[State] Department of Labor and the CARES Act Discovery Findings

Technical Summary

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Who we are

U.S. Digital Response (USDR) is a volunteer-run, non-partisan organization that offers access to highly skilled expertise, empowering governments' rapid response efforts with support in technology, data, design, operations, communications, project management, and more during the COVID-19 crisis.

Executive Summary

COVID-19 and the CARES Act had many repercussions for state unemployment insurance systems nationwide. The crisis brought over 35 million new applicants for unemployment benefits into state UI systems. At peak, there were 10 to 50 times more claims than ordinarily seen, with the wave of users starting practically overnight.

State Departments of Labor have **struggled to keep up and must rely on outdated technology and manual processes to determine who is able to receive benefits**. Prior to the pandemic, this was not a high priority problem as unemployment and applicant volume was low. Then, state employees were able to manually verify documents and interview applicants as needed.

Since April 2020, USDR teams have helped state DOLs with audits to address long processing times, call center backlogs, and ways to improve their systems. Our investigations found that most problems and delays applicants and state staff face can be traced back to the following three root causes:

- **The process for eligibility determination is hard, slow, and unreliable**. Between wage verification, identity verification, existing claim status, fraud checks, document upload, and certification/benefit windows, **eligibility checking is, at present, unreliable and manual**.
- **Systems are mainframe-centric, not applicant-centric.** Mainframes continue to drive user experience, technical operations, and customer support. While they contain a lot of functionality and historical records, they're difficult to update or change, under-tested, and often poorly understood.
- **Humans power the system.** Though there may be an online application and tracking system, human intervention in moving applications through the system remains very high. Most UI applications are touched by humans in some way. This contributes to delays, requires hiring of emergency personnel, and can be a frustrating experience for both staff and applicants.

Effectively updating these processes and systems requires a better understanding of workflows, data needs, and backlogs, as well as a user-centered, agile approach to procuring and modernizing state software tools.

This report is informed by our work with state DOLs and reflects common themes we saw across multiple states. It's based on reviews of code, technical documentation, manuals, testimony, and over 50 hours of interviews with staff. It doesn't represent the situation in every state or any particular state. Instead, it's an anonymized and fictionalized compilation of the reports we created for state DOLs. The examples shown are real, but the exact figures and data have been fictionalized to de-identify them. We hope that this summary illustrates some of the difficulties administering UI, and can inform modernization planning.

Background

Tens of millions of Americans lost their jobs in the first half of 2020 and all states have been hit hard. Local businesses closed, large corporations laid off thousands, and many others who work as part of the "gig economy" lost their sources of income because of the COVID-19 crisis.

The CARES Act, passed in late March, expanded or created three new benefits for those who lost work due to the pandemic:

- State residents already receiving traditional Unemployment Insurance (UI) benefits (typically W-2 workers), would automatically receive an additional $600/week through July 31, 2020.

- State residents who had already used their 26 weeks of UI in the prior year could apply for 13 additional weeks of Pandemic Emergency Unemployment Compensation **(PEUC)**.

- State residents who were self-employed or worked in the gig economy (and therefore ineligible for traditional UI) could apply for Pandemic Unemployment Assistance **(PUA)**, and receive $600 per week, through July 31, 2020.

The unprecedented number of applicants and new changes to benefits resulted in cascading workflow and system changes, described in this document.

The UI System before CARES Act

Before the COVID-19 crisis, the DOL processed conventional unemployment insurance (UI). This means that people who were laid off from their W-2 job could go to their state Department of Labor website and apply for cash payments. **These applicants had to:**
- **File an initial claim and be approved, and then**
- **File weekly claims, certifying that they were still unemployed, in order to receive payment**

State residents could also start an application by calling into the DOL Hotline, which accounted for around 25% of applications.

Initial Claims Process

The workflow for filing an "initial claim" is as follows. Items with an 👤 icon indicate they are done by the applicant, while the 🖥 indicates that the action is taken by the system, and the

icon indicates that the action is taken by a Department of Labor employee:

1. Applicant goes to the state Department of Labor website (myunemploymentbenefits.gov) and creates a user account.

2. Applicant fills out an initial claim form, including demographic data, previous employers, and a questionnaire.

3. The web application adds the applicant's claim to the batch file, which is scheduled to run nightly on the mainframe computer (a.k.a. the mainframe, more details about that later).

4. The mainframe processing logic boots up at 1 AM and processes the batch file by executing business logic including:
   a. **Identity check** to see if the SSN associated with that account is from a deceased person, non-citizen, etc.
   b. **Wages cross-check**, linking to data from the state Department of Revenue to confirm prior year wages
   c. **Computed benefit amount**, if anything, using the applicant's computed wages
   d. **Business logic** applied to the applicant's case after looking at their questionnaire answers. For example, if the applicant notes that they are an officer in a corporation, their application is automatically moved into a holding status "temporary suspension: 94911." (More about temporary suspensions later.)
   e. Based on the identity check, the wages cross-check, and the answers to their questionnaire, the applications are either "accepted," "denied," or placed in "temporary suspension," which covers a variety of reasons.

5. **Between 45% of claims are automatically accepted or denied.** The remaining 55% of applications are put into "temporary suspension," where they require review and determination of next steps by a customer service representative (CSR). Below is a list of sample temporary suspense reasons and codes:

Temporary Suspense for Separation/Job Refusal Issues		
93100	Quit	Effective the day after the last day worked. Disqualification is 3xs the WBA.
98446	Fired	Effective the day after the last day worked. Disqualification is 3xs the WBA.
98447	AI – Quit, Fired, LOA	Effective the day after the last day worked. No scheduled call – statement taken the same day.
91131	Job Refusal	Effective the day after the last day worked.

		Disqualification is 3xs the WBA.
98449	Leave of Absence	Effective the Sunday after the claim is processed.
98600	Not a citizen	Alien/Not a Citizen
98422	Name Mismatch	SSA and reported name do not match
93600	Back pay	Received back payments for worked wages
93799	Wrong Last Employer	Employer data does not match reported
94332	CWOS	Claimed Wages in another state
94414	Wage mismatch	Wages do not match reported
93122	Overpayment	Overpaid

List of Temporary Suspension Codes

6. 👤 Some claims in temporary suspension are put into a queue, in which a customer service representative (CSR) will call the applicant to resolve outstanding questions. The CSR can then amend the application and approve or deny it.

Once an initial claim is approved, the applicant is now able to receive benefits after one week (called the "waiting week"). In order to receive payment, applicants must also file a weekly claim.

Weekly Claims

After the "waiting week" is complete, the weekly claim process is as follows:

1. 👤 Login to the UI portal (myunemploymentbenefits.gov) and select "weekly claim."
2. 👤 Select a week to claim and fill out the questionnaire.
3. 🖥 The claim is written to a batch file to be processed for payout by the mainframe.
4. 🖥 Weekly claims are processed in a weekly batch, usually on Wednesday.
5. 🖥 The mainframe runs business logic on the questionnaire to determine eligibility for the weekly claim.
6. 🖥 Claim is accepted and paid out or denied. The process is fully automated, with no manual intervention except for appeals.

Did you work any day, Sunday through Saturday, during the week being claimed?
○ Yes ○ No

Did you receive any bonus pay during the week being claimed?
○ Yes ○ No

Did you receive any holiday pay for the week being claimed?
○ Yes ○ No

Did you receive any vacation pay for the week being claimed?
○ Yes ○ No

Did you receive any severance pay for the week being claimed?
○ Yes ○ No

Did you refuse work during the week being claimed?
○ Yes ○ No

Did you quit a job or were you fired from a job during the week being claimed?
○ Yes ○ No

Did you receive or change any type of pension, other than Social Security benefits, during the week being claimed?
○ Yes ○ No

Did you apply for or receive any workers compensation payment for the week being claimed that was for a work-connected injury or disability?
○ Yes ○ No

Were you physically able to work four or more days during the week being claimed?
○ Yes ○ No

Were you available for work, with no undue restrictions, for four or more days during the week being claimed? Note: Being available for work with no undue restrictions means there was nothing which would have prevented you from accepting work had it been offered to you.
○ Yes ○ No

Claimant work search question has been temporarily removed when filing weekly claims online due to COVID-19.

| BACK | SUBMIT CLAIM |

The weekly claim questionnaire, applicants need to fill this survey out weekly to claim benefits.

7. If a weekly claim is rejected (based on answers to the questionnaire) it can be appealed through the call center workflow described later in this document.

The System

The UI system includes **several web and voice applications that surround a mainframe computer system, which we will refer to as the "mainframe."** The mainframe acts as the system of record for UI applications, executes business logic like cross-checking wages and identity checks, and interfaces with the state banking partner to do payouts.

The mainframe has two modes of data access:

- A real time data connection provided through a Customer Information Control System (CICS)
- A batch file interface — when a batch file with the appropriate format is produced, the mainframe consumes claim data

Below is a simplified diagram of the UI system, showing the major functional parts of the system. Some subsystems, including fraud, the employer website, and wage data sync, are not covered in the diagram, for legibility.
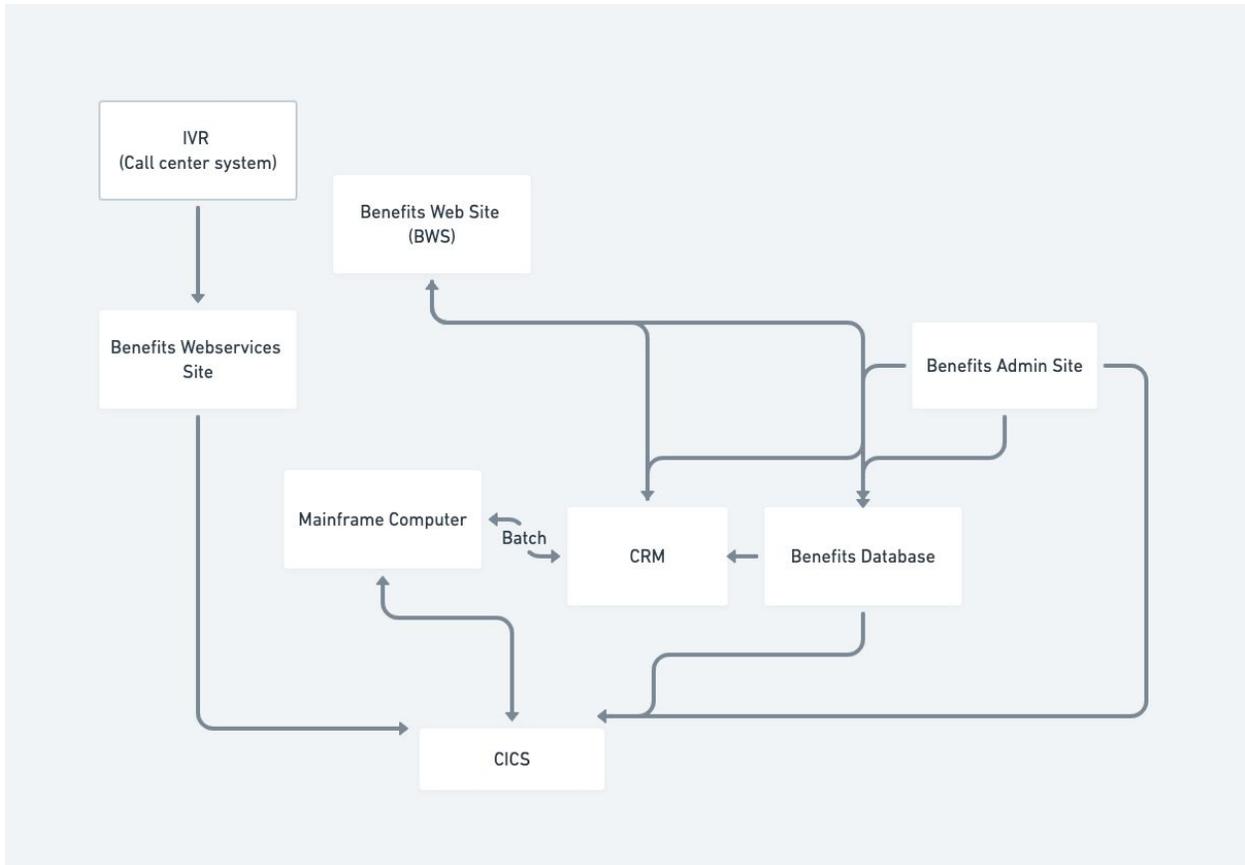
Diagram of the major system components

Below is a summary of the different parts of the system and how they interact:

- **The mainframe** (IBM model 2965-N02, z/OS v2.2) is the most important part of the system and is responsible for:
  - Serving as the system of record for UI. It stores all the applications and their status, as well as the transaction history for claims and payouts.
  - Running and maintaining core business logic, like wage cross-checks, questionnaire processing, and identity checks, and automatically accepting and denying claims as business logic.
  - Producing payout files and interfacing with a bank secure file transfer system for payouts. Payout files are generated weekly, usually on Wednesdays. If a user certifies for multiple weeks at once, they may receive multiple payments at once.
  - Storing user accounts for website login.
- **Benefits Website (BWS):** Web application(s) allow users to create and update applications stored in the mainframe.
- The web applications mainly function to create and update claim and application data.
  - They also allow users to check the status of their applications
- **Benefits Admin Site:** The internal website for CSRs is a web application that is only available on the intranet. It has the following functionality:

- ○ Creates and updates the application and claim data
- ○ Allows the addition of notes and additional documentation
- **The CRM System:** Manages a queue of claims that CSRs use to make outbound calls. It allows them to perform the following actions:
  - ○ Override approve/deny judgment made by the mainframe
  - ○ Add notes and documentation to the applications
  - ○ Produce batch files of applications for processing and payment by the mainframe
- **The Interactive Voice Response System (IVR)** powers the call center, manages the callers, and provides automated messages in some situations.
- **CICS** enables an HTTP interface to the mainframe that allows real-time connection between the mainframe, the web applications, and CRM. These make the web applications more useful and help CRS troubleshoot. For example:
  - ○ It allows the web application to check whether the user has any active applications in the system.
  - ○ It allows the web application to check which weeks the user has not yet certified.
  - ○ The CICS has a terminal that allows users to log into the mainframe and edit data,which is useful for complex support requests.
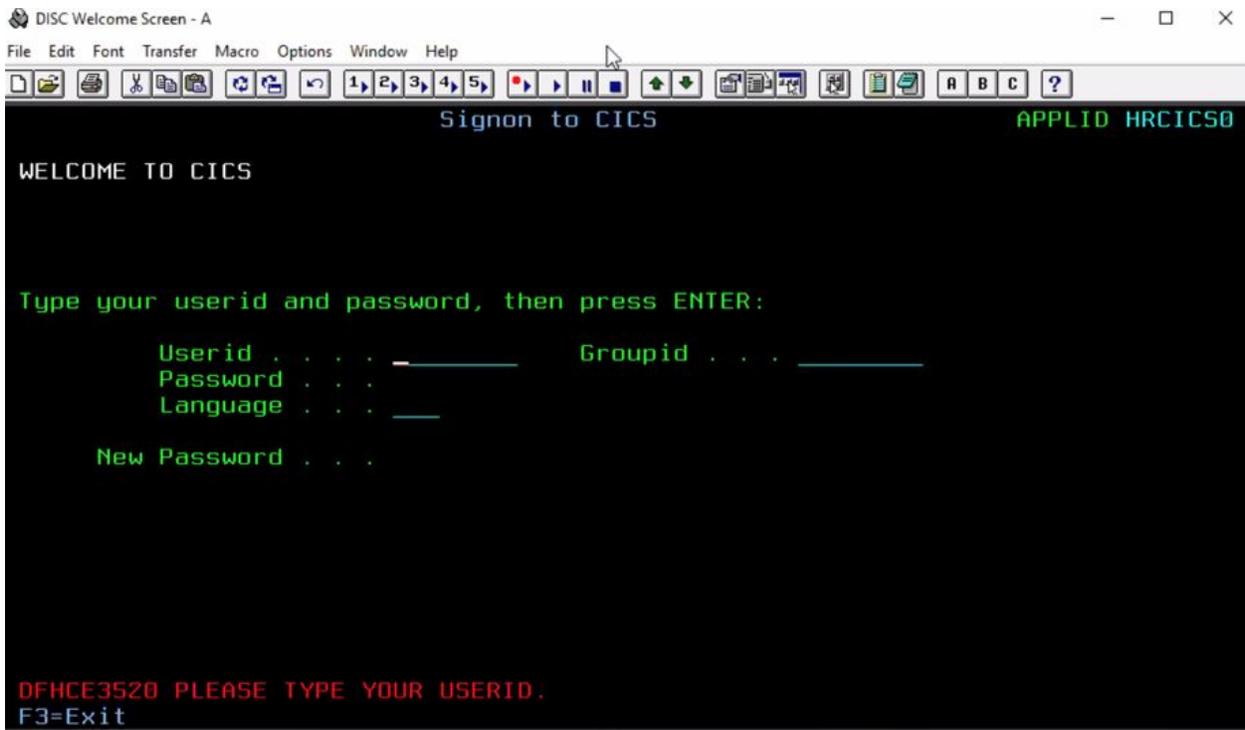
Terminal login to the Mainframe through CICS

Implementing CARES Act

When the CARES Act was passed, many changes were required of the UI system at once. The shifting landscape showed:

- A large increase in applicants through the IVR system and website, from 4,000/week to about 50,000 per week.
- A **new workflow — employers uploading spreadsheets of laid-off workers** on — was getting a lot of usage, with tens of thousands of initial claims submitted.
- The CARES Act stipulated that an additional $600 per week would be provided to those eligible for traditional UI.
- The CARES Act also stipulated that UI claimants, both new and existing, would receive an additional 13 weeks of unemployment benefits, through the Pandemic Emergency Unemployment Compensation (PEUC) program.
- For the first time, the PUA program, also part of the CARES Act, allowed the self-employed — not just W2 employees — to collect benefits.

These changes led to a corresponding cascade of new program implementation work, technical upgrades, and application upgrades. The following sections describe the changes in the system, roughly in chronological order, though many of these projects happened at the same time.

Fixing Downtime Due to Load

The initial spike in traffic in late March/early April revealed problems with the middleware that bridges the web interface and the mainframe via CICS. The middleware software team patched its product, which fixed the immediate bug and allowed the department to scale up their web traffic.

However, the middleware component remains the primary performance hurdle in the existing architecture. The CICS (version 5.3) middleware that it connects to now has its own web services features. These are being explored by the team as an alternative to the middleware as (a) DOL is already paying for them and (b) they may provide better throughput than the middleware.

Federal UI: Adding $600 Per Week

The CARES Act added a new rule, allowing those who were eligible for UI to receive an additional $600 per week, paid for by the federal government. This amount was greater than

normal UI benefits, and implementing this was one of the highest priority projects for the department. The changes were implemented in the mainframe in late April 2020 and benefits began being paid early May.

This process required **editing existing claims** to include an additional $600/week. In order to fulfill some of those payments linked to existing claims, the staff implemented a protocol called "troubleshooting production issues," which will appear several times in this review.

During the troubleshooting of a production issue, database administrators (DBAs) would write custom scripts to update the mainframe database to edit records and generate additional payments. The troubleshooting of production issues was sometimes error-prone and resulted in double payments for some individuals.

Implementing Multiple New Application Types

The original UI system had a single application form, for conventional UI, and a weekly certification form. However, with the passing of the CARES Act, the number of programs jumped to three, with dependencies between each. The logic to move users between applications included:

Conventional UI
- Does the user have an existing UI claim (in the past 1 year)?
- If no, allow them to apply

PEUC
- Does the user have an existing UI claim open in the past 1 year?
- Is their existing benefits claim exhausted?
- Allow them to apply for PEUC

PUA
- Does the user have an existing UI claim that has been rejected?
- If no, tell them to apply for conventional UI, and expect to get rejected (in a few business days), and then apply for PUA
- If rejected UI claim is found, allow them to apply for PUA

Weekly Certification UI and PEUC
- Does the user have an existing UI claim?
- Which weeks haven't been claimed and are within the time window?

Weekly Certification PUA
- Does the user have an existing PUA claim?
- Which weeks haven't been claimed and are within the time window?

Primary menu on www.myemploymentbenefits.gov that allows applicants to choose which program to apply to.

The logic of these eligibility checks could require the user to start filling out the form before it determines whether the user could complete the application. The interdependencies between the applications led to a lot of user confusion. **Program interdependency and the resulting confusion is one of the most important findings of this investigation and is discussed in the [Key Findings](#) section at the end of the document.** For example, applicants experienced confusion regarding the following:

1. Applicants didn't know to "Apply for Benefits" and then be rejected in order to apply for "Pandemic Unemployment Assistance."
2. Applicants didn't know the difference between "Pandemic Emergency Unemployment Compensation" and "Pandemic Unemployment Assistance."
3. Filing weekly claims for PUA and UI were separate forms, but that wasn't obvious in the user interface, which made it a point of confusion for applicants.

From a technical perspective, the PUA app and the UI+PEUC App were completely separate applications, with different code repositories, flows, and deployments.

Merging Accounts from Employer-Filed Claims

Employers have a special website (www.mystateemployers.gov) to submit layoff data in spreadsheet form. Tens of thousands of applications were submitted here. These layoffs were automatically considered to be valid, as they were submitted by employers, so this process bypassed many of the fraud and risk checks that regular applications went through.

These applicants were sent a letter directing them to log in or call the call center to make a weekly claim and get a payment.

This process used the employees' social security numbers as the primary key for matching the claims, and in many cases, applicants had to present a driver's license in order to link their state UI account to the claim created on the state DOL website.

Customer service representatives gathered identification documents. In some cases, if the customer service backlog was too large, applicants missed weeks of payments, because the window to claim them expired.

Account matching failures became "production issues" requiring a DBA to manually match accounts in the mainframe. This process was error-prone, leading staff to refer to it as a "funky data" problem.

Implementation of PEUC

PEUC allows those eligible for traditional Unemployment Insurance 13 more weeks of benefits. Applicants must apply for PEUC after their traditional UI benefits are exhausted, and continue filing weekly certifications as needed.

The mainframe database schema is difficult to edit, so the implementation of the PEUC program was done by writing over a legacy "EUC" claim type. (Emergency Unemployment Compensation was a program from years ago and was no longer active.) The reuse of the old claim code was a source of production issues and what staff called "funky data" in the system, because some social security numbers were associated with old EUC claims, and therefore could not be used to make a new PEUC claim. This was difficult for customer service reps to troubleshoot, requiring manual, error-prone data touch-ups by database administrators.

The inability to add a new claim code to the mainframe, and the resulting reuse of existing code, was the root of significant problems.

PUA for the Self-Employed

The CARES Act allowed an entirely new population of people —the self-employed — to have access to unemployment insurance. This population had a high need for benefits but had several challenges with the application process and verification of data and identity. Self-employed PUA applicants' workflow was as follows:

1. The applicant submits a traditional UI application via "Apply for Benefits" in the main menu.
2. The application moves through the UI system but **is rejected because there is no W-2 wage data on file**. The mainframe's wage cross-check process compares employer-submitted wage data to the state database using the applicant's SSN. If no

employer-submitted wage data is found, the application is rejected. Rejection normally takes at least one business day, but often takes three or more.

3. Once a rejection is received, the applicant must complete a PUA application. Along with the PUA application and bank account information, the applicant must upload some documentation to demonstrate that they're self-employed (examples below).
4. All PUA applications and documentation are reviewed by CSRs and approved or denied.
5. If approved, the applicant can start submitting weekly PUA claims. Weekly PUA claims are separate from conventional UI claims and have a different certification flow, but follow the same pattern of payment being tied to weekly claims.

Document uploader for the PUA application
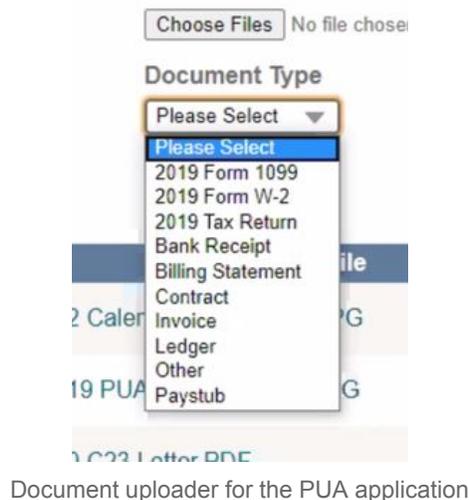
Unlike traditional UI payments, which rely on wage data corroboration from the state tax system, PUA workflows rely solely on data submitted by the applicant. This makes the PUA process more susceptible to fraud, use of stolen identity data, and forged/fraudulent documents. In those cases, not only is there a risk that erroneous payments are made to fraudulent applicants, but victims of this identity theft will be unable to access their legitimate PUA benefits.

Claims for Wages in Other States

There is a separate workflow for state residents that earn wages in other states. The process of making a request to the other state is completely manual. This manual process takes an average of 4 weeks to process; which in turn, caused a backlog that became an additional hurdle in the system.

Social Security Administration (SSA) Outage

In mid-May, the SSA had an outage that lasted for approximately a week. During this outage, the state system couldn't check the validity or the live status of SSNs. The initial solution was to

integrate with the state's DMV temporarily, and then revert to the SSA once the outage was over. However, the integration with the DMV was unsuccessful, and the state brought on a third party vendor, Id.me as a stopgap.

Fraud Processing Delays

The fraud team worked constantly to try to keep fraudulent claims from being paid. Fraud routines and processes were run on the records in the mainframe, and applications with a high risk of fraud were flagged with temporary suspension codes:

- 97100 - Fraud
- 98800 - Fraud Investigation Pending

Fraud flags can be triggered by data from external sources like if the Social Security Administration lists a person associated with a given SSN as deceased. Fraud flags can also be triggered by internal anti-fraud monitoring, such as a large number of applicants all directing their payments to the same bank account.

During April and May, the fraud backlog became large, causing delayed payments. Customer service hotlines were often jammed, leaving applicants without benefits or recourse.

Customer Service and the Call Center

Customer service has two primary workflows: receiving inbound calls and placing outbound calls for some categories of temporary suspensions. The call center workflow is complex, with many protocols to address different edge cases and documentation requirements. This overview document is meant to give an overview of the workflow but doesn't cover all of the cases and requests.

Customer service representatives are referred to as CSRs. At the onset of the crisis, the number of CSRs in the call center was in the low 20s. In March and April, as the crisis progressed, the call center staff grew quickly to over 100. Given the complexity of the tools and the workflow, training the staff was a difficult undertaking.

During the COVID-19 crisis and CARES Act roll-out, the call center became unreachable, as applicants called in to get questions answered and filled up capacity on the Interactive Voice Response system (IVR).

Inbound Calls Workflow

The inbound call workflow is triggered by a call into the benefits hotline IVR, which supports the full range of options. Notably, an applicant can sign up for benefits completely via phone.

Approximately 25% of initial applications are submitted over the phone. The workflow is as follows.

- Customers call into the DOL Benefits hotline
- The CSR identifies whether the user is calling in about an existing approved claim, an existing claim in a temporary suspension, or a new claim
- Existing claims can be of two types
    - Existing claims that are approved can have a weekly claim created, updated, or corrected
    - Existing claims in temporary suspension can be amended and approved, or denied.
- If no claim exists, a new application can be started on behalf of the caller, with the CSR asking for the applicant's information and filling out the application, but grants administrative privileges to the CSRs.
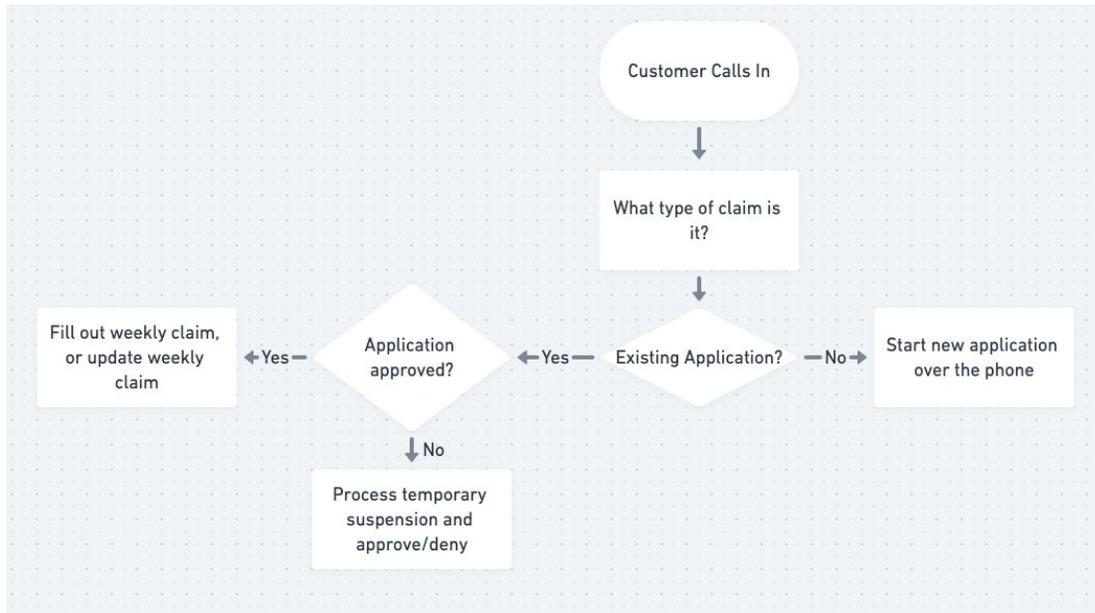
"Production Issues" for Amended/Manual Claims

The CARES Act made people eligible for benefits starting in late March, but state DOL Federal UI, PUA, and PEUC applications took a few weeks to develop. As a result, there were several thousand people with claims that required amendment. For example:

- An applicant received a $200 payment for the first week of April, but that didn't include the additional $600 payment they were eligible for, because the federal UI payment logic hadn't yet been added to the mainframe.

- An applicant was eligible for PEUC for a several week window in April, but the program wasn't implemented, so when it became available, they needed to be allowed to backdate weekly certifications and get payments for those missed weeks. Logic for back-dating was not allowed in the mainframe and so manual edits were made to the records using database scripts.

It was difficult to amend the mainframe to support these spot payments and live issues, so staff did the following procedure to service these issues, which they called "production issues."

- Database administrators (DBAs) would manually query the mainframe database for records that had payments that needed.
- Then, they created a manual set of payouts based on those records using a script in the mainframe and queued them for payment.
- The manual payout file was sent to the bank for fulfillment and payouts were made.

This generation of ad-hoc payments led to errors and made accurate record-keeping difficult. In one case, it was believed that one set of recipients received double payments. To correct the double payments, a set of clawbacks was issued. The clawbacks caused overdrafts in some bank accounts, incurring fees, and distress for benefit recipients. In some cases, the clawbacks may have been applied to accounts that didn't receive double payments.

Because these changes were made to the mainframe database, they didn't have the audit history that typically comes with mainframe use as intended.

Quantitative Analysis

Overview

At present, 90k unique individuals are receiving benefits in [State]. Applications for PUA have plateaued at around 7k/week, and traditional UI-PEUC at around 18k/week.

Claims by Week since March 15 2020
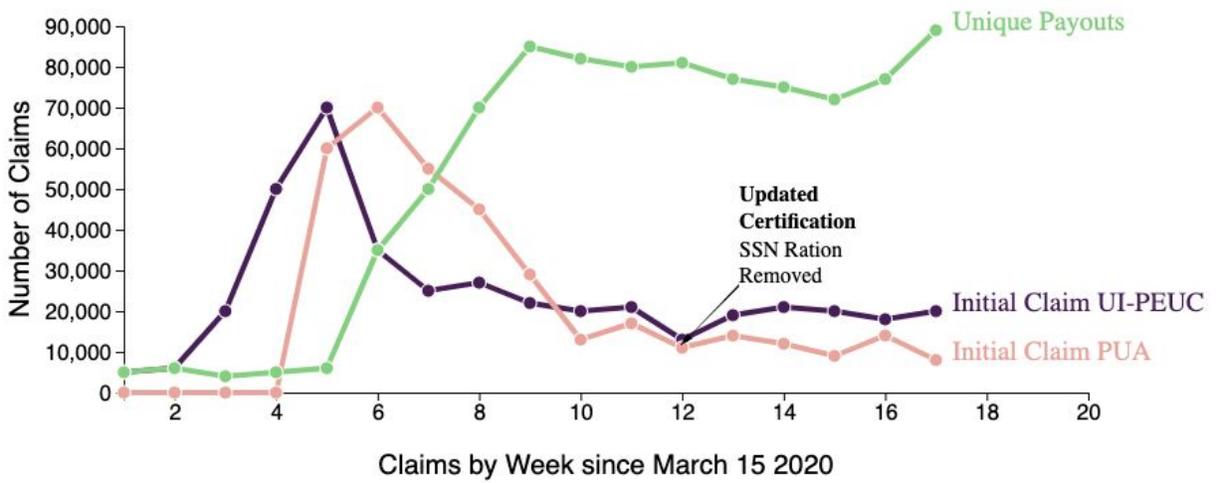
Workflow

The following flowchart illustrates the high level flow of applications through the system, with a breakdown of what percentage of applications are automatically processed and how many are put through a manual review process where they are investigated by a CSR.
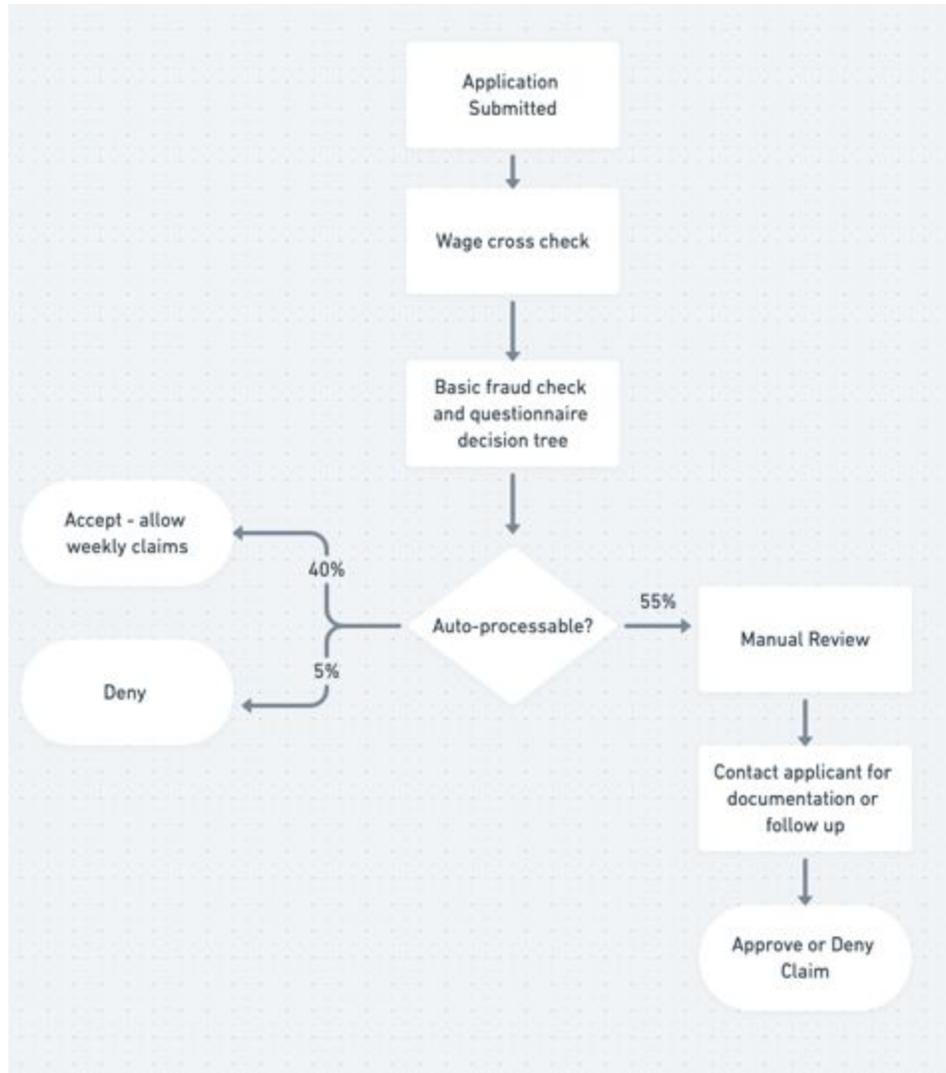
How exactly did we arrive at the 55% manual review number?
We took a cohort of applications submitted April 5-April 19. We looked at their status 2 weeks after being submitted (April 19-May 3) and categorized them by whether they had been approved or denied automatically, or whether they had been touched or queued for a CSR.

Turnaround Times

For all successfully approved claims with payments between March 15 and June 30 we did a turnaround times analysis, shown below. The Y-axis shows claims in that percentile of total turnaround time.

Application TAT Percentile Breakdown by Stage (Weeks)
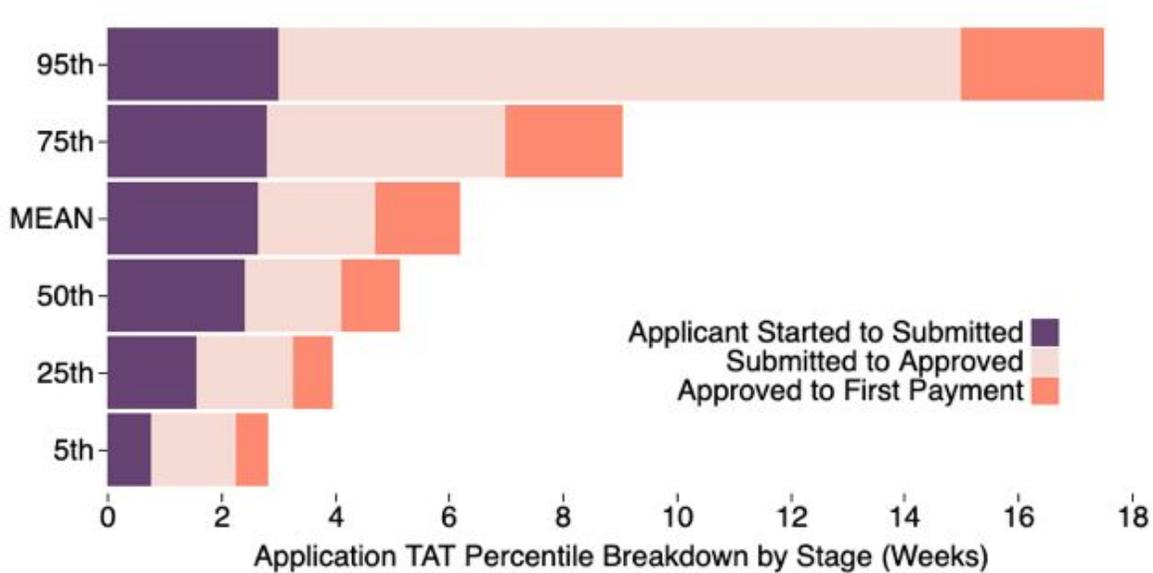
There were several interesting findings from this analysis:
- The median applicant takes 5 weeks from starting an application to receiving payment
- The median applicant takes around 3 weeks from hitting "Submit" on the application to receiving payment
- For the cases that take the longest, the majority of the time is spent waiting for approval, by far
- Some portion of applicants take multiple weeks to certify and receive payment once approved, but that is less than 5%
- Some portion of applicants take over 2 weeks to successfully apply, around 50%

Categories of Manual Review

For the 55% of applications that are queued for manual review, they were broken into the following categories based on their temporary suspension codes.

Manual Review June 1, 2020
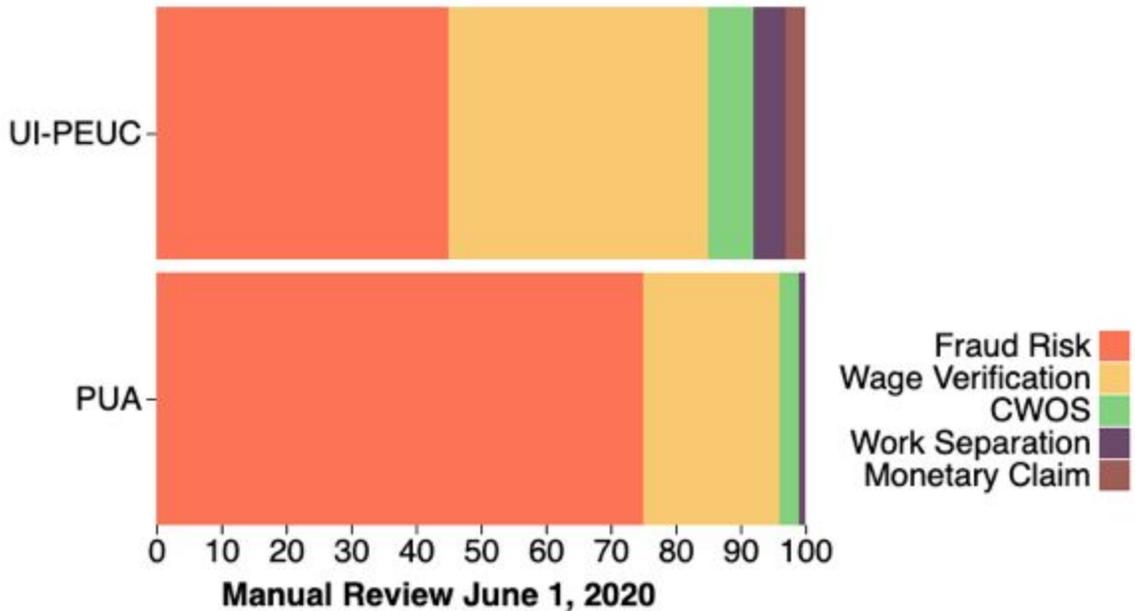
To gather this data, we looked at all claims in the system submitted by users between March 15 and June 1 and filtered for all that were flagged for manual review. We then categorized the review codes into the Fraud Risk, Wage Verification, Claims for Wages in Other States (CWOS), Work Separation and Monetary Claims. The top 2 codes for each category are as follows:

- Fraud: 98600 Not a citizen, 98422 SSN Name mismatch
- Wage Verification: 93600 Back Pay, 93799 Wrong Last Employer
- CWOS: 94332 Claimed wages in another state
- Work Separation: 91131 Job Refusal, 93100 Quit
- Monetary Claim: 94414 Wage mismatch, 93122 Overpayment

Takeaway here is that the majority of manual reviews, by cases, are for fraud and wage verification.

We also did an analysis of manual review, but split by application turnaround time. This analysis includes only applications that have been completed (accepted or rejected) between March 15 and June 1 2020.
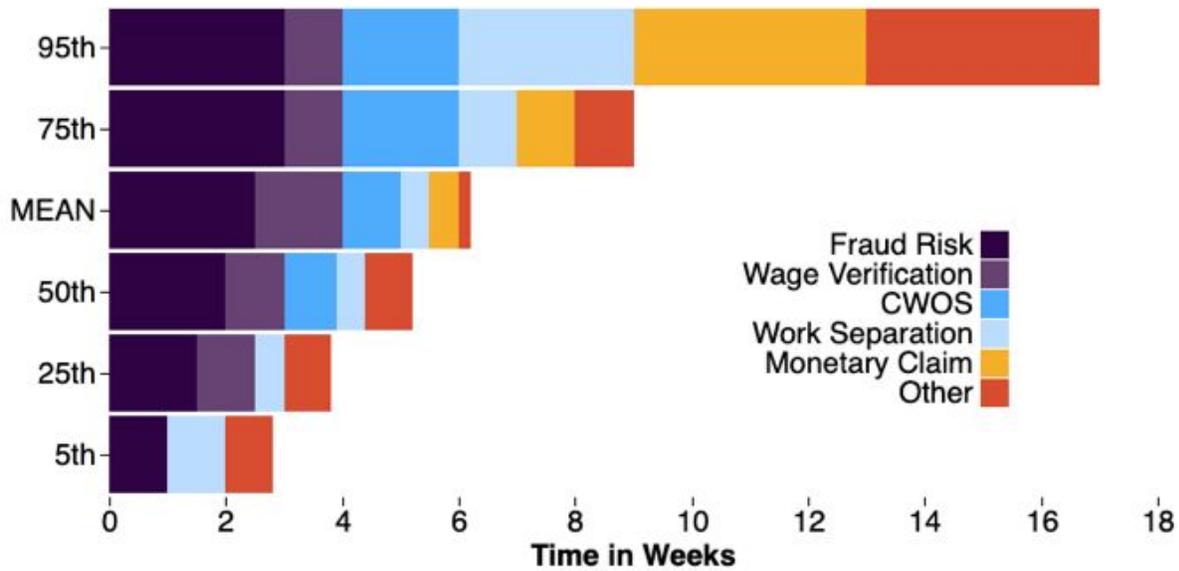
The takeaway from this analysis is as follows:
- Fraud risk and wage verification are persistent in claims of all tenures, which indicates that these are probably the highest leverage categories of backlogged claims that would benefit from automation.
- For the claims that take the longest Monetary claims and "Other" take up a disproportionate percentage. This suggests that these are difficult to resolve, and may be more resistant to automation.

The graph below shows how the backlog has grown over time.
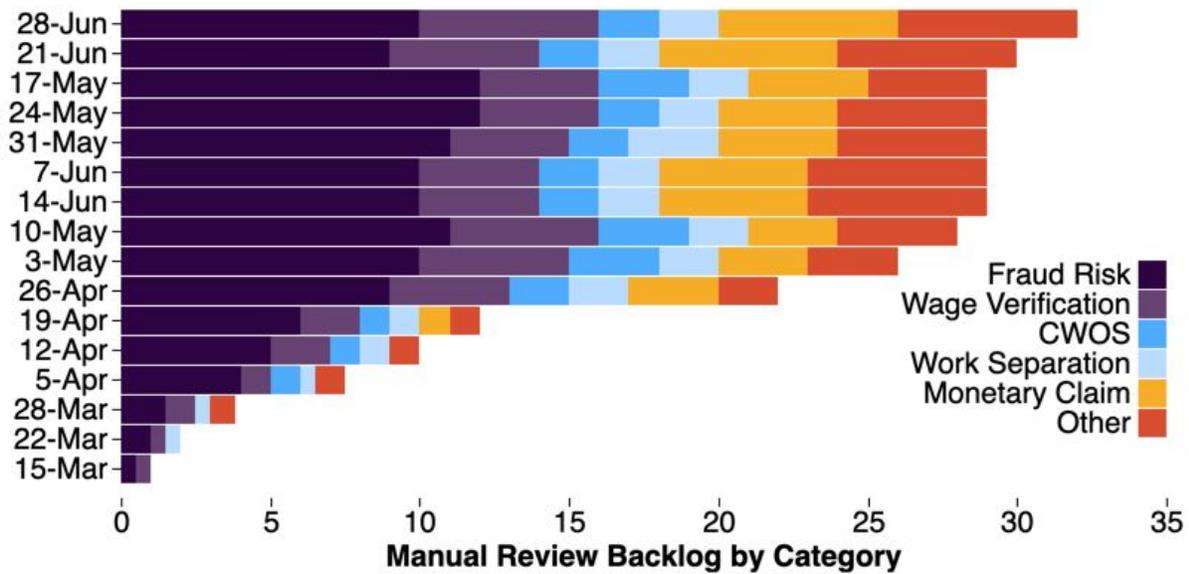
Takeaways from this analysis are as follows:
- The backlog of unprocessed claims has stabilized in the 30k range for about 6 weeks

- Fraud, wage verification and CWOS are the majority (by number, not tenure) of the current backlog.

The Software Development Lifecycle

The state DOL owns and operates their mainframe and full tech stack, though several pieces come from vendors, e.g. Oracle, and were integrated into the stack. The basic workflow is as follows:

- Code is stored in Team Foundation Studio (TFS), where there are two repositories: one for PUA and one for the core web application
- Developers develop on localhost and then merge into the branch and push to the test/staging environment (there may or may not be unit tests)
- Code bakes in the test/staging environment and goes through manual testing
- There is a scheduled deployment each Wednesday, but code can go out when the team agrees to do so

Testing
- There are parallel testing environments for the web applications and mainframe application
- Data is brought from production to testing on an ad-hoc basis to validate scenarios
- Testing is done manually, as changes are deployed to the test/staging
- A list of resolved tickets drives the test plan in the test environment
- It's unclear whether the web application or the mainframe applications have unit tests

Deployment
- Engineers develop code on localhost and merge it into the repositories as they fix issues
- Deployment is done manually as needed to the test environment
- After manual testing, new code is deployed to production
- At present, there is no continuous integration, continuous deployment (CI/CD) system in place

Monitoring & Business Analytics
- Alerts for web application errors are managed through AppDynamics
- The web applications are instrumented with Google Analytics

Vendor Use
- The state DOL has support contracts with AppDynamics, Oracle, and Rocket software to help troubleshoot and fix systems

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Key Findings

This COVID-19 crisis and the CARES Act had many repercussions on the state's UI system. Our investigation found the majority of problems and delays faced by applicants and CSRs can be traced back to the following three root causes:

The current process for eligibility determination is hard, slow, and unreliable. Between the wage verification, identity verification, existing claim status, fraud checks, document upload, and certification/benefit windows, **eligibility checking is, at present, unreliable and manual**. Difficulty in eligibility determination is the cause of the following major issues:

- Confusion about which program to apply for: UI, PEUC, or PUA
- Requiring two applications for the self-employed, one for UI which is rejected and then a subsequent PUA application
- Large queue of applications requiring manual review and callbacks

The system is mainframe-centric, not applicant-centric. The mainframe drives user experience, technical operations, and customer support. It's a powerful application that encompasses a lot of functionality and historical records, but it's also difficult to update or change, under-tested, and often poorly understood. The following major issues can be traced back to the "black box" nature of the mainframe:

- Erroneous double payments and clawback payments
- Inability to search for wage data without submitting an application, requiring PUA applicants to apply twice
- Downtime due to scaling issues with the CICS
- Reuse of the EUC claim code for the PEUC program caused a class of hard-to-troubleshoot issues

Humans power the system. Though there is an online application and tracking system, the amount of human intervention in moving applications through the system is very high. The majority of UI applications are touched by humans in some way. This contributes to application latency, requires hiring of emergency personnel, and can be a frustrating experience for both staff and applicants due to low automation.