

Optimize affordable housing mission performance using secure systems integration



By Adam Herringshaw and Sourabh Pawar

In today's interconnected digital landscape where affordable housing (AH) programs rely on an ecosystem of software systems and services, systems integration is a cornerstone of efficiency and productivity.

In this white paper, we cover systems integration and its association with customer experience (CX) and cybersecurity, exploring strategies and practices that organizations may employ to assure seamless integration for rewarding customer experience along with a strong cybersecurity posture. Such a strong posture is important for all systems, and especially for AH program systems which store sensitive, personally identifiable information (PII) that is protected by federal and state regulations.

Harness Service-Oriented Architecture to tailor CX

CGI utilizes Service-Oriented Architecture (SOA) as a digital transformation approach to designing and organizing AH program systems. We break down complex AH web applications into modular, reusable services that can be independently developed, deployed and maintained. CGI designs these services to communicate with each other via well-defined interfaces, enabling assembly of cohesive, mission-focused systems from new or existing services. Such modular design not only accelerates the development process but also enables CGI to create a tailored and role-specific customer experience for AH program participants, landlords, and support groups. CGI utilizes CX to instill confidence in these end users thus assuring user adoption of systems and return on investment for digital transformation.

Implement exceptional CX with a strong cybersecurity posture

We implement Application Programming Interfaces (APIs) for seamless, robust and reliable communication among AH program system components. While modern software development platforms and frameworks make API implementation straightforward, our experience informs us that securing APIs from internal and external threats requires specific expertise. CGI introduces OAuth 2.0 standards-based API security to AH program system architecture; this is the industry standard for API security. We choose OAuth 2.0 because it is backed by public key infrastructure (PKI), which enables cryptography at scale while eliminating challenges in managing sensitive secret keys among communicating APIs.

CGI configures OAuth 2.0 communication mechanisms (called grant types) using best practices including short-lived access tokens and specifically configured API refresh tokens. These mechanisms also assure rewarding CX: They recognize end-user browsers and remember the users, but don't force them to log in unless certain events like timeouts occur, or sensitive business actions must be performed. On shared machines like library PCs, AH program users can always log out to end their session and assure that someone else using the machine cannot impersonate them.

Loss or theft of PII is extremely disruptive to systems and bring serious ramifications to housing for economically challenged families supported by the AH program. Such incidents can also bring an audit from the Department of Housing and Urban Development's Office of Inspector General.

Golden rules for customer engagement

Good CX depends on making customer interactions simple and intuitive. From our public housing experience, we've consistently found these principles to be effective in creating systems to make that possible.

• **Identify CX requirements:** Get a detailed understanding of the customers and identify the CX requirements that best fit their particular circumstances. There's no one universal right answer.



• **Create wireframes:** Creating customer journeys and wireframes during the design phase of any web application is essential. This assures minimal rework during development of the application.



• **Utilize multistep forms:** Multistep forms offer several features to enhance customer experience, notably including a wizard-based form submission experience to guide users through the process.



• **Create deployment profiles:** Create deployment profiles specific to each environment involved in your deployment. This enables quick, error-free deployments that can also be easily automated.



We also implement Role Based Access Control (RBAC) for AH program users, utilizing industry standard Identity and Access Management (IAM) methodologies and components to deploy high-quality CX while assuring overall integrity and reliability across the system.

Enhance CX by deploying scalable and reliable web applications

The Content Delivery Networks (CDNs) we use enhance performance, security and scalability of AH program web applications. We use CDNs to assure quick responses from AH program web applications, handle increased traffic loads and deal with surges in user activity during peak activity timeframes. We achieve this by configuring the CDN to strategically distribute, cache, and serve dynamic web application content from numerous geographically dispersed servers. Our configuration reduces latency of responses and enhances the delivery of services to end users. By safeguarding the performance of web applications, we enhance overall customer experience.

CGI prefers CDNs that include a protective shield called Web Application Firewall (WAF) to protect AH web applications against known patterns of cyber-attack. CGI implements a security perimeter using WAF, safeguarding various AH program web applications and APIs from malicious attacks and platform vulnerabilities.

CGI configures Web Application Firewalls to detect and prevent potential attacks, such as SQL injection or cross-site scripting, that are designed to compromise data and harm user trust.

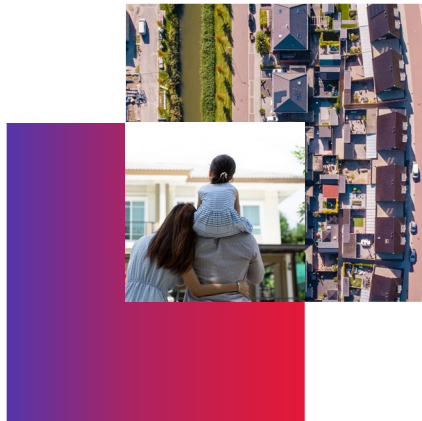
Armor SOA components to prevent internal threats

As we have mentioned thus far, CGI secures software systems against cybersecurity threats that are external to CGI's systems environment. However, we also armor and protect AH program systems against internal, privileged threat actors.

We do so by implementing a defense-in-depth approach, protecting boundary layers of AH program system components that surround individual components of our service-oriented architecture. To do this, we require traffic across all services to be authenticated, authorized and sanitized while crossing boundary layers. We verify the legitimacy of incoming requests and ensure only trusted parties gain access. We equip boundary layers with comprehensive monitoring, logging, and alert capabilities. We implement continuous monitoring which enables us to detect unusual activities or security breaches in real time and enable rapid responses to threats. We maintain detailed logs that enable us to reconstruct threat incidents and identify any shortcomings in our cybersecurity approach.

We deploy encryption of AH program data to assure that this data, whether at rest or during transmission, remains confidential and cannot be stolen or is not subject to tampering. This is especially important for AH program systems given the presence of PII. CGI also performs proactive, periodic security audits and vulnerability assessments to identify and address potential weaknesses within boundary layers to stay ahead of emerging threats and maintain the overall security posture of the architecture.

Cybersecurity threats advance continuously in capabilities. To counter such advances, we continuously evaluate and evolve our cybersecurity posture. CGI's cybersecurity professionals advise teams on updates to best practices and security architecture and implementation that is immediately available to CGI's AH clientele.



About CGI

Founded in 1976, CGI is among the largest IT and business consulting services firms in the world. We provide comprehensive, scalable, and sustainable IT and business consulting services that are informed globally and delivered locally.

CGI Federal Inc., is a wholly-owned U.S. operating subsidiary of CGI Inc. We partner with federal agencies to provide insights-driven solutions for defense, civilian, healthcare and intelligence missions. We help agencies digitally transform and accelerate returns on investments.

For more information:

Visit <https://www.cgi.com/us/en-us/federal/affordable-housing>

Email us at info@cgi.com