NCVHS
NATIONAL COMMITTEE ON VITAL AND HEALTH STATISTICS

November 28, 2006

The Honorable Michael O. Leavitt
Secretary
Department of Health and Human Services
200 Independence Avenue SW
Washington, D.C. 20201

Dear Secretary Leavitt:

The National Committee on Vital and Health Statistics (NCVHS) appreciates your continued support of the Consolidated Health Informatics (CHI) Initiative. This initiative has been an impressive effort to bring together experts from throughout the federal government to identify standards for the electronic exchange of health information. Over the past three fiscal years, the Department's special funding has provided rapid enhancement of CHI-recommended standards and support for ongoing updating, dissemination, and mapping of clinical vocabulary standards. To cite two examples, this funding has been critical to the Department's excellent work on the development and dissemination of the RxNorm clinical drug vocabulary, and the DailyMed Structured Product Labeling (SPL) dissemination service.

The NCVHS concurs with the CHI recommendations on the Functioning and Disability domains, which are enclosed. This recommendation letter on the final Phase II CHI report completes the role that NCVHS has played in the CHI Council acceptance process, i.e. to provide an open forum for review, and an independent assessment, of the CHI standards recommendations. The Committee plans to request periodic updates on the status of standards recommended and adopted under this process.

As recommended by the NCVHS during Phase I of CHI, the enclosed recommendations on the Functioning and Disability domains also address standards for patient/client assessment instruments that contain functioning and disability content. The NCVHS concurs with these recommendations and recommends approval of these CHI standards by the Secretary, formal government adoption, and federal support for US-wide use and dissemination of the International Classification of Functioning, Disability, and Health (ICF) in the National Library of Medicine's Unified Medical Language System (UMLS). Other standards included in these recommendations are SNOMED-CT, LOINC and Health Level Seven messaging and Clinical Document Architecture, which previously were recommended for other CHI domains.

We believe there are many opportunities in the federal health enterprise that would benefit from the implementation of these standards. Therefore, we support the recommendations under "future considerations" on the importance of advancing a use case through the American Health Information Community (AHIC) and the Healthcare Information Technology Standards Panel (HITSP) that includes the functioning and disability domains and associated assessment instruments.

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Implementation of the standards in this report are critical to interoperable data collection and exchange for chronic care, long-term care, patient assessment, and health, functioning, and disability outcomes. However, at this time these priority areas are not well-represented in the national standards portfolio. This could be accomplished through a separate use case or incorporation into use cases for chronic care, problem lists or electronic health records.

We recommend the Department's continued use of the collective CHI reports as the foundation for moving standards forward through the AHIC and HITSP. We also strongly recommend that the Department continue to maintain a central fund for high priority standards support and enhancement tasks. As the work of AHIC and HITSP drives broader implementation in real world settings, new requirements for expansion and improvement of key standards will inevitably emerge. The ability to quickly allocate resources to address such needs will sustain the forward momentum toward interoperable electronic health records.

Sincerely,
/s/
Simon Cohn, M.D., M.P.H.
Chairman, National Committee on Vital
and Health Statistics

Cc: HHS Data Council Co-chairs
Robert Kolodner, M.D.

Enclosure

Consolidated Health Informatics

Standards Adoption Recommendation

Functioning and Disability

Index

1. **Part I – Sub-team & Domain Scope Identification** – Basic information defining the team and the scope of its investigation.

2. **Part II – Standards Adoption Recommendation** – Team-based advice on standard to adopt.

3. **Part III – Adoption & Deployment Information** – Supporting information gathered to assist with deployment of the standard (may be partial).

Summary

Domain: Functioning and Disability Content including Patient/Client Assessments that include Functioning and Disability Content

Standards Adoption Conditional Recommendation:

1. Clinical LOINC® representation of federally-required assessment (i) questions and answers, and (ii) assessment forms that include functioning and disability content as a CHI standard;

2. CHI Endorsed Vocabulary Content:
(a) International Classification of Functioning, Disability and Health (ICF) as a CHI-endorsed standard for the functioning and disability domains;

(b) CHI-endorsed vocabulary for exact and "usefully related" content matches with federally-required patient/client assessments and other functioning and disability content.

Both ICF and SNOMED CT® were found to provide exact and "usefully related" vocabulary for the functioning and disability domains. (SNOMED CT® already is a CHI-endorsed vocabulary for several clinical domains)

3. HL7® (Health Level Seven® (HL7®), Version 2.4 and higher) messaging and Clinical Document Architecture (CDA) to exchange patient and client assessments and other standardized functioning and disability content.

SCOPE

The scope of this report is to define requirements for "exchanging" and re-using standardized federally-required patient/client assessments and other standardized disability and functioning content across the federal health enterprise.

RECOMMENDATION PROCESS[i]

The recommendations being advanced are based, in part, on the following work::

- A project funded by the Department of Health and Human Services entitled "Making the Minimum Data Set Compliant with Health Information Technology Standards." For more information about this report, please see (http://aspe.hhs.gov/daltcp/reports/MDSprjsum.htm);
- SSA analysis of functioning and disability concepts across the federal government;
- SSA and NCHS analysis of the relationships between ICF and SNOMED-CT; and
- Regenstrief standardizing the format and content of the SSA Residual Functional Capacity forms in LOINC format.

OWNERSHIP

LOINC® - The Regenstrief Institute, Inc. owns LOINC®.

SNOMED CT® - SNOMED CT® is a copyrighted work of the College of American Pathologists (CAP). www.snomed.org

ICF – The World Health Organization (WHO) holds the copyright to the ICF (2001). The full title is: *International Classification of Functioning, Disability and Health: ICF* (ISBN 92 4 154542 9). A free Internet Browser version exists. The ICF website is: http://www3.who.int/icf/icftemplate.cfm?

Health Level Seven® holds the copyright to HL7®. www.hl7.org

APPROVALS AND ACCREDITATIONS

LOINC® was approved by full standard development organization vote by HL7® v2.4 as a coding system for observation identifiers.

SNOMED CT® Healthcare Terminology Structure is American National Standards Institute **(**ANSI) approved. The College of American Pathologists (CAP) is an ANSI Standards Development Organization.

ICF – The ICF was approved for worldwide use by the WHO's 54th World Health Assembly in May, 2001. Its predecessor, the *International Classification of Impairments, Disabilities, and Handicaps* (ICIDH, 1980), had been approved for use by the 29th World Health Assembly in May, 1976. In its July, 2001 *Report to the Secretary on Classifying and Reporting Functional Status*, the National Committee on Vital and Health Statistics wrote, "The Committee believes that the ICF should be evaluated for use in coding functional status information in both electronic patient records and administrative data. . . . In the Committee's view, the ICF is the only existing classification system that could be used to code functional status across the age span" (page 13). Equally important to its role as a classification, is its role as a conceptual framework, embraced by both the research and disability communities, for surveys, assessment tools, research and interdisciplinary communication and information exchange.

HL7® – HL7® is an ANSI-accredited Standards Developing Organization. This standard has been approved by full organizational ballot voting.

Reports on the previously endorsed CHI-endorsed standards are located at: http://www.hhs.gov/healthit/chiinitiative.html.

ACQUISITION AND COST

LOINC® database and associated documents and programs are copyrighted, but the copyright permits all commercial and non-commercial uses in perpetuity at no cost. If the LOINC®® database or its contents are distributed as a database, such distributions must include all of the parts of the formal LOINC® term, the LOINC® short name, the LOINC® code, the deprecated flag, and the copyright. No such notice is required when LOINC® codes are used in messages to report test results. The LOINC® database can be obtained at no cost from the Regenstrief LOINC® website (http://www.regenstrief.org/loinc). The website makes available a User's Guide, the free RELMA (Regenstrief Logical Mapping Assistant) program, and the RELMA User's Manual. RELMA is a program for browsing the LOINC database for mapping local test codes to LOINC® codes. RELMA now includes the federally required MDS assessment form represented in a LOINC® format and coded in LOINC®.

SNOMED CT® is available through the National Library of Medicine (NLM). The CAP and the NLM entered into an agreement to provide SNOMED CT® core content (English and Spanish language editions) via the UMLS® at no charge to those who execute a license agreement. This agreement is for healthcare applications and uses within the US and any application of use of SNOMED CT® by any US government facility or office, whether permanent or temporary, wherever located. Health care entities can also choose to purchase SNOMED CT® as a stand-alone terminology directly from SNOMED® International at (http://www.snomed.org)

ICF is a copyrighted classification product of the WHO. Extracts of WHO publications can be used for private study and educational purposes without copyright permission, but wider use of ICF codes in a product to be sold or licensed requires WHO permission. WHO also licenses its published material widely, in order to encourage maximum use and dissemination. Commercial and non-commercial licenses are available. In its licensure application, WHO solicits information from the prospective licensee about potential pricing, number of users, Internet distribution strategies, and about the "added value" that the proposed licensed product would offer to users of ICF.

Licensing information and application forms are available at this WHO website:
http://www.who.int/about/licensing/en/index.html
If and when large scale governmental uses for ICF are identified, beyond current research, education and development uses, the WHO Collaborating Centre for the Family of International Classifications for North America, housed at the National Center for Health Statistics, CDC, would pursue the possibilities for a government-wide license.

HL7® Standards are available from HL7®. HL7® asserts and retains copyright in all works contributed by members and non-members relating to all versions of the Health Level Seven® standards and related materials, unless other arrangements are specifically agreed upon in writing. No use restrictions are applied. HL7® sells hard and computer readable forms of the various standard versions, which cost from $50 - $500 depending on specific standard and member status.

Part I – Team & Domain Scope Identification

Target Vocabulary Domain

Common name used to describe the clinical/medical domain or messaging standard requirement that has been examined.

Patient/Client Assessment Instruments that include Functioning and Disability Content and other Functioning and Disability Content

Describe the specific purpose/primary use of this standard in the federal health care sector (100 words or less)

To support implementation of a nationwide interoperable HIT infrastructure, federally-required patient/client assessment and other functioning and disability content must be "exchanged" and "re-used" by providers and the federal government in a standardized way. This recommendation supports HIT interoperability by: placing patient/client assessment questions and answers into a LOINC®-coded representation; linking assessment questions and answers with "usefully-related" and exact and synonymous matches to CHI-endorsed vocabulary terms; and using HL7 messages to transmit the patient/client assessment and other functioning and disability content. Endorsing ICF as a CHI standard for the functioning and disability content facilitates (i) inclusion of ICF into the UMLS, (ii) mapping between ICF and SNOMED, (iii) expanding the coded disability content available for use, and (iv) making ICF available for use by the federal partners in standardizing patient assessments and other functioning and disability content. Linking patient/client assessment instruments with HIT content and messaging standards removes known barriers to interoperability.

Sub-domains *Identify/dissect the domain into sub-domains, if any. For each, indicate if standards recommendations are or are not included in the scope of this recommendation.*

Domain/Sub-domain	In-Scope (Y/N)
Functioning and Disability Content	Y
Patient/Client Assessment Forms that include disability and functioning content	Y

Information Exchange Requirements (IERs): *Using the table at **Appendix A**, list the IERs involved when using this vocabulary.*

Beneficiary Financial / Demographic Data
Beneficiary Tracking Information
Body of Health Services Knowledge
Care Management Information

Case Management Information
Clinical Guidelines
Cost Accounting Information
Customer Demographic Data
Customer Healthcare Data
Customer Risk Factors
Encounter (Administrative) Data
Population Member Health Data
Population Risk Reduction Plan
Provider Demographics
Provider Metrics
Referral Information
Tailored Education Information

Team Members T*eam members' names and agency names.*

Name	Agency/Department
Jennie Harvell (Co-Chair)	HHS / ASPE
Laurence Desi Sr., MD, MPH (Co-Chair)	SSA
Marjorie Greenberg	HHS/CDC/NCHS
Jay Mariani	DOL
Macaire Carroll-Gavula	DOL
Subramaniam Srinivasan, MD	DOS
Ermie Herring	DOS
Samuel Shipley	HHS/ASPE
John Hough	HHS/CDC/NCHS
Mary Pratt, RN	HHS/CMS
Latousha Leslie	HHS/CMS
Cheryl Ford	HHS/CMS
Bob Connelly	HHS/CMS
Kim Campbell	HHS/CMS
Bruce Finke	HHS/IHS
John Bogner	RRB
Philip Arnold	RRB
Derek Wang	SSA
Sheila Spain	SSA
Bob Hastings	SSA
Steve Duffy	SSA
Lisa Lockwood	SSA
Li-Ming Koo	SSA
Lenora Barnes	VHA

Lois Hall	VHA
Gregg Seppala	VHA
Tom Pamperin	VBA
Vicki Milton, MD	VBA
Nancy Orvis	DoD
Phil Mahlum	MITRE/DHS
Elizabeth Halley	MITRE

Work Period *Dates work began/ended.*

Start	End
July 2005	September 2006

Part II – Standards Adoption Recommendation

Recommendation *Identify the solution recommended.*

Part 1. - Clinical LOINC® representation of federally-required assessment (i) questions and answers, and (ii) assessment forms that include functioning and disability content as a CHI standard

Part 2. - CHI Endorsed Vocabulary Content: for exact and usefully related matches for patient assessment and other disability and functioning concepts including:

(a) **International Classification of Functioning, Disability and Health (ICF**) as a CHI-endorsed standard for the functioning and disability domains;

(b) CHI-endorsed vocabulary for exact and "usefully related" content matches with federally-required patient/client assessments and other functioning and disability content.

Both ICF and SNOMED CT® were found to provide exact and "usefully related" vocabulary for the functioning and disability domains. (**SNOMED CT®** already is a CHI-endorsed vocabulary for several clinical domains)

Part 3. - HL7® messaging: use HL7® Version 2.4 and higher and Clinical Document Architecture (CDA) to exchange patient and client assessments and other functioning and disability content

This recommendation has three parts and encompasses storage of federally required health data.

Part 1 – Clinical LOINC® representation of assessments as a CHI standard.

LOINC® is a database in the public domain maintained by the Regenstrief Institute, with support by or under contract with the National Library of (NLM) in HHS. It includes almost 40,000 coded concepts. LOINC's® original focus was on laboratory results. In 2001, the LOINC® framework was extended to support the codification of nursing instruments (e.g., by adding the text of the questions and the source of the question within existing instruments). [ii iii iv] Several organizations have submitted their nursing surveys for inclusion in and encoding by LOINC® (e.g., the Home Health Care Classification Survey, OMAHA Survey, etc.). Renamed Clinical LOINC® to reflect its expanded focus, the modified framework now supports the coding of assessment instruments, including disability and functioning with applicability for other and health status assessments.

Representing assessment instruments in a LOINC® format:

- Retains the critical link between question and answer;
- Enables exchange of assessment content using HL7® messages;
- Permits coded (CHI endorsed) content to be linked with coded questions and

answers; and
- Promotes comparability of questions and answers across instruments through item banking (i.e., the inclusion of LOINC® coded questions and answers in a repository).

Clinical LOINC® was previously endorsed by CHI as the standard for lab content.

Part 2 (A) – International Classification of Functioning, Disability and Health (ICF) as a CHI endorsed standard for the functioning and disability domains

Both ICF and SNOMED CT® were found to provide exact and "usefully related" vocabulary for the functioning and disability domains. (SNOMED CT® already is a CHI-endorsed vocabulary for several clinical domains.) In some cases, the higher level hierarchical structure that is the foundation of the ICF classification model more frequently matched the concepts that were represented in the assessment tool. On the other hand, SNOMED CT® contained terms at a more granular level that sometimes did not fully represent concepts included in the assessment instrument. If data are coming directly from a provider's electronic health records, then the information may already be coded in SNOMED CT®. This would require mapping SNOMED CT® to ICF codes for use of ICF.

Part 2 (B) – CHI endorsed vocabularies for exact and "usefully related" content.

- Initially we attempted to identify 'exact' or 'partial' matches between assessment content and standardized vocabularies. However, at times this type of matching was unsuccessful given: 1) the complexities of assessment instruments' questions and answers, 2) limits in granularity of standard vocabularies, and 3) limited definitions regarding the ability to reproducibly post-coordinate standardized matching terms.

Therefore, this study expanded its matching parameters to include those standardized vocabulary matches that were (i) exact matches or (ii) 'usefully related' matches to the concepts on the assessment. Exact matches were those that were either equivalent or considered to be synonymous to the assessment item. Usefully-related matches were broadly defined as those standardized vocabulary terms that are identified by Subject Matter Experts or the developer of the form (e.g., CMS) that would be "useful" for various purposes (e.g., for clinician filling out the MDS form or identifying and developing needed care plan, identified by the payer as being related for payment purposes, etc.), but are not "exact" matches for all of the nuances of the assessment item. Approximately, 92% of MDS phrases were identified as having one or more "usefully related" controlled vocabulary matching terms, and almost 50% of these were considered to be exact matches.

Identifying "usefully related" standardized vocabulary matches (such as SNOMED CT® and ICF) to LOINC®-represented assessment items:

- Permits data re-use within and across health care enterprises;
- Permits standardized information exchange including the use of HIT standard messaging and the exchange of single exact semantic matches per answer for the results for an individual patient/client.

- Permits a variety of data analyses, including analyses of the relationships between data elements that would encourage comparability of data elements;
- Enables quality and continuity of care improvements;
- Enables efficiency gains;
- Supports development of standardized HIT products by HIT vendors that supply products to providers who are required to complete assessments (including clinical decision support applications); and
- Permits implementation of previously and newly endorsed CHI content standards.

Web-based collaborative matching In standardizing one of federally-required patient assessment tool, a web-based collaborative matching tool was used. Such tools create an efficient process by which numerous and often remote reviewers can consider whether possible CHI content matches are "usefully-related" to the assessment content.

Using a Web-accessible terminology server is an efficient method presenting to remote users' federally-required assessment content that has been linked with CHI-endorsed vocabularies. Often multiple users, sometimes in remote locations, will be needed to assess the adequacy of standardized vocabulary matches to assessment content. A Web-accessible terminology server permits remote users with little training to link lists of user-specified assessment terms to terms in CHI and other terminologies. Users can quickly access the server by, for example, installing a "plug-in" to the user's copy of the appropriate Microsoft Office application. A Web-based server enables users to control all aspects of the matching, browsing and linking process, and all data – except the CHI Standard terminologies - resides on the user's computer. After matching, identified standardized matching terms would also reside on the users' computers.

Option 1 Connect Users and the User-formatted Assessments to CHI Vocabularies

Under this option users and their user-supplied and formatted assessment content (i.e., appearing in Microsoft Office applications, such as Excel) would be connected to CHI standard terms using the Web.

Option 2 Connect Users and third party formatted Assessments to CHI Vocabularies

Under this option, assessment content would be placed by a third party into a hierarchical format that facilitates matching to standardized vocabularies and this representation would be linked to CHI terminologies using Web-based collaborative tools.

Placing assessment content into a format supported by Clinical LOINC® is one third party representation of assessment content.

Both Options 1 and 2 can be supported by a variety of Web-based services to facilitate matching patient/client assessment content with CHI-endorsed standards. For example: a Web-accessible terminology server containing the CHI terminologies can be hosted either by a third party or the user. If hosted by a skilled third party, the third party can identify

initial CHI content matches and facilitate the identification/refinement of additional matches Third party formatted assessments (such as LOINC®-formatted assessments) can be loaded on to the server and then linked to the CHI standard terminologies. In addition, some Web-based services provide various "subscription" updates of customer-specified terminologies and reports identifying customer links that might be affected by the update, collaborative editing and review of inter-terminology links, etc.

Third party web-based services described above are presently available for a fee in the private sector and used by the Federal Government.

The work to standardize the MDS used Option 2. In standardizing the MDS, Web-based services were provided by Apelon and included (i) an Apelon representation of the MDS and (ii) a LOINC® representation of the MDS (the LOINC® representation of the MDS was led by Dr. Tom White and the Clinical LOINC® Committee); and (iii) matching to standardized vocabularies and hosting collaborative Web sites by Apelon.

Licensing terms for Apelon can be inspected at
http://www.apelon.com/products/dts/dts%20collaboration%20license.htm

Web-services-based terminology mapping tools have been used by Government agencies including the Veterans Health Administration (VHA), the National Library of Medicine (NLM), the Office of the Assistant Secretary for Planning and Evaluation (ASPE), Centers for Medicare and Medicaid Services (CMS) and the Office of the National Coordinator for Health Information Technology (ONC), as well as in education and research activities by universities and academic consortia, and by private enterprises from the pharmaceutical and health information technology sectors.

Although a precise percentage is impossible to specify, the use of the Internet and Internet-based tools to enable collaborative development and new interconnection of complex intellectual work product is growing rapidly. The Government has successfully deployed Web-based collaborative tools to standardize health-related data in a number of agencies including the National Cancer Institute (caBIG) and the Centers for Disease Control (PHIN). The Internet-based "Software As A Service" business model is being explored and deployed throughout the public and private health care sector. A consideration noted by the CMS Office of Clinical Standards and Quality (OCSQ), Quality Measurement and Health Assessment Group (QMHAG), is that the initial MDS efforts associated with the web based matching tools was time intensive and provided limited results and thus is not ready for full implementation without additional analysis.

Healthcare providers are increasingly focusing on the interconnectedness of patient health data, and are joining health information exchange networks and other data-sharing collaboratives at an unprecedented rate. As these efforts mature, Web-based collaboration on data interoperability will increase exponentially. The Federal Government has led the way in this arena, such as with the Health Information Exchange program joining data from the VA and the Department of Defense (DoD). To date, this effort has focused on using

HL7® messaging to exchange needed health information.

Most federal agencies are incorporating Web-based tools into their processes. Many HHS agencies including the NLM, Centers for Disease Control (CDC) and the National Cancer Institute (NCI) have deployed Internet-based data standardization efforts. The VHA and DoD are sharing standardized data via the Internet. Outside the health sector, the Federal Aviation Administration recently began work on a standardized data dictionary or thesaurus to support its mission.

Hong Kong Hospital Authority, Australia's National E-health Transition Authority (NEHTA) and Canada's Health Infoway have used Web-based tools and processes to further data standardization in their own countries. The mammoth effort to computerize hospital records in the United Kingdom involves a number of Internet-based processes as well.

Creating a knowledge-base in the UMLS to (i) represent the information on assessment forms that is constant (i.e., the questions and answer options) and (ii) links this constant information with usefully-related vocabulary content will enable HIT vendors, payers, and other interested parties to conveniently retrieve and use the usefully related matches. Representing in the UMLS the: (A) (i) questions and (ii) answer lists that have been (B) linked with exact and usefully related semantic matches will:

- enable HIT vendors and others to have access to and use terms that have been identified as "usefully-related" to individual assessment questions and answers. Making available "usefully-related" terms that have been linked to assessment questions and answers will permit HIT vendors to integrate standardized semantic terms into their products (such as clinical decision support tools) and to re-use data that is captured by these tools when completing federally required assessments; and
- permit analyses of semantic terms within a single instrument and across instruments. For example, such analyses could promote data comparability and compatibility by examining the relationship of terms for clinical domains that are similar across instruments and/or examining the relationship of related coded terms across vocabularies/classifications (e.g., SNOMED CT® and ICF, etc.).

Part 3 – Using HL7® v.2.4 and higher and CDA to exchange (i) assessment content that has been represented and coded in LOINC®, and (ii) exact or synonymous semantic content matches identified for each assessment answer that applies to a specific patient/client.

HL7®v2+ and CDA are previously endorsed CHI messaging standards. The HL7® standard serves as a "wrapper" for computer-based data sharing. HL7®v2 messaging and CDA standards presently connect a wide range of computer systems in a variety of healthcare settings.
Representing assessment forms and questions and answers in LOINC® and linking the LOINC® coded answers with exact or synonymous semantic vocabulary matches enables

the creation and transmission of HL7v2® messages and CDA with coded or text content. The recommended HL7® messages (CDA) support the transmission of (i) discreet question/answer pairs within the assessment; and (ii) the entire assessment form.

The HL7® message segments being recommended for the exchange of assessments and assessment data are the:

- OBX3 and OBX5 message segments to exchange selected question and answer pairs; and
- OBR4 message segment to exchange the entire instrument.

HL7®v2.4+ messaging can support the exchange of LOINC® coded assessments linked with exact or synonymous CHI-endorsed content for each assessment answer (result) that applies to a specific patient/client. Using HL7®v2.4+ to transmit LOINC®-coded assessment forms and question/answer pairs, and standardized patient/client assessment results provides a straightforward HIT-enabled path that permits the standardized exchange of assessment forms, question and answer pairs, and assessment results. Such standardization, along with the UMLS representation of usefully-related semantic content (linked with assessment questions and answers) will enable computer-based reuse of content.

These HL7® v2.4+ messaging segments and CDA minimize the demand on the IT infrastructure on the developers of assessment forms who presently require the electronic transmission of non-standardized assessments. For example, the HL7® message segments will include the assessment item code specified by the form developer as well as the LOINC® code (for the question) and the exact or synonymous semantic matching code (for the answer). The government's analytic capacity would be enhanced and accelerated if the government embeds the LOINC® representation of assessments in databases created for assessment instruments. For example, applying these HIT standards to software, that in some instances is freely distributed and required by the government, would remove known barriers to and accelerate the adoption and implementation of interoperable HIT products by providers, and could support CMS's ability to examine relationships between questions and answers within and across assessment instruments.

The following three scenarios illustrate information exchange requirements. The recommended exchange standards are listed after each scenario.

Scenario #1: <u>Part A:</u> Exchange of information between providers required to complete the assessment instrument (e.g., transmission of the Minimum Data Set (MDS) Instrument by nursing homes) and the Federal Government.
Recommended exchange standard: Use Clinical LOINC® to represent the structure and content of the MDS, use CHI-endorsed vocabularies (e.g., SNOMED CT® for

nursing content) to represent standardized values (answers) to the variables reported in the MDS, and use HL7®v2.4 messages to exchange all or parts of (i) the LOINC® represented MDS assessment form and question/answer pairs and (ii) the exact or synonymous semantic matches that have linked with the answers for each specific patient. Specifically, use the HL7® OBR-4 field in the OBR message segment to exchange the identity of the entire instrument (as a LOINC code)and use a series of HL7® OBX segments to exchange the question and the answer pairs that constitute a completed MDS form. The question will be carried in OBX-3 (observation ID) field represented by its LOINC code and CMS's native code for that question. The answer will be carried in the OBX-5 field and represented by its CMS native code as well a standardized code (e.g. SNOMED) code for that answer.

The following is a sample message:

Message that will transmit the MDS questionnaire ID and the questions and answers that constitute the completed form. In this example, for simplicity sake, we show only two question and answer pairs (two OBX segments) related to the ability to make decisions. A fully completed MDS form would have well over hundred such question answer pairs and corresponding number of OBX segments.

MSH|^~\&| * Message header information –details left out to for simplicity sake *

PID| * (Patient registration information- details left out for simplicity sake*

OBR||||45962-8^MINIMUM DATA SET FOR NURSING HOME RESIDENT ASSESSMENT AND
CARE SCREEN^LN| *

OBX||CE|45490-0^MAKES DECISIONS REGARDING TASKS OF DAILY LIFE^LN^B4^Ability to make decisions regarding daily life^MDS||2^MODERATELY IMPAIRED-decisions poor, cues/supervision required^MDS^F-90157^Difficulty using decision-making strategies (finding)^SNM| *

OBX||CE|45428-0^STAYS UP LATE AT NIGHT^LN^AC1a^Customary Routine: Staysup late at night (e.g. after 9 pm)^MDS||1^Yes^MDS^R-0038D^Yes (qualifier value)^SNM| *

These two OBX segments would be followed by a whole series of OBX segments, one for each Question and answer pair completed on the MDS form.

Scenario #1:
Part B:
Make available to vendors, providers, government, and researchers a knowledge base in the UMLS (Metathesaurus) that:

a. represents the information on an assessment form that is constant (i.e., the

questions and answer options), and b. links this constant information with usefully-related and exact matching vocabulary content. The knowledge-base will: a. support an evolving list of usefully related terms (e.g., the addition of new terms added, old terms may be retired, etc.); b. have a strategy for grouping usefully related terms (i.e., a semantic hierarchy); c. permit analyses of semantic terms within and across assessments instruments represented in UMLS knowledge base; and d. permit vendors, payers, and other interested parties to conveniently retrieve and use the usefully related semantic matches (e.g., in the development of standardized HIT products).
Rationale: (i) Linking standard vocabularies, when possible, identified via Web-based collaborative tools; (ii) using Clinical LOINC® to represent assessment question and answer pairs; (iii) creating a knowledge base in the UMLS of usefully-related and exact matching standardized terms that have been linked with LOINC® represented assessments; and (iv) using HL7®v.2.4+ to exchange assessment information (including exact or synonymous semantic codes for answers): (a) are actionable and efficient means of integrating patient/client assessment instruments (such as the MDS) into a nationwide interoperable health information infrastructure, (b) enables standardized information exchange and re-use of content; (c) supports quality of care improvements; (d) enables efficiency gains; (e) provides a method to standardized assessments and their exchange that can be immediately applied to existing instruments and as assessment instruments are modified or created; and (f) is a strategy that minimizes the burden on the government while making available information to the private sector to support the deployment and implementation of interoperable HIT products.
Scenario #2: Exchange of information between claimants required to complete disability forms (e.g., transmission of the Residual Functional Capacity (RFC) Form) and the Federal Government (e.g., Social Security Administration (SSA)). The Social Security Administration (SSA) processes over two million disability claims each year, including both Social Security Disability Insurance (SSDI – funded by payroll taxes) and Supplemental Security Income (SSI – funded from general revenue funds). Both types of claims are processed in nearly the same way. An application is taken by an SSA representative, either in person at an SSA field office, over the phone, or by using the internet. Then the claim is usually forwarded to the Disability Determination Services (DDS) in the State where the applicant resides. DDS examiners are responsible for collecting additional, relevant information (including medical records) to enable a decision regarding whether the applicant is disabled within the meaning of the SSA statute. Many times, this process will include an assessment of the

claimant's residual functional capacity that is, an assessment of what work activities a claimant can perform despite his/her medically determinable impairment. This assessment may be made by the claimant's treating physician or, if that is not possible, by an SSA physician.

Purpose

- For those claimants who do not "meet" or "equal" the listed impairments for an allowance (of disability), the RFC form (or the MRFC in case of mental impairments) provides adjudicators (in this case, a DDS claims examiner) with the claimant's physical (mental) abilities in spite of the impairments.
- Although there are also issues of medical substantiation, these will not be considered in this use case.

Actors:

- Disability Determination Services (DDS) claims examiner
- Claimant's treating source (TS)
- SSA consultative examiner (CE)
- SSA medical consultant (MC)

Process

- The DDS claims examiner sends the RFC form to the claimant's TS (if one is available) for completion
  - TS completes and returns RFC form to DDS examiner
  - DDS examiner, usually in conjunction with an MC, substantiates the validity of the RFC (based upon the case file)
  - DDS examiner matches the RFC with the claimant's previous work history to assess a denial; if not a denial,
  - DDS examiner matches the RFC to medical-vocational guidelines to determine allowance or denial.
- If there is insufficient medical evidence in the case record (MER) to properly adjudicate a case,
  - DDS examiner sends claimant for evaluation by TS or CE
  - TS or CE completes RFC and returns form to DDS examiner
  - DDS examiner evaluates claim using above-described process
- If there is sufficient medical evidence in the MER to adjudicate the case, but the TS does not complete the RFC
  - DDS examiner consults with MC who completes RFC form and returns it to the DDS examiner
  - DDS examiner evaluates claim using above-referenced process.

Recommended exchange standards: LOINC® for coding the RFC Form questions and

International Classification of Functioning, Disability and Health (ICF) and SNOMED CT® for coding the RFC Disability Concepts.

Rationale:

- Select RFC form categories and items were identified and mapped to ICF and SNOMED CT®
  - There were many usefully related matches found for both ICF and SNOMED CT®
  - There were gaps identified
  - There were 1-to-1, and one-to-many relationships found for ICF and SNOMED CT® content matches and mappings.
  - Detail spreadsheets illustrating the work is found in ***Appendix B***
- Select sample RFC form questions were reviewed and coded by Regenstrief Institute to support the capability of LOINC® to represent the Assessment Form Questions.
  - In order to further illustrate (in addition to MDS example) the capability of LOINC® to codify Assessment Form questions
  - LOINC® codes were assigned to RFC form sample questions
  - Detail results illustrating the LOINC® work is found in ***Appendix C***
- Mapping RFC concepts to both ICF and SNOMED CT® terminologies, found that ICF was more useful because of its higher level hierarchical structure that more readily reflects the concepts captured in the RFC. Usefully related terms also can be found in SNOMED CT®, but often at a more granular level than needed or with multiple possible meanings. However, if data are coming directly from a provider's electronic health records, then the information may already be coded in SNOMED CT®; these data possibly could be used directly by SSA or mapped to ICF. The example of the SSA exchanging or reporting information using ICF illustrates the need to conduct a full mapping exercise between SNOMED CT® and ICF through the UMLS.

Federal Concepts for Disability Vocabulary

Additional work to review federal disability concepts was done by the CHI Work Group led by SSA. The rationale for reviewing federal disability forms and concepts was that such information would be helpful to the CHI Disability Work Group (DWG) in recommending a disability vocabulary standard(s), as well as, the implementation of such standard(s).

In order to identify and review disability concepts across the federal agencies, questionnaire surveys were sent to member agencies of the DWG. These included RRB, NCHS, DOS, CMS, DOL, VBA, and SSA. The purpose of the questionnaire was to find out what types of functioning and disability information federal agencies collect; as well as, how they collect and use this information.

The SSA RFC form for physical impairments and the similar form for mental

impairments were used as the basic framework for the items related to collecting clinical information. Additional information collected included Information Sources, Information Collection (manual or electronic), details on Electronic Information Collection (if used), Information Processing (manual or electronic), details on Electronic Information Processing (if used), Information Use, and Overall Agency Disability Determination. Based upon the responses, the RFC items, when supplemented with generic Activities of Daily Living (ADLs) (for the purpose of this report and for all appendices, Instrumental Activities of Daily Living (IADLs) are included under ADLs), captured nearly all of the clinical concepts needed by each agency for its respective determinations. It should also be noted that, among the other conventional assessment instruments described, although many of the cited concepts are limitations, some are observations (for example, number of falls, balance w/ or w/o assistance).

Results

Although additional work will need to take place to code, map and retain for future assessment form development, similarities in concepts were identified. Summary results of concepts across federal agencies include:

Exertional Limitations

- **Concepts:** lifting, carrying, pushing, pulling, sitting, standing, walking, shortness of breath
- **Scalars:** pounds, hours, limited/unlimited, level of difficulty, city blocks
- **Data Type(s):** numerical, ordinal, categorical

Postural Limitation

- **Concepts:** climbing, balancing, stooping, kneeling, crouching, crawling
- **Scalars:** constantly, frequently, occasionally, never, level of difficulty, able to re-balance w/ or w/o assistance, number of falls other info (such as refused), difficulty with specific activity (stoop, bend or kneel)
- **Data Type(s):** ordinal, numerical, categorical

Manipulative Limitations

- **Concepts:** reaching, handling, fingering, feeling, dexterity
- **Scalars:** none, limited, unlimited, level of difficulty
- **Data Types(s):** ordinal, categorical

Visual Limitations

- **Concepts:** near/far acuity, depth perception, accommodation, color vision, visual fields
- **Scalars:** none, limited, unlimited, adequate, impaired, moderately impaired, highly impaired, severely impaired, normal, partially impaired [med labels, newsprint], severely impaired [objects by touching, hearing], non-responsive, refused, don't know
- **Data Type(s):** numerical (lab results), ordinal, categorical

ADLs

- **Concepts:** daily routines, sleeping/resting, personal hygiene, transportation, finances, eating/meal preparation, housework/hobbies,

shopping, socialization/entertainment, employment/work routine, bed mobility, transfer, dressing upper/lower body, walk in room, ambulation/locomotion, eating, toilet use, bathing/showering, doing dishes, making beds, yard work, cleaning windows, laundry, grooming

- **Scalars:** able/unable, none, mild, moderate, marked, extreme, independent, supervision, limited assistance, extensive assistance, total dependence, activity did not occur, set-up, one-person assist, two-person assist, total assist, maximum assist, moderate assist, minimal assist, supervision, modified independence, complete independence, yes/no, refused, don't know
- **Data Types(s):** categorical, ordinal

Communicative Limitations

- **Concepts:** hearing, speaking, speak above a whisper, limited/unlimited
- **Scalars:** able/unable, limited/unlimited, adequate, minimum difficulty, special situations only, highly impaired, clear/unclear, none, total assist, maximum assist, moderate assist, minimal assist, supervision, modified independence, complete independence, level of difficulty, other info, minimum, moderate, severe, good, a little trouble, a lot of trouble, deaf
- **Data Type(s):** numerical (lab results), ordinal, categorical

Environmental Limitations

- **Concepts:** heat, cold, wetness, humidity, noise, vibration, fumes/dusts/ odors, machinery, heights, heavy smoking, walking on uneven terrain
- **Scalars:** no, some, moderate, unlimited, ability/inability, unlimited, avoid concentrated exposure, avoid moderate exposure, avoid all exposure

The agency questionnaires summary responses supporting the above concepts can be found in ***Appendix D***.

Scenario #3: Terminology Integration for the ICF Classification and the SNOMED CT® Vocabulary

The example in this Scenario pertains to Back Pain. The demonstrated techniques involve the process of Terminology Integration. In parlance, this is “mapping” new vocabularies, like the ICF, with components of the existing Unified Medical Language System (UMLS), such as SNOMED CT®.

In this Scenario, four outcomes of Terminology Integration might be expected: Exact Matching, Matching After Normalization, No Matching Found, and Multiple Matches. The outcome of Matching After Normalization should be considered as parallel or analogous to making “usefully related vocabulary matches.” Therefore, that outcome is of greatest interest in this Standards Adoption Recommendation.

After presenting this Scenario, relying on the text in ***Appendix E***, readers of this Standards Adoption Recommendation will be able to discern that Terminology Integration of the ICF into the UMLS is both feasible and desirable in the near term. The ICF is comparatively small, and the majority of its concepts are already manifested and straightforwardly mapped within the UMLS and in its component vocabularies, including SNOMED CT®. The volume of "unmatched" concepts between the two nomenclatures is fairly small. Therefore, mapping endeavors are manageable, but thus far not standardized, and therefore inefficient. Private sector, grant-funded, and foreign research projects are underway on the fundamental mapping of ICF coded terms to psychometric instruments, surveys, and clinical vocabularies, but federal support of such research has been constrained.

On the other hand, readers will also know that certain acknowledged shortcomings of the ICF, such as a proportionally large number of "underspecified" terms, presently preclude full automation within electronic health records. None of these perceived deficiencies are conceptually or linguistically insurmountable, though. Progress in applied ICF research will minimize these shortcomings, and govern the likelihood that the Terminology Integration demonstrated in this Scenario might serve as a template for conventional transmittal and storage of information about functional status, for individual patient/clients and among populations.

Recommended exchange standards: Integrate ICF into the UMLS and develop mappings between ICF and SNOMED CT®.

Rationale: Succeeding at full Terminology Integration of the ICF into the UMLS would be beneficial for both entities. Integration would create useable linkages between ICF and the existing vocabularies, including SNOMED CT®. This would yield downward extension, for example to small businesses or software companies, to utilize the newly generated product for broader dissemination and utilization in the field. Integration would certainly enable and assist full adoption of the ICF, in this and any country. Mappings between ICF and SNOMED CT would result in more robust standardized terminology coverage for terms and concepts neeed in the domain of functioning and disability. The benefit to the UMLS would be the addition of a new, fundamentally important and demanded perspective, functional status, into the realm of information to be transmitted and delivered as a result of the CHI at maturity. Moreover, the capacity to render legitimate international comparisons on disability statistics could be a corollary benefit, based fundamentally on the ICF conceptual model, given that there is worldwide access to UMLS resources.

In conclusion, a full mapping of ICF into the UMLS would identify problem areas that may need to be addressed in the classification and also would facilitate mapping with SNOMED CT®, which is the terminology of choice in the United States for electronic health records. This process also would identify gaps in SNOMED CT® that are important for the functioning and disability domains, as well as gaps in the structure of the UMLS to address terminological challenges for these domains.

Future Considerations:
The following items are recommended for future consideration and research support to address issues related to standardizing disability terminology and patient/client assessment instruments:

1. Creating a UMLS knowledge base – NLM has created a workgroup to address issues related to using the UMLS Metathesaurus to serve as a knowledge base that (i) represents information in LOINC® formatted patient/client assessment forms that is constant (i.e., the questions and answer options), and (ii) links this information with usefully - related and exact matching vocabulary content. Such a knowledge base will permit within and across assessment instruments analyses of: (i) semantic relationships within and across vocabularies (e.g., SNOMED and ICF), (ii) LOINC hierarchical representations of assessment items, and (iii) relationships between semantics matches with and LOINC representations of assessment items. Understanding these relationships and hierarchies will provide information needed by providers, payers, vendors, and others.

2. LOINC Hierarchies – The Federal Government and private sector should participate in the Clinical LOINC Committee to review and refine, as needed, the LOINC hierarchical representations of assessment questions and answers within and across LOINC represented assessment instruments and other clinical documents represented in LOINC (e.g., problem lists, discharge summaries, etc.) to support aggregations thus providing information needed by providers, payers, vendors, and others.

3. Work is needed to map legacy assessment data maintained in federal repositories with assessment data that has been standardized with HIT standards as described in this CHI report.

4. Implementation – The timing of implementing these HIT standards in new and modifications to such standards for patient/client assessments in federal health information systems should be considered, including consideration of (i) the time required by Federal programs to update information systems, and (ii) the policy to support implementation of a nationwide interoperable HIT infrastructure.

5. Software – The Federal Government should consider modifying any software it presently makes freely available to providers (e.g. the MDS) by (i) formatting assessments using LOINC®, (ii) integrating linkages with exact and usefully related standardized terms, and (iii) using HL7®v2.4 messages for the transmission of LOINC® represented assessments and exact semantic matches for assessment results for individual patient/clients.

6. Pilot Testing – As federal agencies deploy these recommendations in standardizing patient/client assessment instruments and other functioning and disability content, pilot testing may be needed regarding the use of (i) LOINC to represent patient/client assessments, (ii) matching to CHI-endorsed semantic terms, and (iii) HL7 messaging to transmit such standardized assessments. For example, CMS/Office of Clinical Standards and Quality (OCSQ), Quality Measurement and Health Assessment Group (QMHAG) recommends pilot studies be conducted on how CMS can implement recommendations in a rational, economic and simple way; these pilots should include analysis of the impact on provider burden and CMS iterative implementation plans and costs.

7. Conduct outreach to other stakeholders in the private sector, as well as, local, state and other federal agencies to review and to assess the team's current findings and recommendations. Address and resolve any identified issues or problems associated with the recommendations; and continue the new cooperative partnership to support future research and study including interaction with the Standard Development Organizations to adopt a widely interoperable, complete and useful set of standards meeting the management needs of disability programs. Such outreach would include advancing a use case through the American Health Information Community (AHIC) and the Healthcare Information Technology Standards Panel (HITSP).

Ownership Structure *Describe who "owns" the standard, how it is managed and controlled.*

LOINC®
The Regenstrief Institute LOINC® Committee divides the LOINC® development into three divisions, the first of these is laboratory LOINC®. The clinical LOINC® division is concerned with non-laboratory diagnostic studies, critical care, and nursing measures, as well as the history, physical, and survey instruments. The clinical LOINC® division includes a number of new projects for defining clinical notes, report titles, and dental observations.

SNOMED ®:
The College of American Pathologists (CAP) is holder of the copyright, trademark and patent rights in SNOMED®. The CAP owns the copyright in all editions of SNOMED®, including the copyright in any allowable adaptations, the trademarks SNOMED® and SNOMED CT®, and any and all patent rights in SNOMED®. Within the governance structure of the CAP, the SNOMED® International Authority has the direct responsibility for terminology-related activities. It establishes strategic direction for the CAP's clinical terminology activities, advises management, monitors division performance, and provides connections to the broader outside world. The SNOMED® International Authority protects the purpose of SNOMED® for clinical care and prevents drift of its purpose through its constitution, decision-making criteria, and the expertise of voting members.

The SNOMED® International Editorial Board is responsible for the scientific direction, editorial processes, and scientific validity of the terminology. The Editorial Board, composed of voting members and organizational liaisons, recommends guidelines for external input and field-testing. It also oversees the quality assurance process. The Editorial Board consists of both clinical content experts and medical informatics experts, with equal representation from the UK's National Health Service. In addition, liaisons from numerous associations reflect the vision of an integrated clinical vocabulary useful for dentistry, nursing, veterinary medicine, radiology, ophthalmology, public health, and other clinical specialties, and that is compatible with standards such as HL7® and DICOM®. Participation of liaisons ensures scientific input from a range of clinical specialties and government agencies. Chaired by the SNOMED® Scientific Director, this group provides scientific direction for and supports the work of a multidisciplinary team of modelers and data administrators.

ICF

The ICF is a product of the WHO. WHO is the United Nations' specialized agency for health. WHO is governed by the World Health Assembly, which includes representatives from the 192 Member States that comprise the Organization. Although publicly available, in a legal context the ICF is not in the public domain. A static, no-cost, keyword-driven Internet Browser version is available, but WHO sells hard copies of the ICF book at an approximately "at-cost" price. Currently, no dynamic, relational, or keyword-searchable Internet version of the ICF is available.

No entity "owns" the ICF, although WHO controls the parameters of its large-scale use. WHO protects the integrity and appropriate use of this and its other Classification systems by copyrighting the content, and licensing those uses for which a secondary users' fee or sales price would be charged. WHO permits dissemination of the ICF in six official WHO-recognized languages: Arabic, Chinese, English, French, Russian, and Spanish, and provides licensees the option of choosing which language their end-users could converse in to utilize the ICF.

The ICF is a Classification system, rather than a clinical terminology. "The overall aim of the ICF classification is to provide a unified and standard language and framework for the description of health and health-related states" (page 3). An international voluntary consortium of national health ministries, statistical agencies, clinical organizations, and expert clinicians and other individuals crafted its revision during the 1990s. The WHO manages the Classification in an internationally collaborative manner. Although formal approval of the ICF for worldwide use was granted by the World Health Assembly, a consortium of WHO "Collaborating Centers" with representatives from many Member States has been charged with implementing the ICF in their home regions. For example, the "North American Collaborating Center" handles implementation activities in the U.S. and Canada, not only for the ICF, but for each of the WHO Classifications, including the *International Statistical Classification of Diseases and Related Health Problems* (ICD) and the forthcoming derived Classification entitled the *ICF – Children and Youth Version*. This consortium of Collaborating Centers is now known as the "WHO Family of International Classifications (WHO-FIC) Network," whose members and Collaborating Center Heads meet annually under the auspices of WHO to review implementation activities and engage in updating and revising the Classifications, as warranted.

At this time, no forthcoming revision or subsequent edition of the ICF is planned, but at such time that revision or updating the ICF becomes necessary, those activities would be managed by the WHO-FIC Network. For purposes related to any prospective proposals emanating from the Consolidated Health Informatics Initiative for adapting the ICF so that it could be used more efficiently in an electronic data transmittal scheme, the initial proposal would be compiled and presented by and for the review of the WHO-FIC Network within its committee structure.

HL7®
Headquartered in Ann Arbor, MI, Health Level Seven® (HL7®) is a not-for-profit volunteer organization. Its members-- providers, vendors, payers, consultants, government groups and others who have an interest in the development and advancement of clinical and administrative standards for healthcare—develop the standards. Like all ANSI-accredited Standards Development Organizations (SDOs), HL7® adheres to a strict and well-defined set of operating procedures that ensures consensus, openness and balance of interest. HL7® develops specifications; the most widely used being a messaging standard that enables disparate healthcare applications to exchange key sets of clinical and administrative data. Members of HL7® are known collectively as the Working Group, which is organized into technical committees and special interest groups. The technical committees are directly responsible for the content of the standards. Special interest groups serve as a test bed for exploring new areas that may need coverage in HL7®'s published standards.

Summary Basis for Recommendation *Summarize the team's basis for making the recommendation (300 words or less)*

The recommendations are advanced based on work that was undertaken to standardize the nursing home Minimum Data Set (MDS), a federally required patient assessment instrument, and the Residual Functional Capacity (RFC) form, a Social Security Administration (SSA) benefits assessments form, and analyses of the relationships between concepts and terms in the ICF and SNOMED.

The approach used to standardize the MDS was as follows:

- For the sample assessment instrument (MDSv2) and (some MDSv3 content), the assessment content was deconstructed by Apelon into questions and answers to facilitate matching to standard CHI-endorsed (and some additional) vocabularies[v], and possible content matches between standardized vocabulary terms and items (both questions and answers) on the MDS were identified by Apelon, and posted to a web-based server. Subject matter experts completed a limited review of content matches;

- MDSv2 was then represented using the Clinical LOINC® standard. With leadership by Dr. Tom White, the Clinical LOINC® committee formatted and coded the following MDSv2 assessment instruments: Basic Assessment Tracking Form, Full Assessment Form, MDS Quarterly Assessment Form, MDS Quarterly Assessment Form (Optional Version For Rug-III MDS Quarterly Assessment Form), Optional Version For Rug-III 1997 Update (available by downloading RELMA at http://www.loinc.org/ (After downloading and installing RELMA, click "Map Local Terms to LOINC®" button; type "MDS", "ASSESSMENT", and "FORM" into the first three "Local Words" boxes; click Search (Ctl+Enter); highlight the desired MDS assessment form; click "View Details"; and select the "HTML w/details" radio button).

- Sample Health Level Seven® Version 2 (HL7®v2) messages were constructed for MDSv2 content that had been (i) represented in LOINC® and (ii) linked with standardized vocabularies. The HL7® OBR4 message segment was constructed to exchange the entire instrument and pairs of HL7® OBX3 and OBX5 message segments were constructed to exchange selected question and answer pairs.

The approach used to standardize the RFC content was as follows:

- The concepts and scalars of both the SSA physical and mental residual functional capacity forms (PRFC and MRFC) were mapped to both the ICF and SNOMED CT®. While the majority of concepts and scalars mapped on a one-to-one basis, there were significant gaps, as well as, situations where the concepts mapped on a one-to-many basis (both ICF and SNOMED CT®).

- A sample of two questions from each of the SSA PRFC and MRFC forms, along with underlying XML code and detailed instructions for completion, were sent to the Regenstrief Institute in order for the Work Group to get some sense of the effort that would be required in constructing the forms using LOINC® codes (a standard already adopted by CHI). Information received by Regenstrief is found in ***Appendix C***.

Conditional Recommendation *If this is a conditional recommendation, describe conditions upon which the recommendation is predicated.*

These recommendations are conditional only until the following conditions are met, at which time the recommendation will move to a full, unconditional recommendation:

- The Federal Government should address the issue of how to most efficiently gain access to needed web-based collaboration tools to identify "usefully-related" standardized assessment content.
- The NLM workgroup needs to address and resolve issues related to creating a knowledge-base in the UMLS Metathesaurus to (i) represent information on assessment forms that is constant (i.e., the questions and answer options) and (ii) link this constant information with usefully-related and exact matching vocabulary content.
- The National Library of Medicine and the World Health Organization need to complete their negotiations on the conditions under which ICF will be incorporated into the UMLS.

Note: As federal agencies deploy these recommendations in standardizing patient/client assessment instruments and other functioning and disability content, pilot testing may be needed regarding the use of (i) LOINC to represent patient/client assessments, (ii) matching to CHI-endorsed semantic terms, and (iii) HL7 messaging to transmit such standardized assessments. For example, CMS/Office of Clinical Standards and Quality (OCSQ), Quality Measurement and

Health Assessment Group (QMHAG) recommends pilot studies be conducted on how CMS can implement recommendations in a rational, economic and simple way; these pilots should include analysis of the impact on provider burden and CMS iterative implementation plans and costs.

Approvals & Accreditations

Indicate the status of various accreditations and approvals for HL7®, SNOMED CT®, LOINC®:

Approvals & Accreditations	Yes/Approved	Applied	Not Approved
Full SDO Ballot	Y		
ANSI	Y		

Options Considered *Inventory solution options considered and summarize the basis for not recommending the alternative(s). SNOMED must be specifically discussed.*

We considered but rejected non-LOINC® formatted assessments (including user supplied and other third party specified formats). User-supplied and other third party assessment formats: (i) are not standardized; (ii) do not have the current depth of coded assessment instruments as LOINC®; (iii) do not have a current repository of assessment instruments; and (iv) have not been used to support standardized information exchange.

Using LOINC® to represent assessments, linked with available CHI content standards, is consistent with the December 2003 NCVHS recommendations.

Assessment Information Exchange/Models/Initiatives:

LOINC®
SNOMED CT®
ICF
HL7®

Current Deployment

LOINC®

Summarize the degree of market penetration today; i.e., where is this solution installed today?
What number or percentage of relevant vendors have adopted the standard?
What number or percentage of healthcare institutions have adopted the standard?
What number or percentage of federal agencies have adopted the standard?

Is the standard used in other countries?
Are there other relevant indicators of market acceptance?

LOINC® Current Deployment:
The LOINC® codes were initially released on the Internet in April of 1995. Since then, seventeen revisions of the LOINC® database have been released and it now includes over 30,000 observation concepts. The informatics committee of the College of American Pathologists has endorsed the LOINC® codes. The American Clinical Laboratory Association (ACLA), an association of large referral laboratories whose members are responsible for more than 60% of US outpatient laboratory test volume, has recommended LOINC® for adoption by its members. Quest Diagnostics (formerly Corning MetPath), LabCorp, and SmithKline Beecham (now part of Quest Diagnostics), three of the largest commercial laboratories in the US, have adopted LOINC® as their code system for reportable test results, as has ARUP (Associated Regional and University Pathologists). Mayo Medical Laboratories is currently mapping their tests to LOINC®. In addition, the University of Colorado, Intermountain Health Care, Promedica, Kaiser Permanante, Clarian Health (Indiana University, Methodist Hospital, and Riley Hospital), Partners Healthcare System of Boston (Brigham and Women's and Mass General Hospital), Care Group of Boston, Mayo Medical Group, the Hospital for Sick Children in Toronto, New York-Presbyterian Hospital, the University Hospitals of Columbia and Cornell, the Department of Veterans Affairs, and the Department of Defense are adopting the LOINC® codes for laboratory reporting. All US veterinary medicine laboratories have committed to the use of LOINC®. HMOs such as Empire Blue Cross and Aetna Health Care are also adopting LOINC® for internal purposes. Internationally, LOINC® has also met success. The Swiss Center for Quality Control (Geneva, Switzerland) is adopting LOINC® for quality assurance mandates. The provinces of Ontario and British Columbia, Canada, are adopting LOINC® codes province wide, and Newfoundland is considering following in their footsteps. Most recently, Germany has adopted LOINC® for national use. LOINC® is used in Australia, Korea, Estonia, Brazil, and New Zealand. The LOINC® codes have been incorporated into the National Library of Medicine's ULMS. They have been incorporated in CMS's quality assurance testing pilot programs. They have been adopted by the Centers for Disease Control and Prevention/Council of State and Territorial Epidemiologists' project for electronically reporting/transmitting communicable disease information and by NAACCR (North American Association of Central Cancer Registries) for their tumor registry variables. LOINC® and SNOMED CT® are also supporting a collaboration that will ensure a consistent, unambiguous clinical reference terminology that builds upon the strengths of each.

Among laboratory information systems (LIS), a survey published by the College of American Pathologists in November 2000 revealed that LOINC® code indexes were provided in 33 LIS systems, representing 10,914 installed LIS sites. The Department of Defense Composite Health Care System also incorporated a LOINC® index code during 2001. The current version of CHCS containing the LOINC® index is now deployed to all 103 DoD laboratories. The Veterans' Affairs system, VISTA, has also incorporated a LOINC® Index and is collaborating with DoD on an interoperability project that will utilize LOINC® codes for results transfer between DoD, VA, and commercial reference

laboratories.

Clinical LOINC® Representation
Several organizations have submitted their nursing instruments for inclusion in and encoding by LOINC® (e.g., the Home Health Care Classification Survey, OMAHA Survey, etc.).

Five different versions of the federally-required nursing home MDS were coded by the Clinical LOINC® Committee.

Clinical LOINC® is a public domain database that:

- Creates codes for assessment forms, and for each question and answer pair within them;
- Creates libraries of items and instruments, enabling reuse;
- Enables HL7® messaging of questions, answers, and formulae; and
- Supports semantic mapping to CHI vocabularies.

Representing instruments and items in the LOINC® format, enables reconstruction of the intent of the instrument as designed by the developer of each instrument. By unambiguously dividing assessment items into LOINC® coded questions and answers, LOINC® provides a useful, near-term way of standardizing assessment instruments/items for information exchange purposes even when "usefully-related" standardized content matches can not be identified. Linking LOINC® coded items with "usefully-related" CHI-endorsed content codes supports information re-use and exchange.

SNOMED

Summarize the degree of market penetration today; i.e., where is this solution installed today?

On July 1, 2003, an agreement with the College of American Pathologists (CAP) and HHS was announced that made SNOMED Clinical Terms (SNOMED CT®) available to U.S. users at no cost through the National Library of Medicine's Unified Medical Language System® (UMLS).

Produced by the College of American Pathologists (CAP), SNOMED CT® (Systematized Nomenclature of Medicine--Clinical Terms) was formed by the convergence of SNOMED RT® and the United Kingdom's Clinical Terms Version 3 (formerly known as the Read Codes). With terms for more than 344,000 concepts, SNOMED CT® is the most comprehensive clinical terminology available. It is being implemented throughout the National Health Service in the United Kingdom.

The National Library of Medicine (NLM), a component of the National Institutes of Health (NIH), Department of Health and Human Services, has issued a 5-year, $32.4 million contract to the CAP for a perpetual license for the core SNOMED CT® (in

Spanish and English) and ongoing updates. NLM is paying the annual update fees. Funding for the one-time payment for the perpetual license was provided by:
Department of Health and Human Services
National Institutes of Health (Office of the NIH Director & NLM
Centers for Disease Control and Prevention/Agency for Toxic Substances and Disease Registry
Office of the HHS Assistant Secretary for Planning and Evaluation
Agency for Healthcare Research and Quality
Centers for Medicare & Medicaid Services
Food and Drug Administration
Indian Health Service
Substance Abuse and Mental Health Services Administration
Health Resources and Services Administration
Department of Defense
Department of Veterans Affairs

NLM will distribute SNOMED CT® within the UMLS Metathesaurus under the terms of a revised UMLS license agreement, which will include additional language concerning SNOMED CT®. U.S. licensees will be able to use SNOMED CT® (as distributed by NLM) in the U.S. without charge and without signing a separate license agreement with the CAP. Non-U.S. UMLS users will continue to require a separate license agreement with the CAP for production uses of SNOMED CT®. Current UMLS users will have to sign the revised license agreement before receiving SNOMED CT® within the UMLS. NLM estimates that it will take at least 6 months to integrate SNOMED CT® into the UMLS Metathesaurus. Updates to SNOMED CT® will be incorporated into the UMLS more quickly.
SNOMED CT® became available for download as part of NLM's Unified Medical Language System (UMLS) Metathesaurus. With the release of the 2004AA version of the UMLS, the Systematized Nomenclature of Medicine Clinical Terms (SNOMED CT®), produced by the College of American Pathologists, becomes available for free U.S. use under a license agreement concluded last year. Users must register via the Web for a free UMLS license before downloading the Metathesaurus or requesting a copy on DVD.

What number of or percentage of relevant vendors has adopted the standard?

The state of incorporation into vendor systems varies and is largely dependent on the vendor's development cycle. Following is a representative list of the vendors who have licensed SNOMED®, it should be noted that license does not equate to adoption.

Cerner Corporation	Apelon, Inc.
ComMedica Limited	Health Language, Inc.
Eclipsys Corporation	Intelligent Medical Objects
Epic Systems Corporation	Language & Computing
GE Medical Systems Information Technologies	A4 Health Systems
	ABLESoft

IDX Systems Corporation
McKesson Information Solutions
MEDITECH, Inc.
Oracle Corporation
Per-Se Technologies
Siemens Medical Solutions Health Services
deCode Genetics
Egton Medical Information Systems (UK)
GeneLogic, Inc.
In Practice Systems (UK)
Institute for Medical Knowledge Implementation (IMKI)
Reuters Health Information, Inc.
Safescript Ltd (UK)
TheraDoc, Inc.
TherapyEdge
WellMed, Inc.
AssistMed
Clinical & Biomedical Computing, Ltd.
Cogient Corporation
Creative Computer Applications
Détente Systems Limited (Australia)
ibex Healthdata Systems, Inc.
IMPATH Inc.
iSOFT
Misys Healthcare Systems
Monarch Medical International Ltd.
Picis
Sysmex Delphic Ltd. (New Zealand)
Torex Laboratory Systems Ltd. (Scotland)
Triple G Systems Group, Inc.
VISICU, Inc.
Dictaphone
Berkeley Computer Systems
William Woodward

What number or percentage of healthcare institutions has adopted the standard?

More than 50 commercial healthcare software developers have incorporated SNOMED CT® into their systems.

Two examples of the extent of support for SNOMED® are Kaiser Permanente and the National Health Service (NHS) of the United Kingdom. Kaiser Permanente, who provides health care coverage to 3% of the U.S. population, has actively participated in the development of SNOMED® and is actively rolling out SNOMED®-compatible solutions throughout its organization. Kaiser is using SNOMED® within domain-specific standard documentation templates for use throughout the organization. Also, as of April 1, 2003, the NHS, representing a population of 56 million covered lives, officially stated that: "Subject to successful development and testing of implementability, after April 1, 2003 any computerized information system being developed to support any clinical information system, such as EPRs and EHRs, should use the NHS preferred clinical terminology, SNOMED® Clinical Terms."

Other examples of health care institutions that have adopted SNOMED® are summarized as follows: The University of Nebraska Medical Center is using SNOMED CT® in the development of problem lists which are then mapped to ICD-9; Cedars Sinai Medical Center used SNOMED CT® in its web-based order entry system which processed 700,000 orders for over 8,000 patients between October 2002 and January 2003; HCA is implementing SNOMED CT® within its laboratory network, consisting of over 200 sites

in both the US and Canada, for lab test results and diagnosis; University of Tennessee used SNOMED® in the lab to improve patient safety by detecting cases for which follow-up intervention did not occur despite abnormal Pap tests; Barnes Jewish Christian Health Care is using SNOMED CT® within its perioperative and surgery suites for medical transcription.

What number or percentage of federal agencies have adopted the standard?

Versions of SNOMED® are currently used by: the Centers for Disease Control and Prevention (CDC), Department of Defense (DoD), Indian Health Services (IHS) and the Department of Veterans Affairs (VA) in specific applications. As SNOMED CT® was first released in January, 2002, most of the government applications for which SNOMED CT® has been licensed are in evaluation or developmental stages.

Agency/Organization	Approved	Description
ANSI		The structure of SNOMED CT® is in the process of being balloted as an ANSI standard. On the initial canvass, 72% of the list responded to the ballot, with 86% voting to approve the SNOMED CT® Structure as an American National Standard. A standard proposal addressing the concerns raised increased the favorable vote to 89%.
CDC	10/1/2002 9/22/1999 7/11/2002	1. Licensure of SNOMED® for reporting bioterrorism and infectious disease data from up to 500 sites plus 150 back-up laptops 2. Licensure of SNOMED® for reporting cancer data from up to 100 cancer registries 3. Licensure of SNOMED® for internal evaluation purposes
DoD	1/31/2003	Licensure of SNOMED® for use in standardization of medical data and treatment protocols in the Special Operations Forces Medical Handbook
NIH/NCI	1/7/2003	Licensure of SNOMED® for use in NCI's Apelon DTS server to evaluate the use of SNOMED® codes in reporting NCI-sponsored clinical trials. New clinical documentation system in development will use SNOMED CT®.
Quality Practice		Upon request of the National Quality Forum,

Groups		the "never events" have been integrated into SNOMED®
Tumor Registries	9/22/1999	Licensure by CDC of SNOMED® for reporting cancer data from up to 100 cancer registries
VA	9/14/2000	Many VA hospitals have used earlier versions of SNOMED® for many years, particularly for laboratory applications, and have made extensive local extensions to reflect their specific need. The VA, in conjunction with the DoD and Indian Health Service, licensed SNOMED RT® for use in the pilot phase of the GCPR project, which has now been replaced by the CHI initiative.
NASA (contract held by Wyle Laboratories)	1/31/2002	Use of SNOMED® in the Astronaut Longitudinal Database
AFIP	5/26/1999	Use of SNOMED® in coding of pathology specimens

Is the standard used in other countries?

As of April, 2003, the CAP has licensed users of SNOMED CT® in 31 countries. Earlier editions of SNOMED® have been licensed in over 40 countries. Following are the countries in which SNOMED CT® has been licensed:

Argentina
Australia
Belgium
Brazil
Canada
China
Colombia
Denmark
Hong Kong
Iceland
India
Ireland
Israel
Italy
Japan
Kuwait
Mexico
The Netherlands
New Zealand
Norway
Peru
Portugal
Puerto Rico
Scotland
South Korea
Spain
Sweden
Turkey
United Kingdom
United States
Venezuela

As previously noted, the UK's National Health Service has officially stated that any computerized information system being developed to support any clinical information system, should use the NHS preferred clinical terminology, SNOMED® Clinical Terms. In Australia, where the use of electronic health cares systems to support general practice is relatively advanced, a "Coding Jury" had been established to select a single coding system to support GP clinical systems. Currently, the GP Vocabulary Project is underway, and is designed to assist in the building and support of a standard general practice interface terminology suitable for the management of information collected during the clinical encounter. Phase 2 of this project will include the mapping of a subset of the GP Vocabulary to SNOMED CT®.

Are there other relevant indicators of market acceptance?

Market share information provided by CAP indicates that 79% of computerized patient record systems and 85% of laboratory systems vendors have made licensing commitment. Following are other relevant indicators of SNOMED's® market acceptance:

- Both HL7® and DICOM® have formally recognized SNOMED® as a standard code set within their messaging standard. SNOMED® is embedded in the DICOM® Structured Reporting Standard for Wave Forms.
- The American Veterinary Medical Association (AVMA) has adopted SNOMED CT® as the official terminology for veterinary practice in the US. It has been used extensively by the veterinary community in a collaborative product to track health care data on a national basis.
- The American Nurses Association (ANA) has recognized SNOMED CT® as a terminology that supports nursing practice, specifically: nursing assessments, plans, interventions and outcomes.
- WASPalm, the World Association of Societies of Pathology and Laboratory Medicine, representing 59 member societies throughout the world, has endorsed SNOMED® as the preferred reference language for laboratory clinicians.

ICF

The degree of market penetration exhibited by and on behalf of the ICF is low. However, that fact should be considered neither detrimental nor indicative of the likelihood of either acceptance or non-acceptance by prospective users. Presently, the ICF is being utilized in an investigational context --- either as a tool for or a subject of research. This should be considered conventional.

New or revised Classification systems do not arise in response to "market demand" in the same way other new products or standards emerge. Classification systems are the products of consortia of experts and health ministries working collaboratively in response to perceived needs, rather than observed needs in a traditional marketplace. New

Classification systems have trailblazing advocates, pioneering researchers, and persuaders, but not necessarily "early adopters" in the way that conventional markets do. In fact, consideration is warranted about whether a genuine "market" exists that the ICF could "penetrate" through conventional strategies like demonstrating superiority over a competitor, advertising, incremental quality improvements, new designs, or attractive pricing or licensing. That said, within the "market" in which ICF is promoted and subsequently used around the world, WHO and its Collaborating Centers must be concerned about the methods utilized for dissemination, the feasibility and pace of adoption, and the long-term reliability and validity of the Classification in various uses. Those characteristics of "market penetration" need to be demonstrated quantitatively, and are generally pursued through persuasion, rather than promotion.

What number of or percentage of relevant vendors have adopted the standard?

The number or percentage of relevant vendors that have adopted the ICF is low. It would be safe to presume that a fully dynamic, relational, electronic rendering of the ICF represents the fundamental threshold for wide-ranging adoption by commercial vendors, and that such a version would be very attractive to many potential vendors. But at this time, only a static electronic version of the ICF exists (the searchable Internet Browser version). In the context that the work of this Consolidated Health Informatics Initiative could result in a set of conditions in which such a dynamic electronic version of the ICF could be developed, tested, and brought on-line for daily use, though, today's low percentage of vendor adoption would likely increase rapidly.

It is proper to take stock of the standardization induced by the ICF. Such standardization invokes a contemporary, widely accepted conceptual framework for disability in societies and environments, neutral language describing disabling conditions in non-stigmatizing ways, and consistent coding that adheres to prescribed rules and conventions. Moreover, standardization of a wide variety of products or services that require direct explication of functioning status is an important parallel development to the standardization induced by the ICF. Specifically, the adoption in 2002 and current revision in 2006 of the standard known as ISO 9999, published by the WHO's sister agency the International Organization for Standardization, represent contemporary milestones for the necessity of including and standardizing functional status information. ISO 9999 is entitled "Classification of Technical Aids for Persons with Disabilities." There is a direct relationship between the ICF and ISO 9999. The 2002 version specifically referred to the ICF conceptual framework, and the forthcoming 2006 revision will incorporate explicit ICF coding related to specific technical assistance devices based on an individual patient's functional status, and cross-referenced ICF coding to capture several levels of functional status, particularly pertaining to a patient's environmental characteristics that could induce disablement. In this manner, the rate of adoption by relevant vendors of the ICF might not be the best lens through which ICF penetration should be evaluated. Instead, it might be better to associate the ICF with parallel, essential international standardization activities that promote inclusion of functional status information within various types of electronic data streams, including commercial data streams. In due course, such standardization activities will affect vendors, inducing by necessity their

adoption of ICF.

What number or percentage of healthcare institutions have adopted the standard?

Both the number and percentage of health care institutions that have adopted the ICF are low. However, individual institutions would not adopt the ICF for use, *per se*, except for special purposes such as intra-institutional research.

What number or percentage of federal agencies have adopted the standard?

Both the number and percentage of federal health agencies that have adopted the ICF are low. Nevertheless, adoption as induced by the results of demonstration projects can be reasonably anticipated, and discussions toward such goals are underway within the Department of Health and Human Services. To date, the most substantive ongoing discussion about adoption throughout the federal health infrastructure has been pursued by the National Committee on Vital and Health Statistics, which has supported testing and evaluation of the ICF within U.S. health systems and has recommended the same to the Secretary, in the context of the importance of incorporating functional status within electronic health records. An existing ICF Subcommittee that reports to the Interagency Committee on Disability, coordinated by the DHHS Office on Disability, convenes representatives of DHHS agencies to encourage their adoption and application of both the ICF framework and coding structure. To date, the most likely candidate for implementing ICF demonstration projects in actual clinical record-keeping is the Indian Health Service, whose closed population and dedicated data streams make it the ideal agency venue for retrospectively coding and compiling clinical data in ICF codes. Similarly, the DHHS Centers for Disease Control and Prevention, which provided substantial funding and personnel support to revise the ICF and therefore can be considered to be the "most adoptive" agency, has infused ICF coding as requirements in grant-funded research supported by its National Center on Birth Defects and Developmental Disabilities.

Is the standard used in other countries?

Familiarity with the ICF in health and statistical agencies in other countries is broader than in the U.S., and as a consequence many more practical steps have already been taken toward full adoption of ICF coding in those countries. On the other hand, no country can be said to have already implemented a full-scale electronic data exchange system based fundamentally on or incorporating ICF codes; the Classification is still too new in every country, having been introduced in 2001. WHO has justifiably elected to let Member States make their own decisions about and systems for utilizing the ICF; WHO has not generated an electronic tool for international utilization. Individual health ministries are funding research or demonstration projects within their own academic sectors, often in leveraged tandem with support from WHO, such as in Italy and Germany. Italy, Canada and Australia have actively pursued incorporation of the ICF framework within census and survey questions, and individually have mapped survey results to respective ICF code sets. Generally speaking, countries that have nationalized or single-payer health

systems operating at a lower level of magnitude than that represented by the U.S. can be anticipated to be the first "full-adopters." On the other hand, with this Standards Adoption Recommendation in place, a commercial or profit-oriented set of incentives to render the ICF electronically will be induced, such that within the U.S. or other countries without nationalized health systems, adoption within the commercial sector might be more salient and rapid than even the type of adoption within governmental sectors of other countries described here.

Are there other relevant indicators of market acceptance?

An important set of relevant indicators of acceptance has been generated by the endorsements of the ICF made by professional associations of clinicians working in rehabilitation settings, and by health information technology associations. Examples include the following: American Occupational Therapy Association, American Physical Therapy Association, American Speech-Language-Hearing Association, American Therapeutic Recreation Association, and American Health Information Management Association. Each has either endorsed or approved the use of ICF codes within certain venues or situations, or broadly endorsed the ICF conceptual framework for application as individual practitioners deem appropriate. Counterpart associations in other countries have also endorsed or approved the ICF for similar purposes. Existing government resources such as the National Committee on Vital and Health Statistics regularly maintain formal liaison relationships between various governmental, association, and private sector entities, through which commonly important information about the ICF is regularly exchanged.

HL7®

Summarize the degree of market penetration today; i.e., where is this solution installed today?

HL7® is used in many places as the messaging standard for health care data. Furthermore, HL7® has a great deal of support in the user community and 1999 membership records indicate over 1,600 total members, approximately 739 vendors, 652 healthcare providers, 104 consultants, and 111 general interest/payer agencies. HL7® standards are also widely implemented, though complete usage statistics are not available. In a survey of 153 chief information officers in 1998, 80% used HL7® within their institutions, and 13.5% were planning to implement HL7® in the future. In hospitals with over 400 beds, more than 95% use HL7®. As an example, one vendor has installed 856 HL7® standard interfaces as of mid 1996. It is a key element of the proposed Health Insurance Portability and Accountability Act (HIPAA) Claims Attachments standards that apply: (1) the X12 N 277 transaction using the LOINC® to allow payers to request the desired additional clinical information to support claims; and (2) X12N 275 transaction using the embedded HL7® Clinical Document Architecture (CDA) based clinical data for the provider to respond to the incoming payers' X12N 277 request. In response to Social Security Administration's (SSA) request, the X12N subcommittee developed an X12N 277 implementation guide in 2003 to permit SSA or any other

organizations including disability insurance carrier to request for clinical data in support of a disability claim. To best support this additional business needs, the original X12N 277 implementation guide was modified to provide for initiation of a X12N 277 without a pre-existing claim, and also supports inclusion of an authorization to disclosure information. Anecdotal information indicates that the major vendors of medical software, including Cerner, Misys (Sunquest), McKesson, Siemens (SMS), Eclipsys, AGFA, Logicare, MRS, Tamtron, IDX (Extend and CareCast), and 3M, support HL7®. The most common use of HL7® is probably admission/discharge/transfer (ADT) interfaces, followed closely by laboratory results, orders, and then pharmacy. HL7® is also used by many federal agencies including VHA, DoD and CDC, hence federal implementation time and cost is minimized. The widespread and long-standing use of HL7® leads to the team conclusion that this is a strong recommendation.

What number or percentage of federal agencies have adopted the standard?

Many federal agencies, several of which are represented within the CHI group, have adopted HL7® for messaging.

Is the standard used in other countries?

Yes, Argentina, Australia, Canada, China, Czech Republic, Finland, Germany, India, Japan, Korea, Lithuania, The Netherlands, New Zealand, Southern Africa, Switzerland, Taiwan, Turkey and the United Kingdom are also part of HL7® initiatives.

Are there other relevant indicators of market acceptance?

Yes, this standard is so widely accepted and used across the healthcare industry; see the market penetration section for vendor and federal agency use.

Part III – Adoption & Deployment Information

Provide all information gathered in the course of making the recommendation that may assist with adoption of the standard in the federal health care sector. This information will support the work of an implementation team.

Existing Need & Use Environment

Measure the need for this standard and the extent of existing exchange among federal users. Provide information regarding federal departments and agencies use or non-use of this health information in paper or electronic form, summarize their primary reason for using the information, and indicate if they exchange the information internally or externally with other federal or non-federal entities.

Column A: Agency or Department Identity (name)
Column B: Use data in this domain today? (Y or N)
Column C: Is use of data a core mission requirement? (Y or N)
Column D: Exchange with others in federal sector now? (Y or N)
Column E: Currently exchange paper or electronic (P, E, B (both), N/Ap)
Column F: Name of paper/electronic vocabulary, if any (name)
Column G: Basis/purposes for data use (research, patient care, benefits)

Department/Agency	B	C	D	E	F	G
Department of Veterans Affairs	Y	Y	Y	B	HL7 CDA for test based Assessment Report	PC, Benefits
Department of Defense	Y	Y	Y	B	HL7 CDA for test based Assessment Report	PC, Benefits
HHS Office of the Secretary	Y	Y	N	N/Ap	MDS/OASIS Assessment Study	Research
Administration for Children and Families (ACF)						
Administration on Aging (AOA)						
Agency for Healthcare Research and Quality (AHRQ)						
Agency for Toxic Substances and Disease Registry (ATSDR)						

Centers for Disease Control and Prevention (CDC)	Y	Y	Y	B	ICF and without standardized vocabulary	Research/Statistics
Centers for Medicare and Medicaid Services (CMS)	Y	Y	Y	B	MDS/OASIS/ IRF-PAI Electronic transmission without standardized vocabulary	Reimbursement/Research
Food and Drug Administration (FDA)						
Health Resources and Services Administration (HRSA)						
Indian Health Service (IHS)						
National Institutes of Health (NIH)						
Substance Abuse and Mental Health Services Administration (SAMHSA)						
Social Security Administration	Y	Y	Y	B	RFC (Physical and Mental)	Benefits
Department of Agriculture						
State Department						
US Agency for International Development						
Justice Department						
Treasury Department						
Department of Education						
General Services Administration						
Environmental Protection Agency						
Department of Housing & Urban Development						
Department of Labor	Y	Y	Y	P		Benefits

Homeland Security	Y	N	Y	P		Benefits
Railroad Retirement Board	Y	Y	Y	P		Benefits

Compatibility

Identify the extent of off-the-shelf conformity with other standards and requirements:

Conformity with other Standards	Yes (100%)	No (0%)	Yes with exception
HIPAA standards	**X**		
HL7® 2.4 and higher	**X**		

End Notes

[i] These recommendations have been approved by the Disability Sub-group. The workgroup decided to make them conditional until the federal government addresses stakeholders' proprietary interests.

[ii] Bakken S, Cimino JJ, Haskell R, et al. Evaluation of the clinical LOINC (Logical Observation Identifiers, Names, and Codes) semantic structure as a terminology model for standardized assessment measures. J Am Med Inform Assoc. 2000;7(6):529-38.

[iii] White TM. Extending the LOINC Conceptual Schema to Support Standardized Assessment Instruments, J Am Med Inform Assoc. 9 (6):
586-99, 2002.

[iv] Choi J, Jenkins ML, White TM, Cimino JJ, Bakken S, Toward Semantic Interoperability in Home Health Care: Formally Representing OASIS Items for Integration into a Concept-Oriented Terminology. Journal of the Medical Informatics Association 12 (4):410-417, 2005.

[v] http://www.hhs.gov/healthit/chi.html

Appendices

Appendix A: Information Exchange Requirements (IERs)
Appendix B: RFC SNOMED ICF Mapping Report
Appendix C (a): Mental RFC LOINC Report
Appendix C (b): Physical RFC LOINC Report
Appendix D: Federal Disability Concepts Summary Report
Appendix E: ICF and UMLS Scenario #3 Background Report

Appendix A

Information Exchange Requirements (IERs)

Information Exchange Requirement	Description of IER
Beneficiary Financial / Demographic Data	Beneficiary financial and demographic data used to support enrollment and eligibility into a Health Insurance Program.
Beneficiary Inquiry Information	Information relating to the inquiries made by beneficiaries as they relate to their interaction with the health organization.
Beneficiary Tracking Information	Information relating to the physical movement or potential movement of patients, beneficiaries, or active duty personnel due to changes in level of care or deployment, etc.
Body of Health Services Knowledge	Federal, state, professional association, or local policies and guidance regarding health services or any other health care information accessible to health care providers through research, journals, medical texts, on-line health care data bases, consultations, and provider expertise. This may include: (1) utilization management standards that monitor health care services and resources used in the delivery of health care to a customer; (2) case management guidelines; (3) clinical protocols based on forensic requirements; (4) clinical pathway guidelines; (5) uniform patient placement criteria, which are used to determine the level of risk for a customer and the level of mental disorders (6) standards set by health care oversight bodies such as the Joint Commission for Accreditation of Health Care Organizations (JCAHO) and Health Plan Employer Data and Information Set (HEDIS); (7) credentialing criteria; (8) privacy act standards; (9) Freedom of Information Act guidelines; and (10) the estimated time needed to perform health care procedures and services.
Care Management Information	Specific clinical information used to record and identify the stratification of Beneficiaries as they are assigned to varying levels of care.
Case Management Information	Specific clinical information used to record and manage the occurrences of high-risk level assignments of patients in the health delivery organization.
Clinical Guidelines	Treatment, screening, and clinical management guidelines used by clinicians in the decision-making processes for providing care and treatment of the beneficiary/patient.

Cost Accounting Information	All clinical and financial data collected for use in the calculation and assignment of costs in the health organization.
Customer Approved Care Plan	The plan of care (or set of intervention options) mutually selected by the provider and the customer (or responsible person).
Customer Demographic Data	Facts about the beneficiary population such as address, phone number, occupation, sex, age, race, mother's maiden name and SSN, father's name, and unit to which Service members are assigned
Customer Health Care Information	All information about customer health data, customer care information, and customer demographic data, and customer insurance information. Selected information is provided to both external and internal customers contingent upon confidentiality restrictions. Information provided includes immunization certifications and reports, birth information, and customer medical and dental readiness status
Customer Risk Factors	Factors in the environment or chemical, psychological, physiological, or genetic elements thought to predispose an individual to the development of a disease or injury. Includes occupational and lifestyle risk factors and risk of acquiring a disease due to travel to certain regions.
Encounter (Administrative) Data	Administrative and Financial data that is collected on patients as they move through the healthcare continuum. This information is largely used for administrative and financial activities such as reporting and billing.
Improvement Strategy	Approach for advancing or changing for the better the business rules or business functions of the health organization. Includes strategies for improving health organization employee performance (including training requirements), utilization management, workplace safety, and customer satisfaction.
Labor Productivity Information	Financial and clinical (acuity, etc.) data used to calculate and measure labor productivity of the workforce supporting the health organization.
Health Organization Direction	Goals, objectives, strategies, policies, plans, programs, and projects that control and direct health organization business function, including (1) direction derived from DoD policy and guidance and laws and regulations; and (2) health promotion programs.
Patient Satisfaction Information	Survey data gathered from beneficiaries that receive services from providers that the health organization wishes to use to measure satisfaction.

Patient Schedule	Scheduled procedure type, location, and date of service information related to scheduled interactions with the patient.
Population Member Health Data	Facts about the current and historical health conditions of the members of an organization. (Individuals' health data are grouped by the employing organization, with the expectation that the organization's operations pose similar health risks to all the organization's members.)
Population Risk Reduction Plan	Sets of actions proposed to an organization commander for his/her selection to reduce the effect of health risks on the organization's mission effectiveness and member health status. The proposed actions include: (1) resources required to carry out the actions, (2) expected mission impact, and (3) member's health status with and without the actions.
Provider Demographics	Specific demographic information relating to both internal and external providers associated with the health organization including location, credentialing, services, ratings, etc.
Provider Metrics	Key indicators that are used to measure performance of providers (internal and external) associated with the health organization.
Referral Information	Specific clinical and financial information necessary to refer beneficiaries to the appropriate services and level of care.
Resource Availability	The accessibility of all people, equipment, supplies, facilities, and automated systems needed to execute business activities.
Tailored Education Information	Approved TRICARE program education information / materials customized for distribution to existing beneficiaries to provide information on their selected health plan. Can also include risk factors, diseases, individual health care instructions, and driving instructions.

	A	B	C	D	E	F
1	***Category***	***Concept***	***ICF Code***	***ICF Explanation***	***SNOMED-CT Code***	***SNOMED-CT Explanation***
2						A - attribute
3						F - finding
4						OE - observable entity
5						PF - physical force
6						PO - physical object
7						QV - qualifier value
8						S - substance
9						
10	**Exertional Limitations**					
11		Lifting	d4300	Lifting	258141001	Lifting, function (OE)
12		Carrying	d4301	Carrying in the hands (d4302-Using hands and arms to carry)		
13		Pushing	d4451	Pushing		
14		Pulling	d4450	Pulling		
15		Sitting	d4153	Maintaining a sitting position	33586001	Sitting position (F)
16		Standing	d4154	Maintaining a standing position	10904000	Orthostatic body position (F
17		Walking	d4500	Walking-short distances	129006008 63448001	Walking, function (OE) Gait, function (OE)
18		Walking	d4501	Walking-long distances	129006008 63448001	Walking, function (OE) Gait, function (OE)
19		Walking	d4502	Walking-different surfaces	129006008 63448001	Walking, function (OE) Gait, function (OE)
20						
21	**Postural Limitations**					
22		Climbing	d4551	Climbing		
23		Balancing	d4106	Shifting the body's centre of gravity	249982003	Balance (OE)
24		Stooping	d4105	Bending at the torso	9964006	Flexion, function (OE)
25		Kneeling	d4102	Kneeling	55864004	Kneeling (F)
26		Crouching	d4101	Squatting		
27		Crawling	d4550	Crawling		
28						
29	**Manipulative Limitations**					
30		Reaching	d4452	Reaching		
31		Handling	d4401	Grasping		
32		Fingering	d4402	Manipulating		
33		Feeling	b265	Touch function	397624008	Touch sensation, function(OE)
34						
35	**Visual Limitations**					
36		Near/far acuity	b2100	Visual acuity functions; see code book for additional detail	363983007	Visual acuity (OE)
37		Depth perception	b2108	See functions, other specified	246171009 61402003	Depth (A) Vision,function (OE)

	A	B	C	D	E	F
1	***Category***	***Concept***	***ICF Code***	***ICF Explanation***	***SNOMED-CT Code***	***SNOMED-CT Explanation***
38		Accommodatior	b2108	See functions, other specified		
39		Color visior	b21021	Color vision	271726001	Color vision (OE)
40		Visual fields	b2101	Visual field functions	73750009	Visual field (OE)
41						
42	**Communicative Limitations**					
43		Hearing	b2309	Hearing functions, unspecified	4707008	Hearing, function (OE)
44		Speaking	b16710	Expression of spoken language	87335007	Speaking (OE)
45						
46	**Environmental Limitations**					
47		Heat	e2250	Temperature	88999006	Heat (PF)
48		Cold	e2250	Temperature		
49		Wetness	e2253	Precipitation	17461003	Wet (QV)
50		Humidity	e2251	Humidity	3525006	Humidity (PF)
51		Noise	e2500	Sound intensity		
52		Vibration	e255	Vibration	33679000	Vibration (PF)
53		Fumes/dusts/odors	e260	Air quality	278423000 33008008	Fume (S) Dust (S)
54		Machinery			61284002	Machine, device (PO)
55		Heights				
56						
57	**Understanding**					
58		Ability to understand very short and simple instructions	d1550	Acquiring basic skills - learning elementary, purposeful actions		
59			b16708	Reception of language, other specified		
60		Ability to understand detailed instructions	d1551	Acquiring complex skills - learning		
61			b16708	Reception of language, other specified		
62	**Memory**					
63		Ability to remember locations and work-like procedures	b1442	Retrieval of memory		
64		Ability to remember very short and simple instructions	b1440/b1441	Short-term memory/Long-term memory		
65		Ability to remember detailed instructions	b1440/b1441	Short-term memory/Long-term memory		
66						
67	**Concentration & Persistence**				82742001 130965009	Concentration, function (OE) Persistence (F)

	A	B	C	D	E	F
1	***Category***	***Concept***	***ICF Code***	***ICF Explanation***	***SNOMED-CT Code***	***SNOMED-CT Explanation***
68		Ability to carry out very short and simple instructions	d2100	Undertaking a simple task		
69		Ability to carry out detailed instructions	d2101	Undertaking a complex task		
70		Ability to maintain attention and concentration for extended periods	d2102	Undertaking a single task independently	6769007	Attention, function (OE)
71		Ability to perform activities within a schedule, maintain regular attendance, and be punctual within customary tolerances	d2301	Managing daily routine		
72		Ability to sustain an ordinary routine without special supervision	d2302	Completing daily routine		
73		Ability to work in coordination with or proximity to others without being distracted by them	d2302	Managing one's own daily routine		
74		Ability to make simple work-related decisions	d177	Making decisions		
75		Ability to complete a normal workday and workweek without interruptions from psychologically based symptoms and to perform at a consistent pace without an unreasonable number and length of rest periods	d2400/d8451	Handling responsibilities/Maintaining a job		
76						
77	**Social interaction**					
78		Ability to interact appropriately with the general public	d730/d7408	Relating with strangers/Formal relationships, other specified		
79		Ability to ask simple questions or request assistance	d3500	Starting a conversaation		

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80		Ability to accept instructions and respond appropriately to criticism from supervisors	d7400	Relating with persons in authority		
81		Ability to get along with coworkers or peers without distracting them or exhibiting behavioral extremes	d7402	Relating with equals	225298002	Interaction w/ others (OE)
82		Ability to maintain socially appropriate behavior and to adhere to basic standards of neatness and cleanliness	d7203/d5404/d5108	Interacting according to social rules/Choosing appropriate clothing/Washing oneself, other specified		
83						
84	**Adaptation**				4452006	Adaptation (OE)
85		Ability to respond appropriately to changes in the work setting	d8458	Acquiring, keeping and terminating a job, other specified		
86		Ability to be aware of normal hazards and take appropriate precautions	d8458	Acquiring, keeping and terminating a job, other specified		
87		Ability to travel in unfamiliar places or use public transportation	d4702	Using public motorized transportation		
88		Ability to set realistic goals or make plans independently of others	b1641	Organization and planning		
89						
90	**Activities of Daily Living**			*Not part of SSA RFC but is used to assess workability; also, other agencies require this information; the following are broad categories of ADLs not referenced above.*		
91			d420	Transferring oneself		
92			d630	Preparing meals		
93			d640	Doing housework	129014002	Doing housework (OE)
94			d510	Washing oneself		
95			d520	Caring for body parts		
96			d530	Toileting	129004006	Toileting (OE)
97			d540	Dressing	129003000	Dressing (OE)
98			d550	Eating	48263008	Eating (OE)
99			d560	Drinking	30953006	Drinking (OE)
100			d570	Looking after one's health		

	A	B	C	D	E	F
1	***Category***	***Concept***	***ICF Code***	***ICF Explanation***	***SNOMED-CT Code***	***SNOMED-CT Explanation***
101		Caregiver (child/adult	e340	Personal care providers and personal assistants	133932002	Caregiver (person
102		Care of pet	e350	Domesticated animals		
103		Sleep	b134	Sleep functions	258158006	Sleep, function (OE)
104		Using transportatior	d470	Using transportation		
105		Driving	d475	Driving	12906000	Driving (OE)
106		Money management	d6200/d860	Shopping/Basic economic transactions	129011005	Shopping (OE)
107		Hobbies	d9204	Hobbies		
108		Social activities	d9205	Socializing		
109		Handedness				
110		Assistive devices	e120	Products and technology for personal indoor and outdoor mobility and transportation		
111		Assistive devices	e125	Products and technology for communication		
112						
113						
114	**Information source**					
115		Physician			309343006	Physician (occupation)
116		Health care provide	e355	Health professionals		
117		Nurse				
118		Physical therapist				
119		Optomotrist				
120		Audiologist			309418004	Audiologist (occupation
121		Podiatrist			159034004	Podiatrist (occupation)
122		Chiropractor				
123		Hospital	e5800	Health services		
124		Patient/claiman				
125		Non-medical source			125676002	Person (person)
126		Other source			260753009	Source (A)
127						
128						
129	**Scalars**					
130	*ICF*					
131	Prefix b (Body Functions)			Generic qualifier with negative scale, used to indicate extent or magnitude of an impairment		
132		NO difficulty (none, absent, neglible, ...)		xxxxx.0 0-4%		
133		MILD difficulty (slight, low, …)		xxxxx.1 5-24%		
134		MODERATE difficulty (medium, fair, …)		xxxxx.2 25-49%		
135		SEVERE difficulty (high, extreme, …)		xxxxx.3 50-95%		

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1	***Category***	***Concept***	***ICF Code***	***ICF Explanation***	***SNOMED-CT Code***	***SNOMED-CT Explanation***
136		COMPLETE difficulty (total, …)		xxxxx.4 96-100%		
137		not specified		xxxxx.8		
138		not applicable		xxxxx.9		
139						
140	Prefix d (Activities & Participation)			Performance qualifier - describes what an individual does in his or her current environment		
141				Capacity qualifier - describes and individual's ability to execute a task or an action		
142		NO difficulty (none, absent, neglible, ...)		xxxxx.0 0-4%		
143		MILD difficulty (slight, low, …)		xxxxx.1 5-24%		
144		MODERATE difficulty (medium, fair, …)		xxxxx.2 25-49%		
145		SEVERE difficulty (high, extreme, …)		xxxxx.3 50-95%		
146		COMPLETE difficulty (total, …)		xxxxx.4 96-100%		
147		not specified		xxxxx.8		
148		not applicable		xxxxx.9		
149						
150	Prefix e (Environmental Factors)			A point or separator alone denotes a barrier		
151				The +sign denotes a facilitator		
152		NO barrier (none, absent, neglible, ...)		xxxxx.0 0-4%		
153		MILD barrier (slight, low, …)		xxxxx.1 5-24%		
154		MODERATE barrier (medium, fair, …)		xxxxx.2 25-49%		
155		SEVERE barrier (high, extreme, …)		xxxxx.3 50-95%		
156		COMPLETE barrier (total, …)		xxxxx.4 96-100%		
157						
158		NO facilitator (none, absent, neglible, ...)		xxxxx+0 0-4%		
159		MILD facilitator (slight, low, …)		xxxxx+1 5-24%		
160		MODERATE facilitator (medium, fair, …)		xxxxx+2 25-49%		
161		SEVERE facilitator (high, extreme, …)		xxxxx+3 50-95%		

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1	***Category***	***Concept***	***ICF Code***	***ICF Explanation***	***SNOMED-CT Code***	***SNOMED-CT Explanation***
162		COMPLETE facilitator (total, …)		xxxxx+4 96-100%		
163		barrier, not specifiec		xxxxx.8		
164		facilitator, not specifiec		xxxxx+8		
165		not applicable		xxxxx.9		
166						
167	*SNOMED-CT*					
168		None (QV)		260413007		
169		Slight (QV)		255510006		
170		Mild (QV)		255604002		
171		Moderate (QV)		6736007		
172		Severe (QV)		24484000		
173		Complete (QV)		255594003		
174		Extreme (QV)		12565001		
175		Profound (QV)		255611003		

CHI DWG Use Case (A)
SSA Residual Physical Functional Capacity Assessment:
Prototype for ICF - SNOMED Mapping

	A	B	C	D	E	F	G	H	I
1	This Spreadsheet demonstrates a proposed ICF-SNOMED Mapping Diagram based on the SSA Residual Physical Functional Capacity Assessment form (RFC) . Red text in cells represents NCHS entries. Green text in cells represents Dr. Laurence Desi's original text from his July 27, 2006 prototype spreadsheet. Blue text in cells represents a synonym match with the RFC Limitation Type.								
2	**RFC Limitation Category**	**Concept: RFC Limitation Type**	**ICF Domain and Chapter**	**ICF Code**	**ICF Code Short Title**	**ICF Code Prose Text**	**UMLS ID**	**SNOMED-CT Code(s)**	**SNOMED-CT Explanation**
3			KEY: b = Body Functions s = Body Structures d = Activities & Participation e = Environmental Factors			"Comment" in a cell presents the complete ICF Prose Text. Place your Mouse over a Prose Text cell that has a red marker in its upper right corner; a Comment box will appear showing the complete ICF text.			KEY: A = Attribute F = Finding OE = Observable Entity PF = Physical Force PO = Physical Object QV = Qualifier Value S = Substance
4	**PHYSICAL RESIDUAL FUNCTIONAL CAPACITY ASSESSMENT**								
5	**Exertional Limitations**	**Lifting**	Activities & Participation Ch. 4: Mobility	d430	Lifting and carrying objects	Raising up an object or taking something from one place to another, such as when lifting a cup . . .	C0565671	288330002	Ability to lift (F)
6			Activities & Participation Ch. 4: Mobility	d4300	Lifting	Raising up an object in order to move it from a lower to a higher level, such as when lifting a glass . . .	C0565676	288335007	Difficulty lifting (F)
7			Activities & Participation Ch. 4: Mobility	d4308	Lifting and carrying, other specified	Same as Short Title	C0206244	258141001 (258141001)	Lifting, function (OE)
8			Activities & Participation Ch. 4: Mobility	d4309	Lifting and carrying, unspecified	Same as Short Title	C0418139	218220002	Overexertion from lifting (F)
9		**Carrying**	Activities & Participation Ch. 4: Mobility	d430	Lifting and carrying objects	Raising up an object or taking something from one place to another, such as when lifting a cup . . .	C0565686 C1286809	288347001 365138008	Difficulty carrying (F) Finding related to ability to carry (F)
10			Activities & Participation Ch. 4: Mobility	d4301	Carrying in the hands	Taking or transporting an object from one place to another using the hands, such as when carrying . . .	C0564362	286524005	Difficulty carrying prepared food (F)
11			Activities & Participation Ch. 4: Mobility	d4302	Carrying in the arms	Taking or transporting an object from one place to another using the arms and hands, such as when . . .	C0575526 C0575648	298755008 298877003	Carrying angle of forearm (OE) Increased carrying angle of elbow joint (F)

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12			Activities & Participation Ch. 4: Mobility	d4303	Carrying on shoulders, hip and back	Taking or transporting an object from one place to another using the shoulders, hip or back . . .	C1286398	364724002	Finding related to ability to walk carrying large toy (F)
13			Activities & Participation Ch. 4: Mobility	d449	Carrying, moving and handling objects, other specified and unspecified	Same as Short Title	C0560116 C0560121	282233005 282238001	Ability to walk carrying large toy (OE) Difficulty in walking carrying large toy (F)
14		**Pushing**	Activities & Participation Ch. 4: Mobility	d435	Moving objects with lower extremities	Performing coordinated actions aimed at moving an object by using the legs and feet, such as kicking . . .	C0580843	303367008	Difficulty pushing (F)
15			Activities & Participation Ch. 4: Mobility	d4350	Pushing with lower extremities	Using the legs and feet to exert a force on an object to move it away, such as pushing a chair away . . .	C0560543	282700001	Difficulty pushing and pulling a large wheeled toy backwards (F)
16			Activities & Participation Ch. 4: Mobility	d445	Hand and arm use	Performing the coordinated actions required to move objects or to manipulate them by using hands . . .	C0560555	282713007	Difficulty pushing and pulling a small wheeled toy forwards (F)
17			Activities & Participation Ch. 4: Mobility	d4451	Pushing	Using fingers, hands and arms to move something from oneself, or to move it from place to place . . .	C0562589	284630001	Pushing other person (F)
18		**Pulling**	Activities & Participation Ch. 4: Mobility	d445	Hand and arm use	Performing the coordinated actions required to move objects or to manipulate them by using hands . . .	C0580848	303372004	Difficulty pulling (F)
19			Activities & Participation Ch. 4: Mobility	d4450	Pulling	Using fingers, hands and arms to bring an object towards oneself, or to move it from place to . . .	C0560122	282239009	Ability to walk backward pulling large toy (OE)
20			Activities & Participation Ch. 5: Self-Care	d5401	Taking off clothes	Carrying out the coordinated tasks of taking clothes off various parts of the body, such as pulling . . .	C0560555	282713007	Difficulty pushing and pulling a small wheeled toy forwards (F)

CHI DWG Use Case (A)
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21		**Sitting**	Activities & Participation Ch. 4: Mobility	d410	Changing basic body position	Getting into and out of a body position and moving from one location to another, such as getting . . .	C0580861 C0576730	303387009 299981009	Difficulty changing position (F) Changing position (QV)
22			Activities & Participation Ch. 4: Mobility	d4100	Lying down	Getting into and out of a lying down position or changing body position from horizonal to any . . .	C0555089	249905003	Difficulty lying down (F)
23			Activities & Participation: Ch. 4: Mobility	d4101	Squatting	Getting into and out of the seated or crouched posture on one's haunches with knees closely drawn up . . .	C0444361	272551004	Sitting with knees drawn up
24			Activities & Participation: Ch. 4: Mobility	d4103	Sitting	Getting into and out of a seated position and changing body position from sitting down to any . . .	C0560813	282897003	Does alternate between sitting and standing (F)
25			Activities & Participation: Ch. 4: Mobility	d4106	Shifting the body's centre of gravity	Adjusting or moving the weight of the body from one position to another while sitting, standing or lying . . .	C0560189	282303001	Ability to balance when sitting (F)
26			Activities & Participation: Ch. 4: Mobility	d415	Maintaining a body position	Staying in the same body position as required, such as remaining seated or remaining standing for . . .	C0560775	282858006	Ability to maintain a sitting position (F)
27			Activities & Participation: Ch. 4: Mobility	d4151	Maintaining a squatting position	Staying in a squatting position for some time as required, such as when sitting on the floor . . .	C0560776	282859003	Able to maintain a sitting position (F)
28			Activities & Participation: Ch. 4: Mobility	d4153	Maintaining a sitting position	Staying in a seated position, on a seat or the floor, for some time as required, such as when sitting at . . .	C0560777	282860008 [33586001]	Unable to maintain a sitting position (F) Sitting position (F)
29			Activities & Participation: Ch. 4: Mobility	d420	Transferring oneself	Moving from one surface to another, such as sliding along a bench or moving from a bed to a chair . . .	C0579098	302267001	Difficulty transferring (F)

CHI DWG Use Case (A)
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30			Activities & Participation: Ch. 4: Mobility	d4200	Transferring oneself while sitting	Moving from a sitting position on one seat to another seat on the same or a different level, such . . .	C0579111	302279001	Difficulty transferring between wheelchair and toilet (F)
31		**Standing**	Activities & Participation Ch. 4: Mobility	d410	Changing basic body position	Getting into and out of a body position and moving from one location to another, such as getting . . .	C0560803	282886003	Difficulty standing from sitting (F)
32			Activities & Participation Ch. 4: Mobility	d4104	Standing	Getting into and out of a standing position or changing body position from standing to any . . .	C0560809	282892009	Difficulty pulling to standing from sitting (F)
33			Activities & Participation Ch. 4: Mobility	d415	Maintaining a body position	Staying in the same body position as required, such as remaining seated or remaining standing for . . .	C0560774	282857001	Difficulty maintaining a standing position (F)
34			Activities & Participation Ch. 4: Mobility	d4154	Maintaining a standing position	Staying in a standing position for some time as required, such as when standing in a queue . . .	C0560769	282852007	Ability to maintain a standing position (OE) Orthostatic body position (F)
35		**Walking**	Body Functions Ch. 7: Neuro-musc-skel and Movement-Related Functions	b770	Gait pattern functions	Functions of movement patterns associated with walking, running or other whole body movements . . .	C0016928 C0427124	63448001; 271705001. 249998005	Gait, function (OE) General finding of gait (F)
36			Activities & Participation Ch. 4: Mobility	d450	Walking	Moving along a surface on foot, step by step, so that one foot is always on the ground, such as when . . .	C0080331	129006008	Walking (OE)
37			Activities & Participation Ch. 4: Mobility	d4500	Walking short distances	Walking for less than a kilometre, such as walking around rooms or hallways, within a building or for . . .	C1286400	364726000 129006008 63448001	Walking distance (F) Walking, function (OE) Gait, function (OE)
38			Activities & Participation Ch. 4: Mobility	d4501	Walking long distances	Walking for more than a kilometre, such as across a village or town, between villages or across open . . .	C1540719	161995002 129006008 63448001	Impaired exercise tolerance; walking distance reduced Walking, function (OE) Gait, function (OE)

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39			Activities & Participation Ch. 4: Mobility	d4502	Walking on different surfaces	Walking on sloping, uneven, or moving surfaces, such as on grass, gravel or ice and snow, or walking . . .	C0560065	282165001 129006008 63448001	Difficulty walking down a slope (F) Walking, function (OE) Gait, function (OE)
40			Activities & Participation Ch. 4: Mobility	d4503	Walking around obstacles	Walking in ways required to avoid moving and immobile objects, people, animals, and vehicles, such as . . .	C1286395	364721005	Ability to start and stop walking spontaneously (F)
41			Activities & Participation Ch. 4: Mobility	d4508	Walking, other specified	Same as Short Title	C0424878	202571003	Walking difficulty due to other specified site (F)
42			Activities & Participation Ch. 4: Mobility	d4509	Walking, unspecified	Same as Short Title	C0424874	202566005	Walking difficulty due to unspecified site (F)
43			Activities & Participation Ch. 4: Mobility	d460	Moving around in different locations	Walking and moving around in various places and situations, such as walking between rooms in a . . .	C0578251	301561001	Difficulty moving around supporting self on furniture (F)
44			Activities & Participation Ch. 4: Mobility	d4600	Moving around within the home	Walking and moving around in one's home, within a room, between rooms, and around the whole . . .	C0425249	160683008	Needs walking aid in home (F)
45			Activities & Participation Ch. 4: Mobility	d4601	Moving around within buildings other than home	Walking and moving around within buildings other than one's residence, such as moving around other . . .	C0427002	249894008	General difficulty in moving (F)
46			Activities & Participation Ch. 4: Mobility	d4602	Moving around outside the home and other buildings	Walking and moving around close to or far from one's home and other buildings, without the use of . . .	C1286274	364578004	Observable feature of walking (OE)
47			Activities & Participation Ch. 4: Mobility	d469	Walking and moving, other specified and unspecified	Same as Short Title	C0560560	282718003	Moving (OE)

CHI DWG Use Case (A)
SSA Residual Physical Functional Capacity Assessment:
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	A	B	C	D	E	F	G	H	I
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48	**Postural Limitations**	**Climbing**	Activities & Participation Ch. 4: Mobility	d455	Moving around	Moving the whole body from one place to another by means other than walking, such as climbing . . .	C0561944	284099002	Difficulty climbing (F)
49			Activities & Participation Ch. 4: Mobility	d4551	Climbing	Moving the whole body upwards or downwards, over surfaces or objects, such as climbing steps . . .	C1290942	129016000	Climbing stairs (OE)
50		**Balancing**	Body Functions Ch. 2: Sensory Functions and Pain	b235	Vestibular functions	Sensory functions of the inner ear related to position, balance and movement. Inclusions: functions of . . .	C0234964	282302006	Difficulty balancing (F)
51			Body Functions Ch. 2: Sensory Functions and Pain	b2351	Vestibular function of balance	Sensory functions of the inner ear related to determining the balance of the body.	C0575090	3235001; 387603000; 298313002.	Impairment of balance (F)
52			Body Functions Ch. 7: Neuro-musc-skel and Movement-Related Functions	b755	Involuntary movement reaction functions	Functions of involuntary contractions of large muscles or the whole body induced by body position . . .	C0582158	304281000	Unable to control posture (F)
53			Activities & Participation Ch. 4: Mobility	d4106	Shifting the body's centre of gravity	Adjusting or moving the weight of the body from one position to another while sitting, standing or lying . . .	C0561945; C1256755	284100005; 416240000 249982003	Ability to control posture (F) Postural balance (OE) Balance (OE)
54		**Stooping**	Activities & Participation Ch. 4: Mobility	d4105	Bending	Tilting the back downwards or to the side, at the torso, such as in bowing or reaching down for an object	C0555090	249906002 9964006	Difficulty bending (F) Flexion, function (OE)
55		**Kneeling**	Activities & Participation Ch. 4: Mobility	d410	Changing basic body position	Getting into and out of a body position and moving from one location to another, such as getting . . .	C0555092	249908001	Difficulty kneeling (F)
56			Activities & Participation Ch. 4: Mobility	d4102	Kneeling	Getting into and out of a position where the body is supported by the knees with legs bent, such as during. . .	C1260920	55864004	Kneeling (F)

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57			Activities & Participation Ch. 4: Mobility	d415	Maintaining a body position	Staying in the same body position as required, such as remaining seated or remaining standing for . . .	C0444356	272545009	Two-point kneeling (F)
58			Activities & Participation Ch. 4: Mobility	d4152	Maintaining a kneeling position	Staying in a kneeling position where the body is supported by the knees with legs bent for some time . . .	C0456983	277773003	Kneeling position (F)
59		Crouching	Activities & Participation Ch. 4: Mobility	d4101	Squatting	Getting into and out of the seated or crouched posture on one's haunches with knees closely drawn up . . .	C0560491	282644006	Difficulty crouching (F)
60		Crawling	Activities & Participation Ch. 4: Mobility	d455	Moving around	Moving the whole body from one place to another by means other than walking, such as climbing . . .	C0560763	282846006	Difficulty moving within a position (F)
61			Activities & Participation Ch. 4: Mobility	d4550	Crawling	Moving the whole body in a prone position from one place to another on hands, or hands and arms . . .	C0560460	282611000	Difficulty crawling (F)
62			Activities & Participation Ch. 4: Mobility	d460	Moving around in different locations	Walking and moving around in various places and situations, such as walking between rooms in a . . .	C0454447	229238007	Moving between two positions (F)
63	Manipulative Limitations	Reaching	Activities & Participation Ch. 4: Mobility	d4105	Bending	Tilting the back downwards or to the side, at the torso, such as in bowing or reaching down for an object	C0560868	282952006	Difficulty bending to reach feet (F)
64			Activities & Participation Ch. 4: Mobility	d445	d445 Hand and arm use	Performing the coordinated actions required to move objects or to manipulate them by using hands . . .	C0459177	229998001	Reach arm position
65			Activities & Participation Ch. 4: Mobility	d4452	Reaching	Using the hands and arms to extend outwards and touch and grasp something, such as when reaching . . .	C0560524	282681005	Difficulty reaching (F)

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66		Handling	Activities & Participation Ch. 4: Mobility	d440	Fine hand use	Performing the coordinated actions of handling objects, picking up, manipulating and releasing them . . .	C0562230; C0556293.	284364006; 228160005.	Hand functions (OE) Hand function disability (F)
67			Activities & Participation Ch. 4: Mobility	d4401	Grasping	Using one or both hands to seize and hold something, such as when grasping a tool or a door knob.	C0565706; C0424243.	288368000; 247918002.	Ability to pass things from hand to hand (OE); Forced grasping (F)
68			Activities & Participation Ch. 4: Mobility	d4402	Manipulating	Using fingers and hands to exert control over, direct or guide something, such as when handling coins or . . .	C0562178; C0565699.	284311007; 288361006.	Ability to manipulate objects (OE); Ability to perform general manipulative activities (OE)
69			Activities & Participation Ch. 4: Mobility	d449	Carrying, moving and handling objects, other specified and unspecified	Same as Short Title	C1286822	365152005	Finding related to ability to pass things from hand to hand (F)
70		Fingering	Activities & Participation Ch. 4: Mobility	d440	Fine hand use	Performing the coordinated actions of handling objects, picking up, manipulating and releasing them . . .	C0561987	284144008	Ability to move hand (OE)
71			Activities & Participation Ch. 4: Mobility	d4400	Picking up	Lifting or taking up a small object with hands and fingers, such as when picking up a pencil.	C0562024; C0565705	284180008; 288367005	Ability to perform hand functions (OE) Difficulty picking up objects (F)
72			Activities & Participation Ch. 4: Mobility	d4402	Manipulating	Using fingers and hands to exert control over, direct or guide something, such as when handling coins or . . .	C0562184	284317006	Ability to manipulate objects relative to one another (OE)
73			Activities & Participation Ch. 4: Mobility	d4403	Releasing	Using fingers and hands to let go or set free something so that it falls or changes position, such as when . . .	C0562172	284305009	Ability to release grip (OE)
74		Feeling	Body Functions Ch. 2: Sensory Functions and Pain	b265	Touch function	Sensory functions of sensing surfaces and their texture or quality. Inclusions: functions of touching, feeling of touch . . .	C0702221 C1285608	70761002; 397624008. 363833003	Touch sensation, function (OE) Observation of sensation of touch (F)

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75			Activities & Participation Ch. 1: Learning and Applying Knowledge	d120	Other purposeful sensing	Using the body's other basic senses intentionally to experience stimuli, such as touching and feeling textures . .	C0563074 C1301549	285158003 397599003	Ability to recognize objects by touch (OE) Ability to sense touch (OE)
76	Visual Limitations	Near/Far Acuity	Body Functions Ch. 2: Sensory Functions and Pain	b210	Seeing functions	Sensory functions relating to sensing the presence of light and sensing the form, size, shape and colour of the . . .	C0042812	83760008 363983007	Visual acuity (OE)
77			Body Functions Ch. 2: Sensory Functions and Pain	b2100	Visual acuity functions	Seeing functions of sensing form and contour, both binocular and monocular, for both distant and near vision.	C0429541	251743004	Near visual acuity (F)
78			Body Functions Ch. 2: Sensory Functions and Pain	b21000	Binocular acuity of distant vision	Seeing functions of sensing size, form and contour, using both eyes, for objects distant from the eye.	C0429540	251742009	Distance visual acuity - binocular (F)
79			Body Functions Ch. 2: Sensory Functions and Pain	b21001	Monocular acuity of distant vision	Seeing functions of sensing size, form and contour, using either right or left eye alone, for objects distant from the eye.	C0429538 C0429539	251740001; 386716001. 251741002; 386714003.	Distance visual acuity - left eye (OE) Distance visual acuity - right eye (OE)
80			Body Functions Ch. 2: Sensory Functions and Pain	b21002	Binocular acuity of near vision	Seeing functions of sensing size, form and contour, using both eyes, for objects close to the eye.	C0429544	251746007	Near visual acuity - binocular (F)
81			Body Functions Ch. 2: Sensory Functions and Pain	b21003	Monocular acuity of near vision	Seeing functions of sensing size, form and contour, using either right or left eye alone, for objects close to the eye.	C0429542 C0429543	251744005; 386711006. 251745006; 386712004.	Near visual acuity - left eye (OE) Near visual acuity - right eye (OE)
82		Depth Perception	Body Functions Ch. 1: Mental Functions	b1565	Visuospatial perception	Mental function involved in distinguishing by sight the relative position of objects in the environment or . . .	C0011586	251763006; 251764000; 59104008.	Stereoscopic vision (observable entity)
83		Accommodation	Body Functions Ch. 2: Sensory Functions and Pain	b2150	Functions of internal muscles of the eye	Functions of the muscles inside the eye, such as the iris, that adjust the shape and size of the pupil and lens of the eye.	C0278210	55891002	Problem of visual accommodation; Difficulty focusing (F)

CHI DWG Use Case (A)
SSA Residual Physical Functional Capacity Assessment:
Prototype for ICF - SNOMED Mapping

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84		**Color Vision**	Body Functions Ch. 2: Sensory Functions and Pain	b21021	Colour vision	Seeing functions of differentiating and matching colours.	C0086032	765005; 271726001	Color vision (OE)
85		**Visual Fields**	Body Functions Ch. 2: Sensory Functions and Pain	b2101	Visual field functions	Seeing functions related to the entire area that can be seen with fixation of gaze. Inclusions: impairments such as in	C1563190	416626008	Functional visual field loss (OE)
86			Body Functions Ch. 2: Sensory Functions and Pain	b2152	Functions of external muscles of the eye	Functions of the muscles that are used to look in different directions, to follow an object as it moves across the visual. .	C0042826	73750009; 271729008	Visual field (OE)
87	**Communicative Limitations**	**Hearing**	Body Functions Ch. 2: Sensory Functions and Pain	b230	Hearing functions	Sensory functions relating to sensing the presence of sounds and discriminating the location, pitch, loudness . . .	C0018767	47078008	Hearing, function (OE)
88			Body Functions Ch. 2: Sensory Functions and Pain	b240	Sensations associated with hearing and vestibular function	Sensations of dizziness, falling, tinnitus and vertigo. Inclusions: sensations of ringing in ears, irritation in ear, aural pressure, nausea associated with	C0430638	268363004	Auditory (or) vestibular test abnormal (F)
89			Environmental Factors Ch. 1: Products and Technology	e1251	Assistive products and technology for communication	Adapted or specially designed equipment, products and technologies that assist people to send and receive . . .	C0018768	6012004	Hearing aid, device (physical object)
90			Activies & Participation Ch. 1: Learning and Applying Knowledge	d115	Listening	Using the sense of hearing intentionally to experience auditory stimuli, such as listening to a radio, music . . .	C0428756	250891003	Listening level (OE)
91		**Speaking**	Body Functions Ch. 1: Mental Functions	b1470	Psychomotor control	Mental functions that regulate the speed of behaviour or response time that involves both motor and . . .	C0564257	286416003	Difficulty speaking at normal rate (F)
92			Body Functions Ch. 1: Mental Functions	b16710	Expression of spoken language	Mental functions necessary to produce meaningful spoken messages.	C0564251	286410009	Difficulty speaking intelligibly (F)

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93			Activities & Participation Ch. 3: Communication	d330	Speaking	Producing words, phrases and longer passages in spoken messages with literal and implied meaning, such as . . .	C1527347	47004009	Difficulty speaking (F)
94			Activities & Participation Ch. 3: Communication	d3501	Sustaining a conversation	Continuing and shaping a dialogue or interchange by adding ideas, introducing a new topic or retrieving a topic . . .	C1286732	365061008	Finding related to ability to maintain conversation (F)
95	Environmental Limitations	Heat	Body Functions Ch. 2: Sensory Functions and Pain	b2700	Sensitivity to temperature	Sensory functions of sensing cold and heat.	C0576655	299906001 88999006	Heat sensation absent (F) Heat (PF)
96			Body Functions Ch. 5: Functions of the Digestive, Metabolic and Endocrine Systems	b5501	Maintenance of body temperature	Functions involved in maintaining optimal body temperature as environmental temperature changes.	C0549167	248469008	Tolerance of changes in ambient temperature (OE)
97			Environmental Factors Ch. 2: Natural Environment and Human-Made Changes to Environment	e2250	Temperature	Degree of heat or cold, such as high and low temperature, normal or extreme temperature.	C1301559	397628006	Heat sensation, function (OE)
98		Cold	Body Functions Ch. 2: Sensory Functions and Pain	b2700	Sensitivity to temperature	Sensory functions of sensing cold and heat.	C0576657	102998005	Cold sensation absent (F)
99			Body Functions Ch. 5: Functions of the Digestive, Metabolic and Endocrine Systems	b5501	Maintenance of body temperature	Functions involved in maintaining optimal body temperature as environmental temperature changes.	C0009269	80585000	Intolerant of cold (OE)
100			Environmental Factors Ch. 2: Natural Environment and Human-Made Changes to Environment	e2250	Temperature	Degree of heat or cold, such as high and low temperature, normal or extreme temperature.	C0497061 C0479553	221639006 221277007; 221266001	Exposure to excessive natural cold Exposure to excessive cold of man-made origin
101			Activities & Participation Ch. 5: Self-Care	d5700	Ensuring one's physical comfort	Caring for oneself by being aware that one needs to ensure, and ensuring, that one's body is in a comfortable position	C0150213	386284008	Environmental Management: Comfort

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102		**Wetness**	Environmental Factors Ch. 2: Natural Environment and Human-Made Changes to Environment	e2253	Precipitation	Falling of moisture, such as rain, dew, snow, sleet and hail.	C0205381	17461003	Damp Wet Humid Moist (QV) Wet (QV)
103			Activities & Participation Ch. 5: Self-Care	d5200	Caring for skin	Looking after the texture and hydration of one's skin, such as by removing calluses or corns and using moisturizing . . .	C0241126 C1286233	16514006 364532007	Skin wetness (F) Moistness of skin (A)
104		**Humidity**	Environmental Factors Ch. 2: Natural Environment and Human-Made Changes to Environment	e225	Climate	Meteorological features and events, such as the weather. Inclusions: temperature, humidity, atmospheric . . .	C0020167		
105			Environmental Factors Ch. 2: Natural Environment and Human-Made Changes to Environment	e2251	Humidity	Level of moisture in the air, such as high or low humidity.		3525006	Humidity (PF)
106			Environmental Factors Ch. 2: Natural Environment and Human-Made Changes to Environment	e2600	Indoor air quality	Nature of the air inside buildings or enclosed areas, as determined by odour, smoke, humidity, air conditioning . . .			
107			Environmental Factors Ch. 2: Natural Environment and Human-Made Changes to Environment	e2601	Outdoor air quality	Nature of the air outside buildings or enclosed areas, as determined by odour, smoke, humidity, ozone levels, and . . .			
108		**Noise**	Environmental Factors Ch. 2: Natural Environment and Human-Made Changes to Environment	e2501	Sound quality	Nature of a sound as determined by the wavelength and wave pattern of the sound and perceived as the timbre . . .			
109			Activies & Participation Ch. 1: Learning and Applying Knowledge	d160	Focusing attention	Intentionally focusing on specific stimuli, such as by filtering out distracting noises.			
110		**Vibration**	Body Functions Ch. 2: Sensory Functions and Pain	b270	Sensory functions related to temperature and other stimuli	Sensory functions of sensing temperature, vibration, pressure and noxious stimulus. Inclusions: functions of being . .			

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111			Environmental Factors Ch. 2: Natural Environment and Human-Made Changes to Environment	e2500	Sound intensity	Level or volume of auditory phenomenon determined by the amount of energy being generated, where high energy .		33679000	Vibration (PF)
112			Environmental Factors Ch. 2: Natural Environment and Human-Made Changes to Environment	e255	Vibration	Regular or irregular to and fro motion of an object or an individual caused by a physical disturbance, such as shaking . .			
113		Fumes / dusts / odors / gases / poor ventilation, etc.	Environmental Factors Ch. 2: Natural Environment and Human-Made Changes to Environment	e260	Air quality	Characteristics of the atmosphere (outside buildings) or enclosed areas of air (inside buildings), and which may . . .		278423000 33008008	Fumes (S) Dust (S)
114			Environmental Factors Ch. 2: Natural Environment and Human-Made Changes to Environment	e2608	Air quality, other specified	Same as Short Title			
115			Environmental Factors Ch. 2: Natural Environment and Human-Made Changes to Environment	e2609	Air quality, unspecified	Same as Short Title			
116		Hazards (machinery)	Environmental Factors Ch. 1: Products and Technology	e1350	General products and technology for employment	Equipment, products and technology used for employment to facilitate work activities, such as tools . . .		61284002	Machine, device (PO)
117			Environmental Factors Ch. 5: Services, Systems and Policies	e5151	Architecture and construction systems	Administrative control and monitoring mechanisms that govern the planning, design, construction and . . .			
118			Environmental Factors Ch. 5: Services, Systems and Policies	e5900	Labour and employment services	Services and programmes provided by local, regional or national governments, or private organizations to find . . .			
119		Hazards (heights)	Activities & Participation Ch. 2: General Tasks and Demands	d2402	Handling crisis	Carrying out simple or complex and coordinated actions to cope with decisive turning points in a situation or times . . .			

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120			Environmental Factors Ch. 2: Natural Environment and Human-Made Changes to Environment	e298	Natural environment and human-made changes to environment, other specified	Same as Short Title			
121			Environmental Factors Ch. 2: Natural Environment and Human-Made Changes to Environment	e299	Natural environment and human-made changes to environment, unspecified	Same as Short Title			
122									
123	**MENTAL RESIDUAL FUNCTIONAL CAPACITY ASSESSMENT**								

CHI Disability Terminology Questionnaire - Summary

Clinical Information - Agency/Instrument	*Scalars*	*Comments/Additional Information*	*Data Type(s)*
Exertional Limitations			
RRB	Pounds, hours, limited/unlimited		numerical/categorical
IRF-PAI	Activity did not occur, less than 50', 50'-149', 150'	Shortness of breath on exertion: yes/no; at rest: yes/no	ordinal/categorical
OASIS	Walking less than or more than 20 feet, at rest, & never	Shortness of breath: walking less than or more than 20 feet, at rest, & never	ordinal/categorical
DOS		Occasional lifting,Occasional pushing cart,frequent standing and sitting	Categorical
SSA	Pounds, hours, limited/unlimited	<10 lbs, 10 lbs, 20 lbs, 50 lbs, 100 lbs+	ordinal/categorical
DOL	Pounds, hours, feet/blocks	To the extent that this relates to the individual's ability to perform in the workplace and there is some residual work-related disability	numerical
Postural Limitations			
RRB	Constantly, frequently, occasionally, never		ordinal
MDS		Balance: maintained position required in test, unsteady bu able to rebalance w/o support, partial support, not able to attempt test w/o physical assist	ordinal
IRF-PAI	Frequently, occasionally, never	Balance problem: yes/no; Total # falls during rehab	ordinal/numerical/categorical
DOS		Frequent/infrequent	
SSA	Frequently, occasionally, never		ordinal
DOL	Frequently, occasionally, never	To the extent that this relates to the individual's ability to perform in the workplace and there is some residual work-related disability	ordinal
Manipulative Limitations			
RRB	limited, unlimited		categorical/ordinal
DOS	limited, unlimited	Hand frequent dexterity,fine grasp handling,Bimanual handling	ordinal/categorical
SSA	None, limited, unlimited		ordinal
DOL	limited, unlimited	To the extent that this relates to the individual's ability to perform in the workplace and there is some residual work-related disability	categorical/ordinal
Visual Limitations			
VBA		Snellen, Jaegar, Reduced Snellen, Goldmann Bowl	numerical (lab results)
RRB	limited, unlimited		categorical/ordinal
MDS	adequate, impaired, moderately impaired, highly impaired, severely impaired		ordinal

CHI Disability Terminology Questionnaire - Summary

Clinical Information - Agency/Instrument	*Scalars*	*Comments/Additional Information*	*Data Type(s)*
OASIS	Normal vision; partially impaired-cannot see medication labels or newsprint; can see obstacles in path;-severely impaired, cannot locate objects without touching or hearing;-patient non-responsive	Identify vision with corrective lenses, if usually worn	ordinal
DOS	limited, unlimited	Snellen,Jaeger,Reduced Snellen	Lab results
SSA	None, limited, unlimited	Near, distant, depth, accommodation, color, field	ordinal
DOL	limited, unlimited	To the extent that this relates to the individual's ability to perform in the workplace and there is some residual work-related disability	categorical/ordinal

CHI Disability Terminology Questionnaire - Summary

Clinical Information - Agency/Instrument	*Scalars*	*Comments/Additional Information*	*Data Type(s)*
ADLs			
VBA	Able/unable		categorical/ordinal
RRB	none, mild, moderate, marked and extreme	Daily routines, sleeping/resting, personal hygiene, transportation, finances, eating/meal preparation, housework/hobbies, shopping, socialization/entertainment, employment/work routine	ordinal
MDS	Self performance: independent, supervision, limited assistance, extensive assistance, total dependence, activity did not occur; Support: no set-up or help from staff, set-up help only, one person assist, two person assist, activity did not occur	bed mobility, transfer, walk in room, locomotion, dressing, eating, toilet use, personal hygiene, bathing	ordinal
IRF-PAI	1-total assist; 2-max assist; 3-mod assist; 4-min assist; 5-supervision; 6- modified independence; 7-complete independence		ordinal
DOS		Doing dishes, making beds,preparing meals,yardwork,cleaning windows,laundry.	
OASIS - grooming, dressing upper & lower body, bathing, toileting, transferring, ambulation/locomotion, feeding or eating	independent; requires a device or human supervision or assistance		ordinal
Communicative Limitations			
VBA	Able/unable to speak above a whisper	Audiogram, PTA, SDT	numerical/categorical/ordinal
RRB	limted, unlimited		categorical/ordinal
MDS	hears adequately, minimum difficulty, hears in special situations only, highly impaired; Speech: clear, unclear, no speech		ordinal
IRF-PAI	1-total assist; 2-max assist; 3-mod assist; 4-min assist; 5-supervision; 6- modified independence; 7-complete independence		ordinal
DOL	limted, unlimited	To the extent that this relates to the individual's ability to perform in the workplace and there is some residual work-related disability	categorical/ordinal
DOS		Audiogram.speech discrimination	Lab results
SSA	None, limited, unlimited	Hearing, speaking	ordinal
OASIS	minimal difficulty, moderate difficulty, severe difficulty, unable to speak/hear	speech in patient's own [primary?] language; hearing with hearing aids if usually worn	ordinal

CHI Disability Terminology Questionnaire - Summary

Clinical Information - Agency/Instrument	*Scalars*	*Comments/Additional Information*	*Data Type(s)*
Environmental Limitations			
RRB	no, some, moderate, unlimited	also, walking on uneven terrain	ordinal
OASIS	heavy smoking	Identify if patient has exposure to heavy smoking or not	Categorical
DOS		Inability/ability to tolerate	Categorical
SSA	Unlimited, avoid conc exposure, avoid mod exposure, avoid all exposure	Cold, heat, wetness, humidity, noise, vibration, fumes/odors/gases/dusts, hazards(machinery/heights	ordinal
DOL	no, some, moderate, unlimited	To the extent that this relates to the individual's ability to perform in the workplace and there is some residual work-related disability	ordinal

CHI Disability Terminology Questionnaire - Summary

Clinical Information - Agency/Instrument	*Scalars*	*Comments/Additional Information*	*Data Type(s)*
Understanding & Memory			
VBA	Impaired/mild impairment/ not impaired		ordinal
RRB	No evidence of limitation/not significantly limited, moderate, marked		ordinal
MDS	OK, memory problem	Short term memory; long term memory; Memory recall: normally able to recall: current season, location of own room, staff names/faces; that he/she is in nursing home; none of the above	Categorical
IRF-PAI	1-total assist; 2-max assist; 3-mod assist; 4-min assist; 5-supervision; 6- modified independence; 7-complete independence		ordinal
OASIS	alert/oriented; requires prompting or cueing; requires assistance and direction; requires considerable assistance; totally dependent	Cognitive functioning	ordinal
DOS		mild impairment,not impaired	categorical/ordinal
SSA	not,moderate, marked, no evidence, not ratable	Locations, procedures, simple & detailed instructions	ordinal/categorical
DOL	not, mild, moderate, marked	To the extent that this relates to the individual's ability to perform in the workplace and there is some residual work-related disability	ordinal
Sustained Concentration & Persistence			
VBA	Total/deficient/reduced/occasional decrease/mild or transient/none		ordinal
RRB	No evidence of limitation/not significantly limited, moderate, marked		ordinal
OASIS	alert/oriented; requires prompting or cueing; requires assistance and direction; requires considerable assistance; totally dependent	Cognitive functioning	ordinal
DOS		none/occcasional,reduced ,deficient	ordinal
SSA	not,moderate, marked, no evidence, not ratable	Carry out instructions, maintain concentration, perform activities regularly, routine w/o supervision, work w/o bein distracted, make decisions, complete activities	ordinal/categorical
DOL	not, mild, moderate, marked	To the extent that this relates to the individual's ability to perform in the workplace and there is some residual work-related disability	ordinal
Social Interaction			
VBA	Total/deficient/reduced/occasional decrease/mild or transient/none		ordinal

CHI Disability Terminology Questionnaire - Summary

Clinical Information - Agency/Instrument	*Scalars*	*Comments/Additional Information*	*Data Type(s)*
RRB	No evidence of limitation/not significantly limited, moderate, marked		ordinal
MDS	not, mild, moderate, marked limitation	Sense of initiative/involvement: at ease w/ others; at ease w/ planned, structured activities; at ease w/ self-initiated activities; establishes own goals; pursues involvement in life of facility; accepts invitations to group activities	ordinal
IRF-PAI	1-total assist; 2-max assist; 3-mod assist; 4-min assist; 5-supervision; 6- modified independence; 7-complete independence		ordinal
DOS		None,occasional decrease,mild or transient.	ordinal
DOL		To the extent that this relates to the individual's ability to perform in the workplace and there is some residual work-related disability	ordinal/categorical
SSA	not,moderate, marked, no evidence, not ratable	Interact appropriately, request assistance, accept instructions/criticism, get along w/ co-workers, maintain socially appropriate behavior	ordinal/categorical
OASIS	No scale - check all that apply	verbal disruption, physical aggression, socially inappropriate behavior	Categorical

CHI Disability Terminology Questionnaire - Summary

Clinical Information - Agency/Instrument	*Scalars*	*Comments/Additional Information*	*Data Type(s)*
Adaptation			
RRB	No evidence of limitation/not significantly limited, moderate, marked		ordinal
DOS		No info	
SSA	not,moderate, marked, no evidence, not ratable	Respond to changes is work setting, aware of hazards, travel to unfamiliar places, set realistic goals	ordinal/categorical
OASIS	Independent; ride in a car/taxi driven by another; unable to ride in a car/taxi; must use ambulance	physical & mental ability to use a car, taxi or public transportation	ordinal/categorical
Other Clinical Information			
MDS: mood, behavior, continence, disease diagnoses, ICD-9 codes, health conditions/pain, oral/nutritional status, skin condition, medications, special treatment		see MDS 2.0 form at 222.cms.hhs.gov/quality/mds20	
SSA		Items less than no limitation require written documentation.	Text
IRF-PAI: bowel & bladder continence; coughing, clearing airway; pressure ulcers; pain; ICD-9 codes, co-morbid conditions; etiologic diagnosis	Bowel & bladder: 0-7 scale; 7=no accidents, 1+five or more in 7 days; Cough/airway clearing: yes/no; Pressure ulcers: 0-5 scale, 0=no press ulcer, 4=Stage IV press ulcer, 5=unstageable; Pain: 0-10 scale; 0=no pain, 10=worst possible pain		ordinal

CHI Disability Terminology Questionnaire - Summary

Information Sources	*Comments/Additional Information*
Private physicians' records	
VBA	
RRB	
MDS	Transfer info
IRF-PAI	Transfer info
NCHS*	
	Within the federal health surveys conducted by NCHS and the Bureau of the Census, private physicians' records would only be reviewed within the National Ambulatory Medical Care Survey (NAMCS), which incorporates a sampling of chart reviews reflecting office-based patient encounters, diagnostically coded. The National Health Interview Survey (NHIS), from which this Questionnaire's responses had been drawn, does not inquire directly with treating physicians or other clinicians.
DOS	
SSA	
DOL	
Other HCP records	
VBA	
RRB	
MDS	Nursing home medical record on the patient/residen
DOL	
NCHS*	As above. The National Ambulatory Medical Care Survey and the National Hospital Ambulatory Medica Care Survey (NHAMCS) do inquire among physicians and hospitals to corroborate self-reported responses from sampled individuals, but the NHIS relies solely on self-reported responses.
DOS	
SSA	Any licensed HCP
IRF-PAI	
Hospital Records	
VBA	
RRB	
MDS	Hospital discharge/transfer info
IRF-PAI	Hospital discharge/transfer info
NCHS*	NHAMCS only.
DOS	
SSA	
DOL	
State Agencies	
VBA	
	Information goes from federal to state and back to federal often involving state disability determinatic
SSA	services or rehab services
RRB	
Other federal agencies	
VBA	
RRB	
DOS	
SSA	Can be any federal agency with medical records; VA most commor
OASIS	Home health agency assessment tool, OASIS data set for Medicare-certified home health agenci
Other medical sources	
SSA	Other “other medical sources” as defined by regulatio
MDS	Other medical professionals' observations of the resident: PT, OT, SLP, nurses aid.
Employers	
VBA	
DOS	
SSA	Only if employer has relevant medical record; for example, work-related injuries/illness
RRB	
Other non-medical sources	
MDS	Family's observations
SSA	Family's and other's observations
IRF-PAI	Family's observations

CHI Disability Terminology Questionnaire - Summary

Information Collection	*Comments/Additional Information*
Manual Only	
RRB	
CMS	
Primarily manual/some electronic	
VBA	
DOS	
DOL	Electronic submission is solely from contract RNs
About equal manual & electronic	
SSA	In process of converting to entire electronic environment
IRF-PAI	
Some manual/mostly electronic	
OASIS	Roughly, 60% HHAs use electronic POS device to collect assessment data; 40% use manual paper assessment tool
Electronic only	

CHI Disability Terminology Questionnaire - Summary

Electronic Information Collection	*Comments/Additional Information*
Information collection by web portal	
SSA	Especially consultative examinations
DOL	Electronic submission is solely from contract RNs
Information collection by other means	
DOS	
SSA	Receiving her from VA; other records scanned into electronic format
VBA	
Specific plans to expand electronic data collection	
SSA	Working to develop all electronic environment
Specific plans to implement electronic data collection	
Electronic only	
OASIS	HHAs transmit OASIS data via the Medicare Data Communications Network, a private telephone line that CMS supports through AT&T

CHI Disability Terminology Questionnaire - Summary

Information Processing	*Comments/Additional Information*
Manual only	
RRB	
Primarily manual/some electronic	
About equal manual & electronic	
CMS	Varies by site
SSA	In process of converting to entire electronic environment
Some manual/mostly electronic	
Electronic only	
VBA	
IRF-PAI	
DOS	
OASIS	Outcome-based quality monitoring and outcome reports are generated by IFMC and HHA access their individual reports using the MDCN network in place
DOL	All case records are maintained in an electronic format

CHI Disability Terminology Questionnaire - Summary

Electronic Information Processing	*Comments/Additional Information*
Information collection by web portal	
SSA	For consultative exams
Information collection by other means	
VBA	
Specific plans to expand electronic data collection	
SSA	
Specific plans to implement electronic data collection	
Electronic only	
MDS	Nursing home sites transmit MDS data via Medicare Data Communications Network (MDCN): a private telephone line that CMS supports through AT&T
IRF-PAI	Info gets transmitted from Inpatient Rehab Facility (IRF) to CMS
OASIS	Outcome-based quality monitoring and outcome reports are generated by IFMC and HHA access their individual reports using the MDCN network in place
DOL	Manual information is scanned inot an electronic format and maintained in that format

CHI Disability Terminology Questionnaire - Summary

Information Use	*Comments/Additional Information*
Qualification for cash benefits	
VBA	
SSA	
RRB	
DOL	
Eligibility for rehabilitation services	
VBA	
IRF-PAI	ICD-9 codes must match eligible codes for rehab
DOL	
Disability Retirement	
DOS	
Eligibility for assignments	
DOS	
New employee hiring	
Other use	
MDS	Data derived from the MDS: Guides patient/resident care planning process; Generates performance numbers for publicly reported Quality Measures; Drives Medicare reimbursement and Medicaid payment in some states; Provides vital info for the nursing home survey & certification process
IRF-PAI	Medicare reimbursement; IRF transmits data to a central Uniform Data System for quality reporting (Private organization: generates reports to providers comparing their sites' performance to similar sites and nationally)
OASIS	OASIS data is personal health information used to create an individual Plan of Care for the patient during the home health episode

CHI Disability Terminology Questionnaire - Summary

Overall Agency Disability Determination	*Comments/Additional Information*
Dichotomous	
SSA	
DOS	
RRB	
Semi-quantitative	
DOL	Initial determination is disability for date-of-injury employment; however, once partial disability is established rehab efforts begin to find employment within the established work restrictions
Quantitative	
VBA	
DOS	
DOL	To the extent that a permanent impairment is to a member cited in our schedule of permanent impariment
Other	

CHI Disability Terminology Questionnaire - Summary

Other Information - Agency	*Comments/Additional Information*
RRB	RR service & earnings, non-RR earnings, job duties
DOS	Independent Comprehensive Medical Functional Capacity Determination.
DOL	Factual information relating to the alleged work factors resulting in a medical condition

Appendix E

The following text supports Scenario # 3, described as the "Terminology Integration for the ICF Classification and the SNOMED CT® Vocabulary."

The example in this Scenario pertains to Back Pain. The demonstrated techniques involve the process of Terminology Integration, or in parlance "mapping" new vocabularies, like the ICF, with components of the existing Unified Medical Language System (UMLS), such as SNOMED-CT.

The original building blocks of this Scenario had been compiled by Dr. Olivier Bodenreider of the U.S. National Institutes of Health, National Library of Medicine, Division of Medical Ontology Research, who presented many elements of this Scenario at the June, 2005 11th Annual North American Collaborating Center Conference on the ICF, in Rochester, MN, and again in July, 2005 before the DHHS Office on Disability's Subcommittee on the ICF, in Washington, DC. In those presentations, Dr. Bodenreider also gave intellectual credit to Dr. Marcelline Harris for selected outcomes reported from the grant-funded research conducted by Professor Harris, in her role as Principal Investigator, and her colleagues in the Division of Biomedical Informatics at the Mayo Clinic College of Medicine, Rochester, MN.

The UMLS serves as a vehicle for regulatory standards, such as the implementation of HIPAA and, as anticipated, the CHI at maturity. It integrates many different types of biomedical terminologies and vocabularies. UMLS includes vocabularies of clinical terms, as with SNOMED-CT, and vocabularies for information sciences, like MeSH terms. UMLS includes the specialized vocabularies within nursing (e.g., NANDA, Omaha), dentistry (e.g, CDT), psychiatry (e.g., DSM), review of adverse reactions (e.g., COSTART), and primary care (e.g., ICPC). UMLS also includes the data exchange terminologies embodied in HL7 and Clinical LOINC. Finally, UMLS incorporates the WHO Classifications and statistical terminologies, including ICD-9-CM; planning is underway to include both ICD-10-CM and ICF within the UMLS in due course. Therefore this Scenario on Terminology Integration is presented as an exercise of working within and throughout the UMLS.

The UMLS is comprised of three broad linguistic components:

- the Metathesaurus, which lists concepts and conceptual relationships;
- the Semantic Network, which links semantic types into semantic relationships; and
- Lexical Resources, a toolkit of lexical tools that manage the variation within each biomedical terminology and generate searchable keywords.

This Scenario pertains mainly to the Metathesaurus and the Semantic Network components of the UMLS.

It might be helpful for the reader to visualize the Metathesaurus as a two-dimensional template or a simple flat piece of paper, in which main Concepts like "Heart" are

surrounded by an array of related cardiac Concepts such as “Heart valves,” “Cardiotonic Agents,” “Mediastinum,” “Angina Pectoris,” “Beta-blockers,” and others. Hovering above this template in a third dimension would be a broad Semantic Network of Semantic Types or observations that link in various and multiple ways to the set of Concepts on the Metathesaurus template. This Semantic Network would resemble a spider’s web of information linkages, above and around the various Concepts on the two-dimensional template. Examples of Semantic Types would include “Anatomical Structure,” “Embryonic Structure,” “Disease or Syndrome,” “Pharmacologic Group” and “Population Group.” The spider’s web that would unite the strands in this three-dimensional visualization represents the modeled Terminology Integration that must occur for ICF and SNOMED-CT vocabularies to yield a “usefully related match,” then forming the datum to be transmitted electronically in the HL7 “wrapper” described above in this Standards Adoption Recommendation.

The term “Pain in back” is already present in the Metathesaurus.

To begin, primary efforts need to be invested in trying to make an Exact Match. If a clinician writes a chart note using the English words “Pain in back,” either by manual entry or prospectively using an electronic entry tool, the ICF code b28013 can be assigned [Body Functions domain; Chapter 2, “Sensory Functions and Pain” --- “Pain in back: sensation of unpleasant feeling indicating potential or actual damage to some body structure felt in the back”].

Luckily, SNOMED-CT contains a code for “Backache, unspecified (finding)” (C0004604), which among many sets of available English synonyms that refer to back pain includes “Pain in back” as one such synonym, and a likely candidate for text matching. In this case, there is an Exact Match in the given text strings. Directly mapped links among Concepts can be visualized between the respective ICF and SNOMED-CT terms, and data about assessments of the patient’s back pain could be transmitted.

But if the clinician writes a chart note using the original term “Pain in joints,” at first a genuinely appropriate ICF code can be assigned from the Body Functions domain: b28016 [“Pain in joints: sensation of unpleasant feeling indicating potential or actual damage to some body structure felt in one or more joints, including small and big joints”]. There is no direct semantic match in SNOMED-CT relying on the words “pain in joints,” but the Concept can be fairly easily mapped to the existing SNOMED-CT term for “Pain in a joint, site unspecified” (C0003862) as a “Sign or Symptom.” By synonym, “Arthralgia” represents a suitable diagnostic term within C0003862 that could be entered. Fortunately SNOMED-CT affords the capacity to achieve an even more minute level of granularity with its additional codes for Arthralgia at specific joints, if such additional information were provided in the original record.

This “Pain in joints” circumstance represents an example of a “Match After Normalization.” Normalization is one of the “Lexical Knowledge” tools used within Terminology Integration. Specifically, Normalization involves such semantic tasks as removing genitive case, “stop words” and upper or lower cases from terms, stripping

punctuation and inflections, and sorting words so that sets of clinical record words have been reduced or normalized to their most basic components for UMLS purposes. In this circumstance, the "Match After Normalization" could be represented in the normalized term "joint pain." It is on the normalized term that the "usefully related vocabulary match" will have been achieved between ICF and SNOMED-CT codes.

In some circumstances, "No Matching Found" is the outcome. For example, ICF codes can be either too general or too specific for satisfactory matching. ICF code b2801 [Body Functions domain; "Pain in body part: Sensation of unpleasant feeling indicating potential or actual damage to some body structure felt all over, or throughout the body"] is too general. ICF code b2803 ["Radiating pain in a dermatome: Unpleasant sensation indicating potential or actual damage to some body structure located in areas of skins served by the same nerve root"] is too specific. ICF code b28012 ["Pain in stomach or abdomen: Sensation of unpleasant feeling indicating potential or actual damage to some body structure in the stomach or abdomen"] suffers from a common problem within many ICF codes: the "or" yields the practical inability to assign the code to one and only one discrete health state. In each case, no corresponding synonyms can be found in SNOMED-CT. In ICF parlance this "or" problem is called a "coordination" problem, resulting from the attempt to maximize parsimony. Coordination problems can only be completely resolved in a subsequent edition of ICF.

In still other circumstances, "Multiple Matches" can arise as the outcome. In these circumstances, the greatest degree of variability among the terminologies is exhibited, and there is substantial sensitivity to original errors in a record, the use of shorthand or jargon, and incomplete acronyms. For example, ICF code b1304 [Body Functions domain; "Impulse control: Mental functions that regulate and resist sudden intense urges to do something"] could potentially match on at least three discrete SNOMED-CT codes. Those might include: C0517616, "Ability to self-restrain compulsive or impulsive behaviors" and its synonyms; C0262701, "Assisting the patient to mediate impulsive behavior through application of problem-solving strategies to social and interpersonal situations"; and the synonym match at C0150632, "Impulse control." In these situations, further discussion on rule-making will be necessary, to render "Multiple Matches" into "Matches After Normalization." No such rule set exists currently. Therefore, resolving Multiple Match cases currently requires manual review by experts who can produce the necessary disambiguation.

Above, the term "Lexical Knowledge" was referred to as one of the tools used within Terminology Integration. Another Terminology Integration tool is "Semantic Pre-processing." This tool relies on metadata within the various source vocabularies. Semantic Pre-processing results in tentative categorization, and utilizes lexical features to generate positive or negative evidence for a possible synonymic match. The UMLS is ordered into a large number of Semantic Groups, comprised of the metadata terms from the source vocabularies that are components of the UMLS. For example, UMLS Semantic Groups include "Activities and Behaviors," "Disorders," "Physiology," and others. Similarly, it can be legitimately observed that the ICF is ordered into a set of Semantic Groups, too, although the Classification currently does not explicitly feature

such an ordering. Any Semantic Grouping of the ICF must be considered investigational at this time. For discussion purposes, one Semantic Grouping of the ICF could invoke the four existing Domains initially, then distinguish subgroups. For example, the Body Functions domain could be parsed into "Physiology," "Sign or Symptom," "Finding," "Biologic Function," and "Individual Behavior" subgroups. From such an ordering, Semantic Pre-processing could ensue utilizing the techniques of Validation and Disambiguation to generate either Exact Matches or Matches After Normalization.

Research efforts are underway to distill the existing 1,495 discrete codes within ICF into ordered sets of codes that can be covered with the Lexical Knowledge and Semantic Pre-processing tools of Terminology Integration. This research is funded by the National Library of Medicine and conducted mainly at the Mayo Clinic [PI: Marcelline Harris, Grant Number R01LM007453]. Recently the investigators reported that, among the 1,495 codes, 478 codes (32 %) can be initially removed from the working set because of their inclusion in their prose descriptions the words "other specified," "unspecified," both "other specified" and "unspecified," or "specified." 1,017 ICF codes would remain. Among them, the mapping effort underway has yielded about a 35 % completion rate: 359 ICF codes have been completely mapped to the UMLS Metathesaurus, and are functionally ready to use, although they remain in check until the full complement of ICF codes can be mapped. Among the four ICF domains, the largest volume of codes exist in the Body Functions domain, and about 32 % of those Body Functions codes have been mapped, for example (Bodenreider, 2005). The pace of this mapping endeavor would probably increase if it moved from the research sector to the commercial sector, but this evidence suggests that a strong business case can soon be justifiably made that Terminology Integration between ICF and SNOMED-CT, or other UMLS vocabularies, is just on the horizon.

Harris and colleagues (2003) have also demonstrated a Java-based "term extraction tool," an algorithm that identified, parsed, and stored and retrieved the text-based frequencies of and relationships among a wide variety of nurses' notes about patients' functional status, coded according to the ICF. In brief, this represents research about discriminating signal from noise. For example, they asked a clinical expert to review nursing records and mark "the most specific term" pertaining to the patient's functioning. But they did not ask the expert to mark "primitive terms" that might have been nested within specific terms acknowledged to be representative of functioning (e.g., "assistance" appearing independently in the record before a more relevant, marked entry of "patient requires maximum assistance"). On the other hand, they did "ask" their algorithm to identify such "nested primitives" within complex phrases. On selected outcomes, the algorithm's hybrid approach outperformed the clinical expert's linguistic approach, and yielded a manageably small number of false positive ascertainments. This line of investigation suggests a full-scale term extraction tool could be adapted or developed with straightforward ease. Harris and colleagues wrote that their broad goal was "to develop automated approaches to expanding the content [of nursing terminologies] within the domain of functioning, disability and health" (2003, p. 259).

A set of salient issues has arisen from the inherent properties of the ICF that need to be addressed, either in a patchwork fashion in the near-term so as to render the ICF fully useable in the Consolidated Health Informatics Initiative, or in a formal revision at the WHO level in the further term. These include the aforementioned "coordination" problem, in which ICF code prose descriptions incorporate conjunctions that mix, confuse, or nullify the code's capacity to impart information about a discrete health state. As currently configured, this prevents these particular ICF codes from being mapped, whereas the majority of ICF codes can be easily mapped. For example, among the 1,495 codes, 147 codes (9.8 %) include the conjunction "and" (by itself) which invalidates the code's capacity to address one and only one health state or environmental characteristic; [sample: e5852, Environmental Factors domain; "Education and training policies"]. Seven codes (0.05 %) include the conjunction "or" by itself; [sample: b28012, Body Functions domain; "Pain in stomach or abdomen"]. Two codes include both the conjunctions "and" and "or"; [sample: e1451, Environmental Factors domain; "Assistive products and technology for the practice of religion or spirituality"]. These facts warrant attention, but do not represent "fatal flaws" that would preclude full utilization of the ICF. It should be noted that this is a characteristic of a Classification, which groups like items for statistical and related purposes, as opposed to a terminology, which is at a granular level.

Another issue generated by the inherent properties of the ICF that needs attention is the poor degree of logical correspondence or overlap among the type of Semantic Grouping mentioned above, namely a grouping based on the four ICF domains, and the Semantic Groupings in the UMLS. This is particularly the case for subgroups that might arise in the Environmental Factors domain, namely the chapter headings such as "Products and Technology," "Supporting Relationships," and "Attitudes," which legitimately represent some of the most appealing components of the ICF for covering the breadth of health states involving disability and the relevant environmental factors that influence the course of disability. There is poor correspondence between these chapter titles, rendered as subgroups of an overall Semantic Grouping, and the UMLS vocabularies.

A set of conclusions can be drawn from this Scenario. First, pursuing Terminology Integration of the ICF into the UMLS is both desirable and feasible in the near term. This opinion also stems from the relatively small size of the ICF, and the fact that many of its concepts are indeed already manifested in the UMLS and in its component vocabularies, including SNOMED-CT. The feasibility of rendering "usefully related vocabulary matches" has been demonstrated, and the probability of delivering reliable and valid usefully related vocabulary matches increases with experience and eventual algorithmic automation. There are overt challenges, though, that need to be addressed. These include the proportionally large number of "underspecified" terms within the ICF, which probably can only be corrected by consensus generated at the WHO level. The "coordination" problems also require WHO action or revision, because they involve the fundamental texts of the code descriptions rather than "shades of meaning" or interpretations adopted in daily practice. These problems are not insurmountable. They can be overcome on a national basis without requiring immediate international action or revision, although in the long run, the sake of standardization would rely on adequate and

timely revision at the WHO level, rather than risk an unwieldy set of national and supra-regional "patchwork fixes" around these correctable linguistic problems. A full mapping of ICF into the UMLS would identify problem areas that may need to be addressed in the classification and also would facilitate mapping with SNOMED-CT, which is the terminology of choice in the United States for electronic health records. This process also would identify gaps in SNOMED-CT that are important for the functioning and disability domains, as well as gaps in the structure of the UMLS to address terminological challenges for these domains.

References:

National Institutes of Health Grant Number R01LM007453, "Terminological Systems for Reporting Patient Status," Principal Investigator Marcelline Harris, Mayo Clinic College of Medicine, Rochester, MN; Project Period May 15, 2002 – May 31, 2006.

Bodenreider O. Mapping new vocabularies to the UMLS: Experience with ICF. Oral paper presentation at the 11th Annual North American Collaborating Center Conference on the ICF. Rochester, MN, June 21, 2005. Summary accessed on the World Wide Web at:
http://mor.nlm.nih.gov:8000/pubs/pres/050621-ICF-tutorial.pdf

Harris MR, Savova GK, Johnson TM, Chute CG. A term extraction tool for expanding content in the domain of functioning, disability, and health: Proof of concept. Journal of Biomedical Informatics 2003; 36:250-259.