

Case Study - New Check Capture Process

New Check Capture Process – Core Banking UI Overhaul (5-Month Project)

- **Concise Description:** Redesign and digital transformation of the core banking check capture workflow to replace physical check scanners with a fully integrated digital process.
- **Scope:** End-to-end UI/UX redesign covering workflow analysis, user research, system integration, and compliance alignment.

1. Introduction & Background

Project Context

This case study focuses on a **major ongoing UI overhaul of the core banking system**, led entirely by me as the **sole UI/UX designer**. The project aimed to modernize check capture workflows while adhering to **strict regulatory, technical, and operational constraints**.

Problem Statement

The current check capture process relies heavily on physical check scanners to capture and store check data in the core banking system. This reliance introduces several operational challenges:

- Slower transaction processing at the branch level, especially during peak periods
- Increased risk of human error in handling, scanning, and validating checks
- Limited flexibility for employees performing transactions in front of customers
- Challenges in maintaining real-time compliance with internal policies and regulatory requirements

The goal of the project was to address these inefficiencies and improve both user experience and operational reliability.

Key Requirements & Constraints

The solution ensures:

- **Usability:** Be intuitive, requiring no additional hardware and minimal training
- **Compliance:** Meet NCUA regulations, internal check policies, and fraud detection protocols
- **Efficiency:** Complete the full check capture process in ~1 minute 30 seconds, with an optimal **5-click workflow** in ideal scenarios (aligned with Miller's Law)
- **Technical Integration:** Seamlessly integrate with core banking systems, OCR vendors, and automated verification tools
- **Operational Reliability:** Handle complex edge cases in real-time while mitigating risk and maintaining data privacy

Complex Workflow Requirements

The system had to accommodate advanced workflows, including:

- **Multiple Checks:** Efficient simultaneous processing and capture
- **Hold Placements:** Variable hold conditions with distinct outcomes (e.g., days, amounts)
- **Approval Processes:** Conditional approvals based on check amounts, customer profiles, and hierarchical roles
- **Deletions/Voiding:** Secure deletion or voiding of checks
- **Federal Reserve Communication:** Accurate and timely reporting of transactions
- **Fraud Notification:** Real-time ability for employees to flag potentially fraudulent activity
- **OCR / Third-Party Verification:** Accurate image capture and data extraction via OCR (Optical Character Recognition) integration or vendor solutions

Role & Collaboration

As the **sole UX designer**, I led the **end-to-end user experience strategy**:

- **Stakeholder Engagement:** Conducted interviews and contextual inquiries with frontline employees, branch managers, and digital users to map workflows and identify pain

points

- **Workflow & Interaction Design:** Developed user flows, decision logic diagrams, and interaction patterns addressing technical, operational, and regulatory requirements
- **Technical Collaboration:** Worked closely with front-end, back-end, and data engineers to ensure designs were technically feasible, scalable, and integrated with existing systems
- **Cross-Functional Alignment:** Coordinated with project management, the CEO, CIO, CLO, SVP of Retail, and regulatory teams to validate design compliance and business objectives

This approach ensured that high-level requirements were decomposed into detailed, actionable design artifacts, balancing the needs of diverse user groups with technical feasibility and compliance constraints. My work provided a foundation for a smooth transition into development and eventual product launch, maximizing value for both users and the business.

Project Notes

This case study highlights one of several requests I managed as part of a larger UI overhaul project. The application is currently live and in use. **I've included key process insights while maintaining confidentiality around sensitive details. The overview reflects my direct contributions across the project lifecycle.*

This UI overhaul, which I led over my two-year tenure, and I have extensive experience in similar initiatives. I am proud of these accomplishments and can provide additional examples or answer follow-up questions in greater detail.

2. Empathize

Stakeholder Communication & Process Review

To fully understand the end-to-end check capture process and the technical, operational, and regulatory constraints impacting users, I conducted a multi-layered discovery phase combining documentation analysis, observational research, and structured user feedback.

Documentation Review

I systematically reviewed all relevant documentation to map the existing system and process environment:

- **Process Manuals & Operating Procedures:**

- Detailed analysis of step-by-step instructions for manual check capture
- Cross-referenced the current process with historical process deviations to identify gaps
- Captured the exact sequence of operations for deposits, approvals, holds, and exception handling
- **Technology Inventory & System Architecture:**
 - Cataloged all endpoints: check scanners, mobile banking capture apps, desktop interfaces, and core banking modules
 - Mapped data flow between user-facing interfaces and backend systems, including OCR processing pipelines and validation logic
 - Documented system dependencies, limitations (e.g., batch processing capacities, latency, error-handling capabilities), and integration points
- **User Role-Based Responsibilities:**
 - Mapped task assignments and authorization levels for each employee tier (tellers, branch managers, compliance officers)
 - Traced hierarchical approval dependencies to understand real-time notification and escalation requirements
- **Video Workflow Analysis:**
 - Reviewed screen recordings and security footage to capture operational nuances:
 - Timing of transactions, clicks, and input sequences
 - Contextual use of auxiliary tools (calculators, internal messaging, reference databases)
 - Error recovery strategies employed by staff

User Research Methods

I employed a combination of quantitative and qualitative research methods to capture real-world user behavior and operational constraints:

- **Surveys:**
 - Collected structured feedback from 20+ employees across multiple branches
 - Mapped perceptions of efficiency versus regulatory compliance adherence
 - Quantified pain points by measuring time-to-completion, frequency of exceptions, and employee confidence in fraud detection.

- **Contextual Interviews & Observations:**
 - Shadowed employees performing check capture tasks in situations to observe:
 - Interactions with the core system and current check scanners
 - Decision-making at conditional approval points
 - Customer-facing behaviors during transaction verification
 - Noted deviations from documented process, revealing implicit workflows and workarounds

- **Environmental & Operational Context Capture:**
 - Documented the branch layout, workstation ergonomics, lighting, and countertop surfaces, which were critical for OCR image quality and process efficiency
 - Analyzed how device placement and network reliability influenced workflow consistency

Outcome

Through this technically in-depth discovery phase, I:

- **Identified critical pain points:** system latency, inconsistent OCR accuracy, and error recovery inefficiencies
- **Uncovered operational inefficiencies:** redundant data entry, multi-step approvals causing delays, and gaps in cross-branch tracking
- **Recognized regulatory and compliance risks:** incomplete audit trails, inconsistent signature verification, and variable hold logic application
- **Established a data-driven foundation for:**

- Workflow mapping, including conditional decision trees and exception handling logic
- Interaction modeling, including error handling, notifications, and automated feedback mechanisms
- Technical feasibility assessment, aligning user behaviors with backend system capabilities and constraints

3. Define

Project Scoping & Requirements Gathering

Led a comprehensive requirements gathering process to define the full scope, constraints, and success metrics for the project:

- **Captured Requirements:**
 - **Functional:** End-to-end check capture, approval workflows, exception handling, OCR integration, and real-time feedback
 - **Non-Functional:** Performance targets (e.g., completion in ~1:30 minutes), minimal clicks per workflow, accessibility, and system responsiveness
 - **Regulatory & Compliance:** NCUA, internal audit readiness, fraud detection, and hold rules
- **Workflow Rules & Constraints:**
 - Single-check deposits exceeding daily limits
 - Multi-branch deposits and mobile capture tracking
 - Signature verification errors
 - Audit-readiness of captured check data
- **Additional Operational Constraints:**
 - Hierarchical approval notifications based on check amount and customer type
 - Hold conditions tied to fraud risk or flagged behavior
 - OCR capture requirements, including check numbers, routing information, amounts, signatures, positioning, and lighting

Collaboration:

- Aligned requirements with product managers, developers, and compliance teams
- Ensured timelines, resources, and deliverables were feasible within technical and operational limits

User Flow Creation & LOB Approval:

- Developed high-fidelity user flows incorporating:
 - Role-based decision logic and hierarchical approval levels
 - Conditional workflows for exceptions, fraud alerts, and holds
 - System prompts, error handling, and automated feedback loops
 - Integration points with OCR and the core banking system
- Produced a **comprehensive check flow chart** serving as both a training tool and a compliance reference
- Validated flows with line-of-business stakeholders, project managers, and compliance teams

Outcome:

Established a structured, technically informed, and user-centered foundation for ideation and design phases.

4. Ideate

Initial Design & Developer Collaboration

During the ideation phase, I translated the insights from the Empathize and Define phases into concrete design concepts and technical workflows. This stage focused on creating robust, end-to-end workflow sketches that encompassed both ideal user journeys and complex, real-world edge cases.

- **End-to-End Workflow Sketches:**
 - Mapped all transaction states, including successful deposits, partial approvals, fraud alerts, and OCR failures

- Included conditional logic flows: e.g., multi-check deposits, cross-branch transactions, and hierarchical approval escalations
- Defined error handling states for common system issues (OCR misreads, network latency, validation failures)
- Captured real-time feedback mechanisms to guide users during front-of-customer interactions
- **Technical & System Review with Engineers:**

Collaborated closely with front-end, back-end, and data engineers to ensure designs were feasible and optimized for system constraints:

 - **Visual Constraints:**
 - Determined which interface elements must always be visible to reduce decision errors (e.g., approval prompts, transaction totals, real-time error alerts)
 - Identified optional or context-sensitive elements to reduce cognitive load without compromising regulatory compliance
 - **Technical Interactions:**
 - Integrated OCR processing: defined requirements for image capture resolution, lighting conditions, and orientation checks
 - Coordinated with third-party verification tools for signature and fraud validation
 - Mapped backend data flows, including temporary storage, validation queues, and audit logging, to ensure regulatory traceability
 - **System Limitations & Constraints:**
 - Accounted for processing times across OCR, core banking validation, and approval workflows
 - Established retry logic for failed transactions and network interruptions
 - Implemented data validation rules to ensure accuracy of amounts, routing numbers, and signature matches

- Planned for scalability considerations, including multi-branch simultaneous transactions and high-volume deposit scenarios
- **UX vs. Implementation Trade-offs:**
 - Evaluated scenarios where optimal UX design conflicted with system limitations (e.g., instant feedback vs. OCR processing latency)
 - Developed mitigation strategies, such as progressive feedback, placeholder prompts, or delayed validation indicators
 - Prioritized critical user experience elements over non-essential enhancements to maintain project timelines and system stability

Outcome

- Achieved a design solution that balanced user experience goals with backend capabilities, regulatory compliance, and business objectives
- Mitigated risk of costly post-development revisions by validating feasibility and system dependencies early
- Created a foundation for high-fidelity wireframes and interactive prototypes, ensuring seamless transition into the Design phase
- Anticipated and documented edge cases and exception handling flows, providing developers with clear, actionable guidance for complex real-world scenarios

5. Design

Wireframes & High-Fidelity UI Design

In this phase, I transformed workflow sketches into structured, testable designs that addressed both user experience goals and technical requirements.

- **Low-Fidelity Wireframes:**
 - Created in **Figma** to visualize full end-to-end workflows, including:
 - Decision points and approval hierarchies for multi-level check verification
 - Error states for OCR failures, invalid inputs, and transaction exceptions

- Exception handling flows, such as fraud alerts, hold placements, and multi-branch deposit coordination
- Defined integration points with backend systems, including:
 - OCR modules and third-party signature verification tools
 - Autofill functionalities based on historical check or account data
 - Real-time validation against regulatory and internal compliance rules
- Conducted iterative user feedback sessions (Around 7-9) with frontline employees to:
 - Validate workflow logic and accessibility of interface elements
 - Identify edge cases and refine error messaging
 - Ensure the wireframes are aligned with real-world operational constraints
- **High-Fidelity UI Designs:**
 - Applied brand standards, visual hierarchy, and responsive design principles to create polished screens ready for implementation
 - Addressed accessibility considerations, including:
 - Color contrast for OCR readability
 - Clear typographic hierarchy for error and instruction messaging
 - Keyboard navigation and screen reader compatibility for compliance
 - Developed reusable component libraries to ensure consistency across workflows, including:
 - Input fields, buttons, modals, and notification banners
 - Standardized error states and feedback messages
 - Consistent interaction patterns for approvals, holds, deletions, and multi-check processing

- Designed real-time feedback mechanisms, including:
 - Inline validation for check amounts, routing numbers, and signatures
 - System prompts for exceptions, approval escalations, and fraud alerts
 - Visual indicators for OCR capture success/failure

Design Presentation & Feedback

- Led structured review sessions with stakeholders and end users to:
 - Validate that the designs supported real-world workflows and decision logic
 - Ensure regulatory compliance and alignment with business objectives
 - Capture edge-case scenarios requiring additional design considerations
- Documented feedback along three dimensions:
 - **Priority**: critical vs. non-critical changes for workflow completion
 - **Technical feasibility**: constraints based on backend, OCR, or third-party integrations
 - **Regulatory impact**: ensuring legal compliance for all exceptions and error handling
- Incorporated input from the software team regarding:
 - Implementation timelines and dependencies
 - Integration with existing backend services
 - Decisions regarding in-house vs. vendor solutions for OCR and verification

Outcome

- Designs were validated as user-centered, technically feasible, and compliant with regulatory requirements
- Established a scalable, standardized UI framework for future features and updates

- Delivered clear design specifications and component libraries to development team, minimizing risk and ensuring high fidelity during implementation

6. Development

Implementation Support

During the development phase, I maintained close collaboration with the engineering team to ensure the final product accurately reflected approved designs while meeting operational and regulatory requirements:

- **Screen-by-Screen Design Verification:**
 - Conducted thorough reviews of each implemented screen, comparing them against low- and high-fidelity wireframes and design specifications
 - Verified that all user interactions, visual hierarchy, and component behaviors matched the intended design intent
- **Design Adjustments for Technical Constraints:**
 - Identified areas where backend limitations, OCR processing constraints, or frontend rendering issues required design modifications
 - Developed alternative solutions that preserved usability, workflow efficiency, and visual consistency
- **Developer Guidance & Support for Developers:**
 - Provided detailed explanations of edge-case handling, including:
 - Multi-check deposits across different branches
 - Conditional approval escalations based on amount, customer type, or fraud alerts
 - Error recovery flows for OCR misreads or invalid entries
 - Clarified responsive behaviors for desktop, tablet, and mobile branch devices
 - Assisted with the integration of autofill functionality, real-time validation, and system prompts

- **Quality Assurance & Compliance Verification:**
 - Ensured that OCR integration captured check numbers, routing information, amounts, and signatures accurately under different lighting and environmental conditions
 - Confirmed that autofill, error handling, and alerts operated reliably and consistently
 - Validated that workflows adhered to NCUA guidelines, internal check policies, and regulatory reporting requirements

Outcome

- Achieved high-fidelity implementation of the approved designs, bridging the gap between UX intent and technical execution
- Minimized rework by proactively resolving design-implementation conflicts and ensuring alignment with complex regulatory and operational rules
- Preserved workflow integrity, visual consistency, and usability, ensuring a seamless transition into QA and subsequent launch

7. Testing

Quality Assurance & Validation

During the QA phase, I took an active, hands-on role to ensure that the implemented product met both design intent and functional requirements, while maintaining compliance and usability:

- **Design Fidelity Verification:**
 - Reviewed all screens to confirm alignment with low- and high-fidelity wireframes and design specifications
 - Verified interaction patterns, visual hierarchy, responsive behaviors, and consistent error messaging across desktop and branch devices
- **Usability & Edge Case Testing:**
 - Conducted scenario-based usability testing with users, including:
 - Multi-check deposits across branches and mobile channels

- Exception handling for hold placements, signature verification failures, and conditional approvals
 - Real-time fraud alerts and customer-facing notifications
 - Observed workflow efficiency, employee decision-making, and error recovery processes to identify friction points
- **Automated Feature Validation:**
 - Confirmed accuracy and reliability of OCR data capture, including check numbers, routing numbers, amounts, and signatures under various lighting and environmental conditions
 - Tested autofill functionality, system prompts, alerts, and notifications to ensure correct triggers and timing
- **Regulatory & Compliance Checks:**
 - Validated workflows against NCUA guidelines, internal banking policies, and fraud detection protocols
 - Ensured that all data capture and reporting processes met audit requirements and legal standards
- **Performance & Efficiency Evaluation:**
 - Measured transaction completion times, verifying that workflows could be completed within target limits (~1 minute 30 seconds)
 - Confirmed minimum click efficiency, adhering to design goals and Miller's Law principles
- **Collaboration with QA Engineers:**
 - Documented discrepancies and edge-case failures in detailed QA tickets within Jira
 - Provided design rationale and guidance to QA teams for prioritization of fixes
 - Iteratively worked with developers to resolve issues and refine workflows

Outcome

- Ensured complete alignment between design intent, technical implementation, and regulatory requirements
- Validated that the system functioned reliably under real-world conditions, including edge cases and complex workflows
- Reduced post-launch errors and ensured a smooth user experience by identifying and iterating on workflow inefficiencies before deployment
- Established a clear QA feedback loop, supporting continuous improvement during launch and post-launch phases

8. End-User Training

Training Materials & Plan

- **Interactive Screen Recordings:** Produced step-by-step recordings of the full check capture workflow, including standard transactions, exception scenarios, and edge-case handling
- **Comprehensive Process Documentation:** Developed detailed manuals covering:
 - End-to-end transaction steps
 - Conditional approvals and hold placements
 - Fraud detection protocols and escalation procedures
- **Terminology & Compliance Guidelines:** Clearly defined all technical terms, operational rules, and regulatory requirements to ensure consistent understanding across employees and branches
- **Training Delivery Structure:** Designed materials to support both in-person training sessions and self-guided learning, ensuring scalability across multiple branch locations

Outcome

- Facilitated the rapid onboarding of employees onto the new system
- Minimized user errors and reduced reliance on support staff for routine guidance

- Aligned user behavior with business objectives, operational standards, and regulatory compliance, ensuring consistent execution of workflows across all branches

9. Launch

Go-Live & Continuous Improvement

- **Real-Time Error Monitoring:** Actively observed system operations and employee interactions during the first weeks of rollout, identifying transaction errors, workflow exceptions, and OCR capture issues as they occurred. Logged incidents and ensured immediate resolution to maintain operational continuity.
- **User Support & Transition Assistance:** Provided hands-on guidance to employees adapting from traditional scanner-based processes to the new front-of-customer digital workflow. This included step-by-step coaching, clarifying system prompts, and demonstrating correct check positioning for OCR capture.
- **Iterative Design Adjustments:** Collected live feedback from employees and branch managers, using it to refine:
 - **Error messaging:** Reworded alerts and instructions to provide clear, actionable next steps, reducing confusion and rework
 - **Workflow sequences:** Adjusted interaction patterns and approval notifications based on observed bottlenecks or inefficiencies
 - **OCR capture guidance:** Updated positioning, lighting, and background recommendations to improve data extraction accuracy
- **Operational Compliance Verification:** Monitored processes to ensure adherence to NCUA guidelines, internal audit standards, and fraud detection protocols, adjusting workflows as needed to maintain compliance

Example of Iterative Improvement

- Initial error messages were too generic, causing user uncertainty when transactions failed. Updates provided explicit corrective actions and real-time guidance, enabling employees to resolve issues without escalating to supervisors.

Outcome

- Achieved a smooth go-live with minimal operational disruption
- Implemented immediate usability improvements based on live feedback
- Maintained regulatory compliance while supporting the adoption of the new digital-first workflow

10. Key Learnings & Design Considerations

Error Messaging & User Guidance

- Observed that default system error messages were insufficient for real-time, front-of-customer workflows.
- Lack of immediate, actionable guidance caused transaction delays, repeated errors, and customer confusion.
- Pre-launch standardization and rewording of all error states is essential to ensure employees can quickly resolve issues without escalating, particularly in high-pressure financial contexts.

OCR & Environmental Testing

- Physical environment directly impacts OCR performance: lighting conditions, countertop color, and background contrast affect image capture accuracy.
- Example: White countertops caused frequent OCR failures; introducing navy-colored mats significantly improved capture reliability.
- Recommendation: Conduct environmental simulations during early design validation to anticipate real-world challenges and reduce post-launch adjustments.

Technical & Operational Constraints

- Core banking system limitations, such as delayed feedback loops and restricted automation, created friction in the new workflow.

- Early identification of these system constraints allows for design workarounds, including real-time prompts, exception handling, and error mitigation strategies.
- Integration with OCR, autofill, and regulatory reporting requires continuous alignment between design intent, backend logic, and operational rules.

Takeaway

- Incorporating operational context, environmental variables, and real-time guidance mechanisms into design decisions is critical for digital-first workflows in complex financial systems.
- Proactive testing, detailed scenario mapping, and standardized messaging are key to reducing errors, improving efficiency, and ensuring compliance.

11. Conclusion, Outcome, Timeline & Next Steps

Outcome

- The launch of the new check capture system was **successful**, receiving positive feedback from both end users and business stakeholders.
- The solution **eliminated dependency on physical check scanners**, enabling fully digital front-of-customer workflows.
- Integrated **OCR and autofill capabilities** performed efficiently, providing accurate, real-time data capture while maintaining compliance with internal and regulatory requirements.
- System adoption demonstrated **improved workflow efficiency, reduced processing errors, and enhanced user confidence** in front-of-customer interactions.

Timeline

- **Total Duration:** 5 months
A significant portion of the timeline was dedicated to requirements gathering and validation, given the evolving business rules, approval hierarchies, and regulatory constraints.

- **Ongoing maintenance** is built into the process to address dynamic factors such as:
 - Updates to transaction limits, hold rules, and approval workflows
 - Edge case scenarios encountered post-launch
 - Regulatory changes impacting capture, storage, and reporting

Post-Launch Learnings

- The system continues to adapt to operational changes and emerging edge cases, ensuring sustained compliance and workflow reliability.
- Feedback mechanisms, including surveys and issue-tracking systems, enables rapid identification and resolution of usability or technical issues.
- The core workflows are stable, scalable, and widely adopted across multiple branches, supporting increased transaction volumes and varied user types.

Next Steps

- **Continuous Improvement:** Ongoing iteration to refine workflows, error messaging, OCR accuracy, and system feedback based on user and operational insights.
- **Expansion of Adoption:** Rollout to additional branches and user groups to maximize system utilization and operational efficiency.
- **Data-Driven Enhancements:** Analyze usage metrics, error logs, and survey feedback to identify opportunities for optimization, streamline user flows, and enhance overall usability.

Final Note

- This project demonstrates the critical balance of regulatory compliance, technical feasibility, operational constraints, and user-centered design principles.
- By combining thorough discovery, iterative design, cross-functional collaboration, and post-launch refinement, the solution delivers a seamless, efficient, and compliant check capture experience, fully adaptable to future business and regulatory requirements.

