assistance with using terminologies in analytics, decision support and other advanced data functions

The 3M HDD: The right tool at the right time

The 3M HDD houses a single, concept-based, integrated terminology to which all other terminologies are mapped, providing a robust, industry-tested framework for linking local, legacy codes to the MU vocabulary standards. A comprehensive and extensible ontology, instantiated as a knowledge base, organizes the content and supports the MU value sets. By creating a centralized vocabulary server as the means to integrate both standards and local terminologies, the 3M HDD provides an efficient, flexible, extensible approach to managing terminologies in the EHR.

The 3M HDD has been designed and is managed with best terminology practices in mind, so it does not suffer from the same problems as many “home-grown” terminologies. Some of the vocabulary desiderata⁵ followed by the 3M HDD include:

- **Concept orientation and non-semantic concept identifiers**
- **Concept permanence**
- **Graceful evolution**
- **Comprehensive content and formal definition**

Conclusion

The ultimate goal of MU is to improve clinical outcomes and the interoperability of the EHR. However, there is not a single universal standard or implementation plan to support MU. Hospitals and providers have an escalating need to maintain a growing amount of structured data to comply with MU requirements. It is crucial that organizations are proficient in managing, accessing, and using this data.

The 3M HDD is an essential data governance tool that:

- **Structures**—associates concepts in a semantic net
- **Normalizes**—provides a single identifier for the multiple terms and codes associated with a concept
- **Standardizes**—links local terminologies to standards through concept mapping

The 3M HDD is the data management tool that combines comprehensive terminology content, a robust database for managing and distributing the content, and an expert community to help your organization achieve the accurate and consistent terminology use essential to meeting MU measures today and the data-driven processes your organization may want—or need—tomorrow.

⁵James J. Cimino, “Desiderata for Controlled Medical Vocabularies in the Twenty-First Century,” *Methods Inf Med.* 1998; 37(4-5):394-403.



3M Health Information Systems

Best known for our market-leading coding system and ICD-10 expertise, 3M Health Information Systems delivers innovative software and consulting services designed to raise the bar for clinical documentation improvement, computer-assisted coding, mobile physician applications, case mix and quality outcomes reporting, and document management. Our robust healthcare data dictionary and terminology services also support the expansion and accuracy of your electronic health record (EHR) system.

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For more information on how our solutions can assist your organization, contact your 3M sales representative, call us toll-free at **800-367-2447**, or visit us online at **www.3Mhis.com**.

Online resources

- MU and the CMS EHR Incentive Programs – see the CMS website for many useful links: <https://www.cms.gov/EHRIncentivePrograms/>
- NQF eMeasures: http://www.qualityforum.org/Projects/e-g/eMeasures/Electronic_Quality_Measures.aspx#t=1&s=&p=&e=1
- SNOMED CT®: www.ihtsdo.org
- LOINC®: www.loinc.org
- RxNorm: <http://www.nlm.nih.gov/research/umls/rxnorm/>
- CPT®: <http://www.ama-assn.org/ama/pub/physician-resources/solutions-managing-your-practice/coding-billing-insurance/cpt.page>
- ICD-9-CM: <http://www.cdc.gov/nchs/icd/icd9cm.htm>
- ICD-10-CM: <http://www.cdc.gov/nchs/icd/icd10cm.htm>
- HL7: www.hl7.org



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