TEFT Demonstration: Promising Practices

Vol. 4: November 2016

Facilitating Person-Centered Health and Care Through Inclusive Design of Technology

Truven Health Analytics TEFT Technical Assistance Team

INTRODUCTION

A common thread woven through the Testing Experience and Functional Tools (TEFT) demonstration objectives is the use of technology to enhance person-centered health care. The health care industry has experienced rapid expansion in the use of electronic health records (EHRs), personal health records (PHRs), and other health information technology (HIT). This growth has created a culture that encourages everyone in the care continuum to be involved with individual decision-making processes.

HIT enables individuals and their caregiver(s) to take an active role in the management of their care. The federal government has been a key driver in the movement toward person-centered care, and that movement continues to gain momentum. Ultimately, these health care advances drive improvements in the individual's experience and quality of care and reduced service fees.

The *Federal Health IT Strategic Plan for 2015–2020* includes several objectives that promote person-centered health care.[1] These objectives include the following:

- Empower the individual, family, and caregiver in their health management and engagement
- Increase access to and usability of high-quality electronic health information and services
- Increase beneficiary and market confidence in the confidentiality and safe use of HIT products, systems, and services

Of particular note is that the first of the Plan's four overarching goals is to advance person-centered and self-managed health.

The Office of the National Coordinator (ONC) for Health Information Technology Nationwide Interoperability Roadmap also includes person-centered goals.[2] The Roadmap describes the person at the center of a learning health system that can continuously improve care, public health, and science through near real-time access to data.

Target Audience and Article Contents

This TEFT Promising Practice article is intended to inform the following types of audiences about developing or procuring a person-centered PHR:

- Demonstration grantees as they continue project work related to PHRs
- States considering implementation of PHRs, other modes of providing health information to individuals, or standards involving access to and use of information technology
- Other stakeholders interested in incorporating aspects of TEFT into related endeavors.

The following sections of this Promising Practices article provide information and resources related to making HIT more accessible and usable for people in community-based long-term services and supports (CB-LTSS) programs. The main topics of each section are described below:

1. The terms *accessibility* and *usability* as they relate to all technology users in CB-LTSS programs
2. Federal legislation and internationally accepted guidelines that address these terms
3. The marketplace gap between the user's needs and what is available in current PHR systems

TRUVEN
HEALTH ANALYTICS™
an IBM Company

4. Practical illustrations of how to address this gap

5. Highlights of promising practices that are designed to integrate the needs of CB-LTSS users with the technology capabilities and specific strategies that will help readers create accessible and usable person-centered HIT systems, which are provided through a series of examples

6. Resources that will support CB-LTSS users as they delve into this process

I. ACCESSIBILITY, USABILITY, AND INCLUSIVE DESIGN

A person-centered approach to CB-LTSS health care includes the creation of technological tools that allow persons with different backgrounds and skill sets to use them. The design should allow all people, regardless of age, sex, mobility, ethnicity, or circumstances, to use a system with success and satisfaction. This is called *inclusive design.*

A CB-LTSS system that is *accessible* is useful, usable, and understandable.[3] An accessible system provides special computer functions that accommodate an array of user needs, such as keyboard shortcuts, predictive text, spell check, screen magnification, and screen readers. It facilitates a satisfying experience free from barriers for any user, including those with disabilities. A system that is *usable* includes ease-of-use features and has visual consistency among other characteristics that facilitate usability for the average person. A usable system provides an effective and efficient means of using and navigating a system but does not necessarily make it accessible. The goal for any person-centric technology process is to incorporate both accessibility and usability.

The challenge today is that health information technologies have not been successful in incorporating accessibility and usability needs across a variety of users. For example, most PHRs are designed using highly clinical language and lack practical information required by individuals, their caregivers, and family members. PHRs generally obtain information directly from EHRs or other clinical systems, which may contain language that is difficult to understand. Many of these challenges can be addressed by using industry standards for accessibility and usability.

II. GUIDANCE FOR ACCESSIBILITY AND USABILITY

Federal Legal Requirements

The federal government has promoted accessibility of electronic and information technology procured by the federal government through a variety of statutes and regulations. Appendix A briefly describes examples of laws and regulations pertaining to accessibility and highlights sections that pertain to technology:

- Americans with Disabilities Act of 1990[4]
- Rehabilitation Act Amendments of 1998, Section 508[5]
- Section 255 of the Communications Act[6]
- American Recovery and Reinvestment Act of 2009 (ARRA)[7]
- Patient Protection and Affordable Care Act of 2010[8]
- Federal Acquisition Regulation Part 39, Acquisition of Information Technology, Subpart 39.2 Electronic and Information Technology[9]
- Health and Human Services Acquisition Regulations (HHSAR) – Acquisition of Information Technology[10]

- Medicaid and Children's Health Insurance Program (CHIP) Programs; Medicaid Managed Care, CHIP Delivered in Managed Care, and Revisions Related to Third Party Liability; Final Rule – Information Requirements[11]

International Guidelines

Web Content Accessibility Guidelines (WCAG) version 2.0 were published in 2008.[12] The goal of WCAG is to make web content accessible, and these guidelines are intended for developers of web content, authoring tools, and web accessibility evaluation tools, as well as those seeking a web accessibility standard.

In October 2012, WCAG became an International Organization for Standardization (ISO) and International Electrotechnical Commission (IEC) standard, ISO/IEC 40500:2012.[13] This standard is part of a series of accessibility guidelines published by the Web Accessibility Initiative (WAI) of the World Wide Web Consortium (W3C), which sets international standards for the Internet. WCAG requirements and conformance criteria address the needs of technology users who have disabilities as well as older users with accessibility needs related to aging.[14] The guidelines address both web and mobile accessibility. Including WCAG 2.0 requirements in the design of health-related technologies is one way to ensure that a product is useful to all users.

The W3C WAI develops other accessibility guidelines that are not approved by the ISO but contribute to the movement toward international accessibility. The following are some of those other accessibility guidelines:

- Authoring Tool Accessibility Guidelines (ATAG), which address authoring tools and aim to improve accessible authoring
- User Agent Accessibility Guidelines (UAAG), which address web browsers and media players, including some aspects of assistive technologies, and aim to improve the accessibility of browsers

The W3C WAI also addresses mobile accessibility through its UAAG and continues to work on techniques and other guidance for designers and developers regarding mobile accessibility.

Since 1985, the Human Factors and Ergonomics Society (HFES) has sponsored the Human Computer Interaction Standards Committee—a technical subcommittee of user interface professionals chartered with the responsibility of monitoring and directing standards on user-computer interaction and design of software user interfaces. In 2006, the HFES released the *Human Factors Engineering of Software User Interfaces* (HFES 200) for public review, and in 2008, the American National Standards Institute approved it as a new American National Standard. HFES 200 includes recommendations on accessibility (e.g., features and functions of computer operating systems, drivers, application services, other software layers on which applications depend, and applications that increase the accessibility of applications for users with disabilities), interaction techniques (incorporating information from ISO standards), interactive voice response, and visual presentation and use of color. The overarching goal of HFES 200 is to provide design requirements and recommendations that will increase the accessibility, learnability, and ease of use of software.[15]

WCAG 2.0 Principles

Although the WCAG 2.0 guidelines do not contain an all-inclusive list of solutions for challenges facing web users with disabilities, the guidelines are internationally recognized and adopted standards that continue to surface in private and public requirements. The guidelines explain how to solve many of the challenges that users with disabilities face and include four principles:

1. Perceivable
2. Operable
3. Understandable
4. Robust

The first principle focuses on three main senses: sight, sound, and touch. It ensures that all users can perceive all information on a website and can "see" and consume it in their own way.

The principle of a website's being operable is about actions that people take when browsing a website. Ensuring that a website is operable means that all functions are accessible from a computer keyboard and that navigation features can be performed. Users should not be limited to the use of a mouse or pointers.

For a website to be understandable, it must use clear terms, have simple instructions, and explain complex challenges. Simply put, the website must function in a user-friendly manner. This includes addressing user errors in clear language with minimal instruction on how to correct them and making events on the page predictable.

Websites that are easy to use can seamlessly integrate with third-party technology (e.g., industry standard web browsers and screen readers). The website must meet recognized standards, such as using clean Hypertext Markup Language and Cascading Style Sheets.

WCAG 2.0 Levels

The WCAG 2.0 guidelines address three levels of conformance:

- Level A—The most basic web accessibility features
- Level AA—The most common barriers for disabled users
- Level AAA—The highest (and most complex) level of web accessibility

For most websites, a combination of Level AA and Level AAA is the best target primarily because not all Level AAA requirements can be applied to all websites. The goal should be to achieve the highest level of conformance, even if that means using a combination of levels or establishing phases that will progressively achieve the highest levels.

WCAG 2.0 Guidelines

The WCAG 2.0 has specific guidelines that address each principle and include options for Level A, Level AA, or Level AAA. There are a total of 12 guidelines with technical specifications for implementation. The guidelines are as follows:

- **Guideline 1.1 – Text Alternatives**: Provide text alternatives for any nontext content so that it can be changed into other forms that people need, such as large print, braille, speech, symbols, or simpler language.
- **Guideline 1.2 – Time-Based Media**: Provide alternatives for time-based and synchronized media, such as audio and video files.

- **Guideline 1.3 – Adaptable**: Create content that can be presented in different ways (e.g., simpler layout) without losing information or structure.

- **Guideline 1.4 – Distinguishable**: Make it easier for users to see and hear content, such as separating foreground from background.

- **Guideline 2.1 – Keyboard Accessible**: Make all functionality available from a keyboard.

- **Guideline 2.2 – Enough Time**: Provide users sufficient time to read and use content.

- **Guideline 2.3 – Seizures**: Do not design content in a way that is known to cause seizures.

- **Guideline 2.4 – Navigable**: Provide ways to help users navigate, find content, and determine where they are on the website.

- **Guideline 3.1 – Readable**: Make text content readable and understandable (e.g., using plain language).

- **Guideline 3.2 – Predictable**: Make web pages appear and operate in predictable ways.

- **Guideline 3.3 – Input Assistance**: Help users avoid and correct mistakes.

- **Guideline 4.1 – Compatible**: Maximize compatibility with current and future user agents, including assistive technologies.

WCAG 2.0 Summary

WCAG 2.0 provides the most comprehensive web accessibility standard available today. Although WCAG standards are not law for all entities in the United States, many organizations use them as a guide for inclusive web design, and the standards are gaining momentum at local and national levels.

WCAG 2.0 requirements have been included in the Health Information Technology (Health IT) Certification Criteria 2015 Edition Base Electronic Health Record (EHR) Definition and ONC Health IT Certification Program Modifications requiring that any capabilities of the EHR technology that permit individuals and their authorized representatives to download and transmit health information also be in conformance with WCAG 2.0 Level A (incorporated by reference in 45 CFR §170.299 (r)(1)). Level AA is an optional component of the certification criteria at this time. The 2015 certification criteria include several provisions that promote accessibility, including accessibility-centered design certification criteria (§170.315(g)(5)) that would apply to all health IT modules certified to the 2015 Edition and require the identification of user-centered design standard(s) or laws for accessibility that were applied, or complied with, in the development of specific capabilities included in a Health IT Module or, alternatively, the lack of such application or compliance.

WCAG 2.0 requirements also are a part of the Medicaid Managed Care regulations at 42 CFR Parts 431, 433, 438, et al. Entities must provide all required information to enrollees and potential enrollees in a manner and format that may be easily understood and is readily accessible to such enrollees and potential enrollees. *Readily accessible* is defined as "electronic information and services which comply with modern accessibility standards such as section 508 guidelines, section 504 of the Rehabilitation Act, and W3C's Web Content Accessibility Guidelines 2.0 AA and successor versions."[16]

On February 27, 2015, the Architectural and Transportation Barriers Compliance Board proposed (at 80 FR 10880) revisions and updates to (1) its standards for electronic and

information technology developed, procured, maintained, or used by federal agencies covered by Section 508 of the Rehabilitation Act of 1973 and (2) its guidelines for telecommunications equipment and customer premises equipment covered by Section 255 of the Communications Act of 1934. The proposed revisions and updates to the Section 508–based standards and Section 255–based guidelines are intended to ensure that information and communication technology covered by the respective statutes are accessible to and usable by individuals with disabilities. The following are some major revisions:

- Incorporation of WCAG 2.0 and associated success criteria to websites and offline electronic documents and software
- Real-time text functionality for products providing real-time, two-way voice communication
- Specification of types of non–public facing electronic content covered
- Further details regarding required compatibility of covered technologies, including operating systems, software development toolkits, and software applications with assistive technology

These revisions have not been finalized to date but are expected to be finalized before the end of 2016.

On May 18, 2016, the Department of Health and Human Services (HHS) published a final rule to implement Section 1557 of the Affordable Care Act, which prohibits discrimination in health coverage and care on the basis of race, color, national origin, age, disability, or sex. These provisions incorporate existing federal nondiscrimination law and policy and also contain some new protections. The following are the key new provisions:

- Extending protections against sex discrimination to health coverage and care for the first time and including gender identity discrimination within the definition of sex discrimination
- Codifying long-standing guidance regarding meaningful access for individuals with Limited English Proficiency, including the provision of free, accurate, and timely language assistance services
- Incorporating existing law that requires reasonable modifications, effective communication, and *readily accessible buildings and information technology to avoid disability-based discrimination*
- Prohibiting discriminatory health insurance benefit designs and including specific coverage protections for transgender individuals

This rule does not specifically call out WCAG 2.0 as a requirement; however, it has required recipients and state-based Marketplaces to ensure that their health programs and activities provided through websites comply with the requirements of Title II of the Americans with Disabilities Act.

Other federal initiatives that have been in the works include a supplemental advance notice of proposed rulemaking issued by the Department of Justice on May 9, 2016.[17] The Department communicated that it is considering a revision to the regulation (28 CFR Part 35) implementing Title II of the Americans with Disabilities Act. The purpose of the revision is to establish specific technical requirements to make accessible the services, programs, and activities that state and local governments offer to the public via the Internet. The Department is considering proposing WCAG 2.0 Level AA as the accessibility standard that would apply to websites and web content of Title II entities.

The Department recently extended the comment period to October 7, 2016, with a final rule expected at the end of 2016.

By implementing an inclusive design approach for accessibility solutions established by law and regulations and incorporating W3C WCAG 2.0 (where it is not law) and other accessibility best practices, technology-enabled health resources can be structured to accommodate people with a wide variety of technology needs.

III. PERSONAL HEALTH RECORDS MARKETPLACE GAP

Research findings show an unmitigated gap between the user's needs and what is available in PHR systems today. For example, Basdekis, Sakkalis, and Stephanidis studied PHRs from various sources (Microsoft® Health Vault, Google Health, PatientsLikeMe®, PatientSite, WebMD© Health Manager, MyPHR©, My Revolution, and NoMoreClipboard©).[18] They examined physical appearance, number of inputs, font size, color and number of colors, and availability to mobile devices, among other characteristics. PHRs from October 2010 to June 2011 were evaluated against WCAG 2.0 conformance. The reviewed PHRs failed to meet the needs of individuals with a disability and to incorporate adequate accessibility and readability levels. Every PHR reviewed failed to achieve Level AA conformance levels. Using the W3C recommended standards as the minimum requirements for PHR web development would be advantageous.

As highlighted in this article, it appears that most PHR products have been developed without adequate attention to the accessibility and usability needs of all users, particularly those with disabilities. In 2012, the Office of the National Coordinator for Health Information

Technology at HHS sponsored a challenge titled "The EHR Accessibility Module Challenge." The challenge was to create and test a module or application that would allow disabled individuals to access and interact with health data stored in EHRs. Standards for compliance in the challenge included WCAG 2.0, Section 508 standards, and the Communications Act at Section 255. This type of challenge inspires innovation and may be useful for incentivizing future developments of electronic health applications for individuals with disabilities.

IV. SOLUTION EXAMPLES

Using the WCAG 2.0 guidelines will promote inclusion of design strategies and functionality that incorporate accessibility from inception and enable a more holistic, usable product with fewer user problems experienced.

In section 1, we mentioned the difficulty that individuals may have interpreting complicated clinical text in PHRs. WCAG 2.0 Guideline 3.1 Readable includes Success Criterion 3.1.5 Reading Level, which addresses this type of issue. This guidance states that content should be as clear and simple as possible. Supplemental content is required when text demands reading ability that is more advanced than the lower secondary education level (more than 9 years of school). Such text can present substantial obstacles to people with a reading disability, and it also may be difficult for some people without disabilities.

Another example includes user challenges with navigation of a website. WCAG 2.0 Guideline 2.4 – Navigable is designed to help users find the content they need and allow them to keep track of their location. These tasks often are more difficult for people with disabilities. They require that the user be oriented to his or her current location and that information about the

possible destination be available. Success Criterion 2.4.6 Headings and Labels (Level AA) is intended to make section headings within web content descriptive. Descriptive headings help users find specific content and orient themselves within the web page. This makes navigation easier for individuals with disabilities and with limited short-term memory and affects their pace of reading. Descriptive headings also can help reduce the number of keystrokes for people who have difficulty using their hands or those who experience pain when using a mouse.

These are two examples of WCAG 2.0 criteria that can benefit a wide range of users of a technology such as PHRs. As stated earlier, incorporating the highest level of conformance for the WCAG 2.0 into product development will ensure the most accessible and usable system.

V. BEST PRACTICES TO ENSURE ACCESSIBILITY AND USABILITY OF HEALTH CARE DATA FOR CB-LTSS USERS

There are several actions that grantees or other stakeholders can take to ensure appropriate development or selection of a CB-LTSS accessible and usable HIT system. We focus on PHRs, but these principles also apply to other types of electronic health data and their HIT systems.

These steps should be taken in the following order: (1) know your target audience and requirements, (2) adopt the principles of an inclusive design approach, (3) communicate your needs to the team or vendor who will develop the system, and (4) test the approach.

In each subsection below, we walk through steps for developing systems that incorporate standards and facilitate the use of PHRs by a wide variety of users, including recipients of CB-LTSS services. Readers who would like additional information about these steps are encouraged to access the resources listed in the reference list and in Appendix B. Resources listed in Appendix B are categorized into the following topics:

- Standards and requirements
- Procurement support
- Designs for specific populations or services
- Website evaluation
- Federal proceedings, hearing, and presentations
- Professional organizations
- Nonprofit organizations
- Testing

Practice 1: Ensure Comprehension of Accessibility and Usability Requirements

CB-LTSS usability and accessibility requirements should be included in PHR system design documents. As discussed in Section 2, there are a multitude of legal requirements that should be reviewed, many of which point to WCAG 2.0 guidelines. Whether grantees are procuring a PHR system or building one internally, the federal legal requirements, state legal requirements, and WCAG 2.0 guidelines must be understood and followed carefully, because they will assist in the development of detailed system requirements. Anyone involved in design, development, or testing also should be keenly aware of usability and accessibility requirements.

Grantees can select the products that best serve their users by understanding user requirements. If grantees are asking a vendor to supply requirements in response to a Request for Proposal, they should ensure that the proposal is clear and comprehensive as to what is expected. Focus on key terms that should be reflected in vendor responses such as *on-screen assistance*, *simple design*, and *alternative text*. These and other responses to user needs should be part of requirements for developing an accessible system.

Practice 2: Adopt a Person-Centered Design Approach

There are emerging trends in the industry that address person-centered HIT design. Person-centered design, participatory design, and interaction design are examples of approaches to solving complex accessibility and usability challenges and to finding meaningful solutions. Person-centered design keeps the diversity and uniqueness of each individual in mind and creates products that are accessible to and usable by as many people as possible.

In the current marketplace, person-centered design is not widely used in PHR development. Occasionally, user satisfaction surveys are conducted after the implementation of finished systems; however, the risk of waiting until postimplementation can be quite costly and disruptive. Person-centered design and user participatory design approaches match the product to users' needs and capabilities at the forefront of development. They invite a broad and diverse set of users to be part of the design team. The full benefits of person-centered design are likely to occur when user input is incorporated early in the design and evaluation process. For example, engaging with an older adult, a young mother, or a teenager with

diabetes from the beginning ensures that user reactions shape development according to what is important to them.

Person-centered design is an approach to designing and developing software or products in which a professional team focuses on user needs in an iterative fashion throughout the product life cycle. Using a person-centered design approach includes user participation in the early stages of technology development. It involves all contributors in a codesign process to ensure that their minimum requirements are met. This approach allows everyone, including nondesigners, to provide input to help envision and create an optimal future state. It is an iterative prototyping process of storyboarding, creating, and enacting. The following are some ways in which users can participate:

- Oversight and approval of the content
- Selection of the look and feel of the site
- Choice of functionality
- Creation of content

When developing requirements for a PHR system, the individuals who will be using the system should be included through some level of participation in preliminary information gathering or through participation in the design group. Grantees could select beneficiaries from their target population to be part of the design team, or they could establish workgroup meetings with beneficiaries to discuss needs and wants related to PHRs to assist in the development of requirements. There is no better way to ensure use of a system than to involve beneficiaries who will be accessing the system during the initial phases of development. This is especially true for those who are expected to use a system frequently for health care issues.

It is critical to map those requirements to the needs of the targeted population to determine whether they will meet expectations for usability and accessibility. It would benefit all parties involved in the development and implementation of the PHR for the vendor to demonstrate that requirements were built with accessibility and usability at the forefront with input from individuals similar to the target population.

Practice 3: Communicate and Validate Internal Team or Vendor Understanding of Accessibility Requirements

Before TEFT grantees or vendors move forward in the development of the PHR system, it is critical to validate the team's understanding of accessibility requirements. Create a checklist of items to discuss with the internal team or vendor.[19] This checklist should consist of all accessibility requirements and include an action plan to ensure that accessibility requirements are met, including testing with users from various populations. The checklist also should include validation of staff credentials to ensure appropriate skills and expertise as well as readily available tools to design an accessible and usable application.

Validating requirements should not be a one-time event. Checkpoints should be made to ensure that the internal state team or vendor is on the right path. For example, at the end of testing, results should be discussed in order to decide on the need for further testing or refinement of system requirements.

Practice 4: Include Beneficiaries as Part of the Testing Team

Grantees should choose beneficiaries from their target populations to test the PHR. This group should be separate from the design team to simulate new users who have no experience with the system. Results of their tests will provide unbiased, naive feedback. Testing should be iterative until maximum usability and accessibility of the system for the targeted population are achieved.

For grantees designing a PHR system, the internal development team needs to work closely with the beneficiaries who are selected to help test the product. Grantees procuring a PHR system will need to communicate closely with the vendor to ensure that requirements are met. The vendor should be obligated to conduct testing with targeted individuals and to report all results and necessary changes back to the grantees so that they can determine the next steps. Testing should include all modes of data including mobile applications.

While conducting research for the writing of this article we did not find a PHR system that has been designed specifically for the CB-LTSS community. If a vendor claims that their software is fully accessible, testing with targeted individuals will be required to confirm usability and accessibility. The internal team should review the testing methodology and results to ensure the highest quality outcome. Through this process, grantees can help drive vendor improvements to systems that account for better accessibility and usability.

CONCLUSION

Accessibility and usability are critical requirements for the development of a PHR or other HIT system for the CB-LTSS community. Designing a state-of-the-art system that appears to be streamlined but does not address these critical challenges can cause failure in

implementation by not meeting beneficiary needs. However, developing a usable and accessible system from the beginning can curtail many long-term problems such as support costs, system changes, or user dissatisfaction and disuse. By addressing usability and accessibility through thoughtful and inclusive designs that meet current laws and standards, and through iterative testing of the designs, system developers and implementers can prevent poor user experiences and ensure the development of PHR systems that invite sustained, long-term use and empower individuals to generate and share their health information.

REFERENCES

1. Office of the National Coordinator for Health Information Technology. Federal Health IT Strategic Plan 2015–2020. https://www.healthit.gov/sites/default/files/9-5-federalhealthitstratplanfinal_0.pdf

2. Office of the National Coordinator for Health Information Technology. Connecting Health and Care for the Nation: A Shared Nationwide Interoperability Roadmap. Final Version 1.0. https://www.healthit.gov/sites/default/files/hie-interoperability/nationwide-interoperability-roadmap-final-version-1.0.pdf

3. Zhang J, Walji MF. TURF: toward a unified framework of EHR usability. Journal of Biomedical Informatics. 2011 Dec;44(6):1056–67.

4. Americans with Disabilities Act (ADA). ADA Standards for Accessible Design. ADA website. http://www.usdoj.gov/crt/ada/stdspdf.htm

5. Rehabilitation Act Section 508: 29 U.S.C. § 794d. August 7, 1998. http://www.section508.gov/section-508-of-the-rehabilitation-act

6. Section 255 of the Communications Act: 47 U.S.C § 255. January 3, 2012. https://www.gpo.gov/fdsys/granule/USCODE-2011-title47/USCODE-2011-title47-chap5-subchapII-partII-sec255/content-detail.html

7. American Recovery and Reinvestment Act of 2009 (ARRA): Pub.L. 111–5. https://www.congress.gov/111/plaws/publ5/PLAW-111publ5.pdf

8. Patient Protection and Affordable Care Act Section 1557(c): Nondiscrimination in Health Programs and Activities. May 13, 2016. http://www.hhs.gov/civil-rights/for-individuals/section-1557/index.html

9. Federal Acquisition Regulation Part 39 – Acquisition of Information Technology Subpart 39.2 – Electronic and Information Technology. https://www.gpo.gov/fdsys/pkg/CFR-1998-title48-vol1/pdf/CFR-1998-title48-vol1-part39.pdf

10. Health and Human Services Acquisition Regulations, 80 *Federal Register* 222 (2015) (codified at 48 CFR §339). http://www.hhs.gov/grants/contracts/contract-policies-regulations/hhsar/part-339-acquisition-information-technology/index.html.

11. Medicaid and Children's Health Insurance Program (CHIP) Programs; Medicaid Managed Care, CHIP Delivered in Managed Care, and Revisions Related to Third Party Liability; Final Rule – Information Requirements 42 CFR §438.10 (2012). https://www.gpo.gov/fdsys/pkg/FR-2016-05-06/pdf/2016-09581.pdf

12. W3C Web Accessibility Initiative. Web Content Accessibility Guidelines (WCAG) Overview. W3C website. Updated October 2, 2012. https://www.w3.org/WAI/intro/wcag

13. ISO/IEC 40500:2012. Information Technology – W3C Web Content Accessibility Guidelines (WCAG) 2.0. ISO website. 2012. http://www.iso.org/iso/iso_catalogue/catalogue_tc/catalogue_detail.htm?csnumber=58625

14. W3C Web Accessibility Initiative. Developing Websites for Older People: How Web Content Accessibility Guidelines (WCAG) 2.0 Applies. Updated September 22, 2010. https://www.w3.org/WAI/older-users/developing.html

15. Human Factors and Ergonomics Society. ANSI/HFES 200 Human Factors Engineering of Software User Interfaces. 2008. HFES website. http://www.hfes.org/Publications/ProductDetail.aspx?Id=76

16. Medicaid and Children's Health Insurance Program (CHIP) Programs; Medicaid Managed Care, CHIP Delivered in Managed Care, and Revisions Related to Third Party Liability; Final Rule - – Information Requirements 42 CFR §438.10 (2012). https://www.gpo.gov/fdsys/pkg/FR-2016-05-06/pdf/2016-09581.pdf

17. Nondiscrimination on the Basis of Disability; Accessibility of Web Information and Services of State and Local Government Entities. Proposed Rule by the Justice Department, May 9, 2016. Federal Register website. https://www.federalregister.gov/articles/2016/05/09/2016-10464/nondiscrimination-on-the-basis-of-disability-accessibility-of-web-information-and-services-of-state

18. Basdekis I, Sakkalis V, Stephanidis C. Towards an accessible personal health record. Lecture Notes of the Institute for Computer Sciences, Social Informatics and Telecommunications Engineering. 2012;83:61–8. http://link.springer.com/chapter/10.1007%2F978-3-642-29734-2_9

19. A sample of this type of checklist can be found at http://www.ucop.edu/electronic-accessibility/standards-and-best-practices/procurement/wcag-2.0-checklist.pdf.

APPENDIX A: FEDERAL LEGAL REQUIREMENTS

Americans with Disabilities Act of 1990 (42 U.S.C. 12101 et seq.)

The Americans with Disabilities Act (ADA) of 1990 is a broad civil rights law that protects individuals with disabilities from discrimination. Several sections address technology. ADA Titles II and III require state and local governments and public accommodations and commercial facilities to provide effective communication whenever they correspond through the Internet. This effective communication rule applies to covered entities using the Internet for messages regarding their programs, goods, or services, because they must be prepared to offer those communications via an accessible medium. The ADA also specifically addresses the needs of people with visual disabilities.

The Department of Justice published regulations implementing the requirements of titles II (state and local government services) and III (public accommodations and commercial facilities) of the ADA, which are located in the Code of Federal Regulations (C.F.R.) at 28 C.F.R. parts 35 (title II) and 36 (title III) (1991). A Final Rule revising titles II and III was published in the Federal Register at 81 Fed. Reg. 155 (August 11, 2016). This Final Rule implements the requirements of the ADA Amendments Act of 2008 which significantly changed the ADA definition of "disability."

Section 508 of the Rehabilitation Act – 29 U.S.C. 794(d) (1986) as amended by the Workforce Investment Act of 1998 (P.L. 105-220)

Section 508 of the Rehabilitation Act of 1973 was enacted to eliminate barriers in information technology, to open new opportunities for people with disabilities, and to encourage the development of technologies that will help achieve these goals. The law applies to all federal agencies when they develop, procure, maintain, or use electronic information technology. Under Section 508, agencies must give employees with disabilities and members of the public access to information that is comparable to access available to others. States that receive federal funds under the Technology Related Assistance for Individuals with Disabilities (TRIAD) Act of 1988 also are required to comply.

Section 255 of the Communications Act (47 USC 255 (e))

Section 255 of the Communications Act, as amended by the Telecommunications Act of 1996, requires that telecommunications products and services be accessible to people with disabilities. Manufacturers must ensure that products are "designed, developed, and fabricated to be accessible to and usable by individuals with disabilities" when doing so is readily achievable. The following are some of the telecommunications products that are addressed by the accessibility guidelines issued by the Board under Section 255:

- Wired and wireless telecommunication devices, such as telephones (including pay phones and cellular phones), pagers, and fax machines

- Other products that have a telecommunication service capability, such as computers with modems
- Equipment that carriers use to provide services, such as a phone company's switching equipment

The Federal Communications Commission (FCC) is responsible for enforcing the Communications Act and has issued regulations that contain requirements based on the Board's guidelines at 36 CFR Parts 1193 and 1194 (2000). On February 18, 2015, the U.S. Access Board submitted an official proposed rule to revise and update the Information and Communication Technology (ICT) Standards and Guidelines as covered by Section 508 of the Rehabilitation Act and Section 255 of the Communications Act.

American Recovery and Reinvestment Act of 2009 (ARRA) (Pub.L. 111–5)

The ARRA was enacted on February 17, 2009. Title IV of Division B of the ARRA amends Titles XVIII and XIX of the Social Security Act by establishing incentive payments to eligible professionals, eligible hospitals, critical access hospitals, and Medicare Advantage organizations to promote the adoption and meaningful use of interoperable health information technology (HIT) and qualified electronic health records (EHRs). These incentive payments are part of a broader effort under the Health Information Technology for Economic and Clinical Health Act to accelerate the adoption of HIT and utilization of qualified EHRs.

The Code of Federal Regulations at 45 CFR §170 (2010) outlines the standards, implementation specifications, and certification criteria to complete EHRs and EHR modules and the testing and certification of such complete EHRs and EHR modules. Criteria include accessibility requirements that include Level A WCAG 2.0 compliance.

Patient Protection and Affordable Care Act of 2010 (42 U.S.C 18001 (2010))

The Affordable Care Act introduced health reforms that were enacted in 2010. Section 1557(c) contains requirements for the provision of auxiliary aids and services, including alternative formats and sign language interpreters, and for the accessibility of programs offered through electronic information technology.[6] 45 CFR § 92.204(a) (2016) contains the implementing regulations for Section 1557 of the Affordable Care Act and addresses a covered entity's responsibilities in making electronic information technology in health programs and activities accessible to people with disabilities.

The Code of Federal Regulations at 45 CFR 155.205 (2012) requires that information regarding Exchanges be provided to applicants and enrollees in plain language and in a manner that is accessible and timely to individuals living with disabilities, including accessible websites and the provision of auxiliary aids and services at no cost to the individual in accordance with the Americans with Disabilities Act and Section 504 of the Rehabilitation Act.

Federal Acquisition Regulation Part 39 – Acquisition of Information Technology Subpart 39.2 – Electronic and Information Technology

This regulation implements Section 508 of the Rehabilitation Act of 1973 and the Architectural and Transportation Barriers Compliance Board Electronic and Information Technology (EIT) Accessibility Standards (36 CFR 1194). On February 18, 2015, the U.S. Access Board submitted an official proposed rule to revise and update the Information and Communication Technology (ICT) Standards and Guidelines as covered by Section 508 of the Rehabilitation Act and Section 255 of the Communications Act.

Health and Human Services Acquisition Regulations, 80 Federal Register 222 (2015) (codified at 48 CFR §339)

In addition to the regulatory guidance in Federal Acquisition Regulation Part 39, contracting officers shall collaborate with the requiring activity to ensure information technology (IT) acquisitions for supplies, services, and systems meet the requirements established by the Department of Health and Human Services (HHS).

Medicaid and Children's Health Insurance Program (CHIP) Programs; Medicaid Managed Care, CHIP Delivered in Managed Care, and Revisions Related to Third Party Liability; Final Rule – Information Requirements 42 CFR §438.10 (2012)

Each state, enrollment broker, managed care organization, prepaid inpatient health plan, prepaid ambulatory health plan, and primary care case management, and PCCM entity must provide all information required in 42 CFR Parts 431, 433, 438, et al. to enrollees and potential enrollees in a manner and format that may be easily understood and is readily accessible by such enrollees and potential enrollees. *Readily accessible* electronic information and services are those that comply with modern accessibility standards such as Section 508 guidelines, Section 504 of the Rehabilitation Act, and W3C's Web Content Accessibility Guidelines 2.0 AA and successor versions.

APPENDIX B: ACCESSIBILITY AND USABILITY RESOURCES

Standards and Requirements

ADA.gov/U.S. Department of Justice Information and Technical Assistance on the Americans with Disabilities Act—Accessible Technology

This website contains Department resources related to accessible technology, including information about enforcement, technical assistance and guidance, regulations, and technology initiatives. It also links to general information about Americans with Disabilities Act laws and regulations, design standards, technical assistance materials, and enforcement.

U.S. Department of Health and Human Services (HHS) Section 508

This HHS.gov website has information about the Office of the Assistant Secretary for Public Affairs/Digital Communication Division ASPA/508 Program, as well as Section 508 basics and links to other Section 508 resources (such as HHS 508 Checklists). Each month HHS also runs a 508 analysis on all of the websites in its portfolio. The resulting 508 status report—called an "HHS 508 Leaderboard Report"—is made available to every operating division and staff division for any needed actions to achieve a 508 compliant site. The link to the most recent leaderboard report is available on this website.

Inclusive Design Research Center (IDRC), OCAD University

The IDRC conducts research and development at OCAD University in Toronto. Staff members are open source developers, designers, researchers, advocates, and volunteers who collaborate on activities related to inclusive design. Among other services, they help generate design and development practices, including creation of tools that others can use. Their website contains useful resources, tutorials, and other educational materials.

International Organization for Standardization and International Electrotechnical Commission (ISO/IEC) Guide for Addressing Accessibility in Standards: ISO/IEC Guide 71:2014

The ISO/IEC guide reviews accessibility requirements and standards for products, services, and built environments. It contains a summary of current technology related to accessibility as of 2014, challenges to consider in the standards development process, accessibility goals, descriptions of user needs, and design considerations.

U.S. Access Board. Section 508 Standards for Electronic and Information Technology, published in the Federal Register December 21, 2000

This website contains the full text from Section 508 of the Rehabilitation Act. It contains background on the process for updating the requirements and sources of information on accessibility and accessible design.

W3C Web Accessibility Initiative (WAI) home page

This valuable website has many resources. It covers internationally approved requirements for accessibility and explains how to meet these requirements through documents and tutorials. It reviews essential components of web development and interaction for people with specific disabilities and for older people.

Procurement Support

California State University (CSU) Professional Development for Accessible Technology in the CSU. CSU Accessibility Requirements

The procurement process defines steps to ensure that programs, services, and activities are accessible. Although it is specific to technology products used in the university setting, the steps of gathering information and reviewing the product or service are applicable to other settings.

Ireland National Disability Authority. Writing an RFT (Request for Tenders)

This website contains many resources related to accessibility criteria and quality assurance for procurement of specific technologies, including websites (commercial or individually designed), public access terminals, application software, telecoms, and smart cards. The site includes a procurement toolkit with specific guidance for writing an order; assessing the service or product; developing accessible software, hardware, or other IT systems; evaluating the deliverable; and maintaining accessibility. Although the website is geared toward European users, its universal design principles are applicable to the United States.

Designs for Specific Populations or Services

Accessible Designs for Personal Health Records project website

This website describes a project funded by the National Institute on Disability and Rehabilitation Research that is designed to make personal health records (PHRs) accessible and usable. It contains a report that evaluates existing PHR systems for accessibility, usability, and functionality. A second report describes a set of interactive PHR prototypes that were tested for accessibility and usability.

Agency for Healthcare Research and Quality. Health Literacy Measurement Tools (Revised)

AHRQ provides three brief tools to measure *health literacy*, defined as individuals' reading comprehension in a medical context: Short Assessment of Health Literacy–Spanish and English (SAHL-S&E), Rapid Estimate of Adult Literacy in Medicine Revised–Short Form (REALM-SF), and Short Assessment of Health Literacy for Spanish Adults (SAHLSA-50). The tools help determine the user's capacity to obtain, process, and understand basic health information and services. Additional tools to measure health literacy can be found in the

Health Literacy Tool Shed database, which contains extensive information and resources related to health literacy.

DeafHealth home page

This organization uses videos to provide health education in American Sign Language. Topics include information about specific diseases, common medical tests, and finding local physicians who are supportive of the deaf community.

Nielsen Norman Group. Usability Guidelines for Accessible Web Design

This report addresses techniques for designing websites for people with visual and motor impairments who use assistive technology such as screen readers, braille readers, and screen magnifiers. It also presents tips to enhance ease of use and to increase productivity.

NonVisual Desktop Access (NVDA) home page

This website provides a free screen reader, which reads the text on the screen in a computerized voice or converts the text into braille. It can be used to test the accessibility of products for people with visual impairments.

Website Evaluation

WebAIM Home Page. Logan, UT: Center for Persons with Disabilities, Utah State University.

WebAIM helps organizations make their web content accessible to people with disabilities. They offer training and certification as well as technical assistance. They also evaluate sites, offer suggestions on how to enhance accessibility, and provide reports on compliance with WCAG 2.0 and Section 508 of the Rehabilitation Act.

Federal Proceedings, Hearings, and Presentations

Interagency Committee on Disability Research. Accessibility and Usability in Health Information Technology: A Research & Action Conference to Empower People With Disabilities, Older Adults, and Caregivers. Conference Proceedings. September 17–18, 2015.

On September 17–18, 2015, the Interagency Committee on Assistive Technology of the Interagency Committee on Disability Research, National Institute on Disability, Independent Living, and Rehabilitation Research, Administration for Community Living, HHS conducted a 2-day conference focused on accessibility and usability in health information technology. Over 35 thought leaders representing users, providers, health IT research and development, and federal leadership shared their perspectives of current issues and identified actionable strategies to advance knowledge and practices.

U.S Senate Committee on Health, Education, Labor and Pensions Hearing on Achieving the Promise of Health Information Technology: Improving Care Through Patient Access to Their Records

On September 16, 2015, the Senate Health, Education, Labor and Pensions Committee held a hearing titled "Achieving the Promise of Health Information Technology: Improving Care Through Patient Access to Their Records." The hearing focused on improving the exchange of health information and patients' access to their electronic health records and included discussions about the challenges of usability of electronic health records, patient portals, and personal health records.

Professional Organizations

International Association of Accessibility Professionals

The International Association of Accessibility Professionals is a membership-based organization for individuals and organizations that are focused on accessibility or are in the process of building their accessibility skills and strategies. Their website contains a variety of information for accessibility professionals, including education, resources, events and webinars, newsletters, and certification information.

Partnership on Employment & Accessible Technology (PEAT)

PEATworks.org offers a central hub of online resources and opportunities for collaboration to employers and IT companies interested in adopting accessible technology as part of everyday business practices. PEAT is a multifaceted initiative to foster collaboration and action around accessible technology in the workplace. Guided by a consortium of policy and technology leaders, PEAT works to help employers, IT companies, and others understand why they should build and buy accessible technology and how to go about doing so. PEAT is funded by the U.S. Department of Labor's Office of Disability Employment Policy and is managed by the Rehabilitation Engineering and Assistive Technology Society of North America.

Nonprofit Organizations

Knowbility

Knowbility, Inc. is a 501(c)(3) nonprofit organization whose mission is to support the independence of children and adults with disabilities by promoting the use and improving the availability of accessible information technology. The website contains information about Knowbility's services that are available to help meet accessibility needs (e.g., testing and technical solutions, accessible website development), resources for those interested in participating in the accessibility community, and tips on how to create and maintain accessible IT.

Testing

Department of Homeland Security, Trusted Tester Program

The Department of Homeland Security Office of Accessible Systems & Technology is committed to the development of the common testing approach for accessibility compliance and conformity named Trusted Tester (TT). TT provides a code-inspection-based test approach for determining software and website conformance to the Section 508 standards. This website includes a TT fact sheet, TT training registration link, and information about the benefits of TT.

ABOUT THE TEFT DEMONSTRATION &
THIS PROMISING PRACTICE SERIES

In March 2014, the Centers for Medicare & Medicaid Services (CMS) awarded Testing Experience and Functional Tools (TEFT) planning grants to nine states to test quality measurement tools and demonstrate e-health in Medicaid community-based long-term services and supports (CB-LTSS). The grant program is designed (1) to field test an experience of care survey and a set of functional assessment items, (2) to demonstrate personal health records, and (3) to create a standard electronic LTSS record.

Grantees are participating in one or more of the four TEFT components:

- **Experience of Care (EoC) Survey.** The EoC survey elicits feedback on beneficiaries' experience with the services they receive in Medicaid CB-LTSS programs. In contrast to many other experience or satisfaction surveys that are disability specific, the home and community-based service EoC survey was designed so that individuals with different types of disabilities (e.g., physical, cognitive, intellectual, behavioral) could respond to the same questionnaire, thus enabling comparisons across programs and disability groups within a state. As a contractor to CMS, Truven Health Analytics conducted a field test of the survey with CB-LTSS beneficiaries in all nine grantee states. The beneficiaries represented a range of ages and had various conditions or disabilities, including frailty, physical disability, intellectual and developmental disability, acquired brain injury, and severe mental illness. Many of the participating states saw this as an opportunity to contribute to the validation of the survey while simultaneously gaining access to beneficiary input on their programs without having to fund the survey effort themselves. In the out years of the Demonstration, grantees will administer the finalized survey to their CB-LTSS beneficiaries and use the results to assess and improve the quality of their programs. This component also involved seeking a Consumer Assessment of Healthcare Providers and Systems (CAHPS®) trademark for the survey which was granted by the United States Agency for Health Care Research and Quality (AHRQ) in June 2016; as such, the survey is now known as the CAHPS® Home and Community-Based Services Survey. In addition, in October 2016 the National Quality Forum endorsed 19 measures derived from the survey.

- **Functional Assessment Standardized Items (FASI).** Under prior initiatives, CMS invested in the development of functional assessment items for use in postacute care settings. TEFT grantees will provide a sample of beneficiaries across disabilities on which the adapted FASI will be field tested. Following the field test, the CB-LTSS FASI items will be finalized, and grantees then will demonstrate their use in their CB-LTSS programs.

- **Personal Health Record (PHR).** Grantees will demonstrate use of PHR systems with beneficiaries of CB-LTSS. The PHR is intended to provide CB-LTSS beneficiaries with a range of personal LTSS and health information to facilitate decisionmaking about their care. The PHR can

encourage a more active role for beneficiaries and their caregivers in managing care and may result in better outcomes through more efficient management of services.

- **Electronic Long-Term Services and Supports Standard (eLTSS).** Grantees will pilot test an eLTSS standard in conjunction with the Office of National Coordinator's Standards and Interoperability Framework.

This document is the fourth in a series of several Promising Practice offerings that the TEFT Technical Assistance Contractor will issue over the course of the TEFT Demonstration. These Promising Practices draw on the experiences of TEFT grantees as they address its various components. They are intended to inform the ongoing work of the Demonstration grantees as well as other stakeholders interested in incorporating aspects of TEFT into related endeavors.

TEFT CONTACTS

Beth Jackson, Ph.D.
Director
TEFT Technical Assistance Contract
Truven Health Analytics
Beth.Jackson@truvenhealth.com

Kerry Lida, Ph.D.
TEFT Demonstration Lead
Centers for Medicare & Medicaid Services
Kerry.Lida@cms.hhs.gov

Allison Lynn Weaver, MPH FAC-COR III LADC
Contracting Officer Representative for TEFT TA
Centers for Medicare & Medicaid Services
Allison.Weaver@cms.hhs.gov