

Real-World User-Centered Design: The Michigan Workforce Background Check System

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Abstract. The Michigan Workforce Background Check system demonstrates how an iterative user-centered design (UCD) process enhances organizational-level communication practices and efficiency. Well-designed information communication technology is an essential component of effective public health management. Usability and accessibility testing informed subsequent design and development. The iterative improvement in the background check application demonstrates that UCD should be a component of public health management projects in particular, and online project development in general.

Keywords: User-centered design, usability, accessibility, information technology, criminal background checks.

1 Introduction

With increased demand for government services concomitant with funding deficits, states are seeking innovative methods to deliver services more efficiently. In many states, this has led to an increasing number of government self-service websites for renewing vehicle registrations, buying fishing and hunting licenses, registering to vote, filing taxes, etc. [1], [2]. The effectiveness of self-service websites, however, depends on how easy they are to use, which can vary significantly according to their design. User-centered design (UCD) is well known within the field of human-computer interaction, and is critical to successful system development [3], [4]. However, governments rarely consider this process, and are therefore unlikely to devote resources to fund such efforts, especially given their economic constraints. The Michigan Workforce Background Check (MWBC) system identified UCD as a critical factor in system development, differentiating it from other applicants (see Acknowledgment).

Michigan was one of seven states included in a pilot study from January 2005 to September 2007 to develop a statewide background check system for direct access workers in long-term care and hospice facilities. The Michigan system is now

considered a national model, winning out over six other systems developed as part of the initial pilot program, in part due to the emphasis on applying the UCD process. Its success is especially noteworthy given the audience that uses the MWBC system and the geographic challenges in Michigan. Most users in adult foster care group homes have little technological expertise, while others are human resource professionals in nursing homes, for example who have moderate to advanced computer skills. The statewide catchment of the system presented unique challenges. Most of the Michigan population is concentrated in the southern lower peninsula with vast rural areas in the northern lower and upper peninsulas, where users operate through dial-up Internet connections.

The ability of the highly complex MWBC system to prosper in this environment is remarkable. The system requires users to parse large and complicated tables and databases, yet receives relatively few requests for support and has a high rate of success for users. The program processes 60,000 to 70,000 background checks per year.

The Michigan program for background checks demonstrates how health information technology positively impacts organizational communication practices, which is essential for effective public health management [5]. This study focuses on how user-centered design (UCD) methodologies improve design and the implementation of an effective background check system in a complex organizational environment under challenging time constraints. We hypothesize that this approach will result in better care for seniors and other vulnerable adults, a more qualified workforce, and will ultimately prevent incidents of abuse, mistreatment, and exploitation.

1.1 Program Background

Michigan was one of seven states that received funding from the United States Department of Health and Human Services, Centers for Medicare and Medicaid Services (CMS) to participate in the legislatively mandated background check pilot program aimed at preventing abuse. Section 307 of the United States Medicare Prescription Drug, Improvement, and Modernization Act (MMA) of 2003 (PL 108-173) directed the Secretary of Health and Human Services to establish a program to identify efficient, effective and economical procedures to conduct background checks on prospective employees of long-term care facilities or providers with direct access to patients, thereby increasing the safety of Michigan's elders and persons with disabilities.

At the time, there was no systematic process across the multiple health and human service agencies to conduct background checks on prospective employees, manage the process, disseminate findings, or to make consistent employment decisions. The complexity of the issue, as well as dated mandates, created voids that potentially put vulnerable populations at risk. To exacerbate the problem, Michigan's aging population and the shortage of healthcare workers increased pressure on long-term care facilities and providers to lower standards when hiring new employees [6], [7]. An improved, standardized system of background checks was necessary to keep unqualified persons from being employed.

The new system was an improvement by:

- Increasing the scope of workers given background checks and the thoroughness of the checks
- Harmonizing procedures across state agencies
- Establishing cost containment measures for background checks

The Michigan Workforce Background Check system launched in 2006 has remained active since the pilot phase with support from the Michigan Department of Community Health (MDCH) and in collaboration with Michigan State University. There has been continuing development in response to state policy and legislative changes. Due to its success, the program was used as the model for the national demonstration program to screen healthcare applicants, authorized by the Affordable Care Act of 2010.

1.2 Michigan Workforce Background Check System Overview

The Michigan Workforce Background Check (MWBC) system is a Web-based application that centralizes the screening process for prospective employees in long-term care facilities. The system integrates abuse and neglect registries, the Office of Inspector General's Medicare /Medicaid exclusion database and state criminal records archives, while providing secure communication between the system and the fingerprint vendor, the Michigan State Police (MSP), the Department of Community Health (MDCH), and the Department of Human Services (MDHS). (See Figure 1.) The system incorporated UCD methodologies such as focus groups, expert reviews, usability testing, and accessibility compliance inspections into the design and development, which was critical for deploying a usable, cost-effective system.

The two-tiered screening process includes name-based searches in relevant databases, such as the HHS Medicare/Medicaid Exclusion List (US Office of Inspectors General), Michigan Nurse Aide Registry (NAR), Offender Tracking Information System (OTIS), Michigan Public Sex Offender Registry (PSOR), and others. Checking applicant names allows an initial assessment that identifies persons with disqualifying convictions in Michigan before requesting a more comprehensive and costly national background check. Provided the applicant successfully completes the initial assessment, the employer then requests fingerprint-based state and federal (FBI) criminal history checks. Once a record is established in the system, a compliance officer can track and monitor the records through RAPback system alerts, in which the state regulatory agency is immediately notified when an employee's criminal history record is updated, including any subsequent violations. The system also has the ability to create customized reports and manage an appeals process.

The system provides a single data entry point for Michigan employers to check registries for potentially disqualifying information, request fingerprint appointments, automatically import results of federal and state fingerprint checks, and download and print system-generated employment authorization letters from the regulatory agencies.

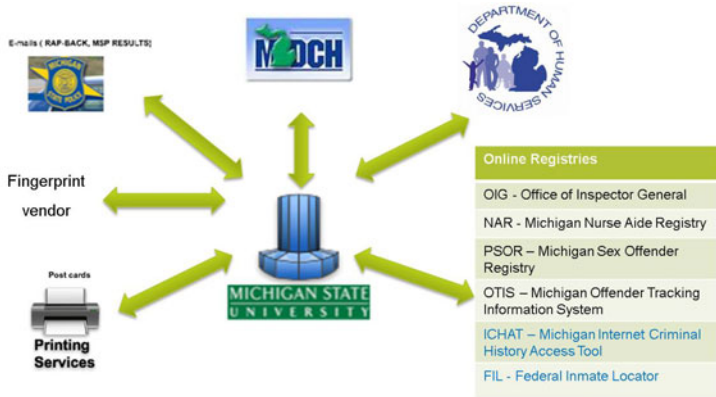


Fig. 1. MWBC system overview

2 Applying User-Centered Design Techniques to System Development

The implementation of the MWBC program is the result of a successful collaboration among multiple constituents. Advisory groups and work groups were convened early in the process in order to achieve consensus for the legislative effort and overall system design strategy. Representatives from AARP, the Michigan Assisted Living Association, Hospice and Palliative Care Association, the Health Care Association of Michigan, Legal Aide of Western Michigan, the Michigan Quality Community Care Council, the Michigan Departments of Community Health, Human Services, State Police and Information Technology, United Auto Workers, Service Employees International Union and the Michigan Home Health Association met regularly and often with Michigan State University researchers to address program and system concerns in the year preceding the launch of the online system.

The development team investigated platform and software tools and creating the initial development environment while usability specialists met with users to gather user interface requirements. Given disparities in skill using Web-based systems or computers in general among potential end-users, these preliminary design discussions were critical in determining realistic task scenarios.

The challenge was to design a system that manages, maintains, and simplifies the background checking process in an automated and efficient way. Due to a compressed timeline for system deployment, the development team elected to use Microsoft Visual Studio and .NET framework and utilized Crystal Reports to generate dynamic and user customized reports. The programming language employed was C# and Microsoft SQL 2005 was the database management system. Some of these choices complicated usability and accessibility compliance during the initial system design phase, but the programmers were able to devise successful solutions. The resulting system has multiple user-interfaces for providers, state analysts and State Police to compliment their tasks and workflow.

3 User Experience Evaluations during the System Design Phase

3.1 Focus Groups and Concept Testing with Providers (2005-2006)

Early in the system design phase, usability experts from Usability/Accessibility Research and Consulting (UARC) at Michigan State University conducted a series of usability focus groups with providers (i.e., facilities tasked with conducting the background checks) to identify their current manual processes and review the proposed web-based approach. Participants discussed user interface concepts and features during the sessions, and they interacted with a concept prototype of the system design (See Figure 2). Participants provided valuable insights on each step of the proposed process, e.g., handling manual registry hits, completing the manual registry status and hiring step pages. Comments were used to create user interface requirements for the Home page and the applicant demographic form.

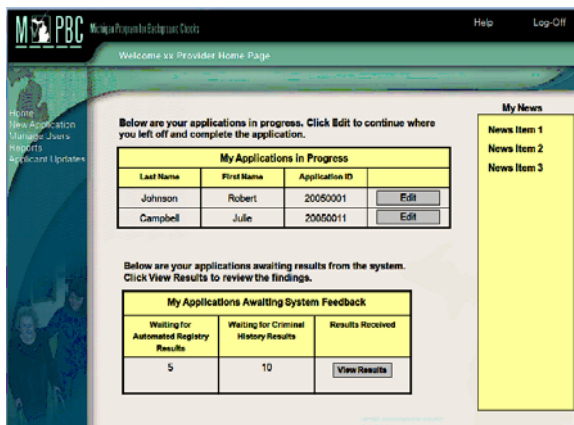


Fig. 2. MWBC home page concept design

3.2 Usability Evaluation with Providers (2006)

As is typical of most real-world development efforts, the highest priority was delivering a stable product that met the functional requirements on time. In Michigan's case, development could not begin until the legislature passed laws authorizing the program. Although the development schedule was quite compressed (about eight weeks), the team was still able to conduct usability testing on a detailed user interface design in tandem with implementation. Six providers from MDCH and MDHS facilities participated. The findings indicated that participants had significant difficulty understanding how to perform the registry checks and make correct determinations based on the registry results. Participants also had trouble with aspects of the site's layout and presentation, including locating fingerprint results on the Home page, and finding the key sentence in the criminal history summary letter that stated whether the applicant had exclusionary findings from the fingerprint checks.

Usability recommendations based on the results were included as much as possible in the first release. (Figure 3 shows the Home page for release 1.)



Fig. 3. MWBC home page – first release

Developers were able to achieve this critical milestone by putting the system into production by the end of March. Approximately 6,600 providers were set up in system and of those, 3,787 providers initiated 4,797 applications within the first month. Providers included nursing homes, homes for the aged, county medical care facilities, adult foster care facilities, Intermediate Care Facility for people with Mental Retardation (ICF/MRs), psychiatric hospitals, hospices, and home health agencies.

3.3 Accessibility Evaluation (2007)

While accessibility compliance with Section 508 standards was a system design goal of the project, achieving compliance was more of a challenge. Usability specialists performed an accessibility compliance inspection against Section 508 accessibility standards a few months after the first release. Unfortunately, although the site met some requirements, each page included in the analysis failed at least one Section 508 requirement. This is not uncommon when the development timeline is too compressed to fully employ standards-compliant coding strategies. We encountered a number of issues when we reviewed the page with adaptive technology (i.e., screen reader) including missing descriptive text for images, non-redundant color coding (exempt personnel were identified only through yellow highlighting without another, non-color

identifier), and interactive new application form (CSS and JavaScript issues). The evaluators recommended re-examining the site after making the accessibility enhancements. Remediation for accessibility was scheduled for future releases.

3.4 Usability Evaluation with Experienced Providers (2007)

About a year after the first release, the website was evaluated again in one-on-one usability sessions with eight experienced participants responsible for conducting background checks at provider agencies on a regular basis. Overall, these experienced participants had little difficulty understanding how to perform registry checks. However, they had some difficulty interpreting the results, tending to incorrectly mark the findings as non-disqualifying and then continuing with the next registry check. As a result, some applicants were sent for fingerprints when they might have been excluded based on the registry findings alone. Recommendations from the second review included providing column sorting capabilities; providing more information in the online guide about scenarios users might encounter, e.g., interpreting criminal history results; enabling users to correct errors on the applicant form; saving partially completed applicant forms; and requiring fewer fields on the applicant entry form, especially with respect to personal characteristics.

3.5 Accessibility Evaluation (2008)

As in usability testing, the 2008 accessibility evaluation indicated that the site had improved, although it still did not meet Section 508 Requirements. Key areas for improvement included ensuring sufficient color contrast, creating consistent navigation that worked properly with adaptive technologies, and cross-browser compatibility.

4 User Experience Evaluations in Phase 2

In 2007 – 2008, significant functionality was added to the system. The integration of the RAPback enabled immediate notification to the department when an employee's criminal history record was updated and decreased the turnaround time significantly. During the same time period an appeal module was added, which consolidated the process for flagging a disqualified individual. This feature resolved a delay in reporting exclusionary findings to the employer and in reporting favorable outcomes of the appeal process.

4.1 User Interface Redesign Effort

Following the integration of the new functionality, a major redesign took place during 2008-2009 to address the remaining accessibility issues in the provider user interface and add comprehensive online help. The entire user interface layer was recoded to incorporate CSS design best practices and to ensure user interface compliance with State of Michigan design standards. In particular, the effort involved separating the presentation layer from the system architecture layers. (See Figure 4.)

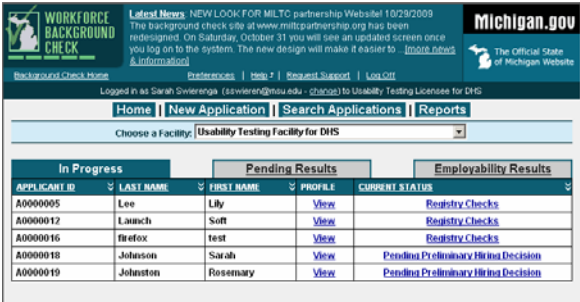


Fig. 4. MWBC home page redesign

4.2 Usability Evaluation with Providers (2008)

In 2008, a final evaluation was conducted in one-on-one usability sessions with 10 providers from MDCH and MDHS facilities. Users were quite successful in conducting background checks, but they had some difficulty working with potentially exclusionary hits in the registries and newer functionality. A few participants experienced significant difficulty with the new RAPback feature. Recommendations for improving the user interface included making the consent checkbox more noticeable, adding drop-down defaults for place of birth and country of citizenship, and adding instructions for the RAPback process.

4.3 Accessibility Evaluation (2009)

A final accessibility compliance inspection was performed in early 2009 before the release of the new interface into production. The user interface was found to meet Section 508 accessibility standards.

4.4 Focus Group with State Analysts (2009)

In 2009, after completing the redesign of the user interface for providers, the team started to concentrate on streamlining the user interface for State analysts. We held a usability focus group with the analysts from MDCH and MDHS to identify areas for improvement in their user interface design and process. In general, the MWBC system worked well for the analysts, but analysts also wanted a comprehensive case management tool within the system. Additional discussions sessions were held to review the process in detail for all of the major areas of the product. The developers enhanced the system to streamline the overall process, combine functionality where appropriate, and add the case management tool functionality.

5 System Effectiveness – Highlights

To date, more than 400,000 applicants have been checked, with over 13,000 eliminated from consideration as a result of background checks. In addition to creating a custom screening tool, the Michigan Workforce Background Check team

helped in establishing policy and procedures for using background checks across state agencies. Highlights include:

- Employer interface provides “one-stop” shopping for comprehensive background checks with real time responses for name-based checks
- Fingerprint-based check virtually eliminates false positive or negative results
- Turnaround time reduced from 6-8 weeks to 48 hours
- Standardizing the background check process and improving communication between agencies prevents disqualified individuals from moving across facility types
- Immediate automatic RAPback notification
- High-security environment protects privacy of applicants and employees
- Turnaround time for appeals reduced to one business day
- Built using best practices for user interface design and software development
- Compliant with Section 508 accessibility standards

In summary, the design and implementation of this background check system benefited greatly from conducting user evaluations throughout an iterative development process. Focusing on applying UCD techniques resulted in a product that (1) facilitates communication among state and federal agencies, (2) services as an interactive decision support system, and (3) provides a better tool for public health practices.

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