RESEARCH BRIEFING
Digital Benefits and Disbenefits Project

№3

UCX WEB BROWSER EXTENSION

A prototype digital intervention for Universal Credit Online

The *Digital Benefits and Disbenefits* project explored e-government technology-generated remote self-service encounters in welfare benefit public services. Analysis of findings from three studies were used to identify implications for design that intended to reduce harms, negative effects impacting claimants themselves (e.g. time, physical, mental, financial) arising from the digital implementation itself, separate to policy choices (e.g. legislation, regulations) or the inherent nature of digital channels (e.g. availability of devices, internet access, ability to use devices and software). This *Research Briefing №3* describes one of the digital prototypes designed and evaluated during the project, which was undertaken to learn more about the harms to claimants arising in Universal Credit Online and how changes to attenuate harms can introduce new harms or amplify existing harms, to contribute to wider knowledge about digitisation of similar social protection payment public services.

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Introduction

Earlier steps in the project began to identify negative impacts arising from digitisation design (the harms) on citizens applying for and receiving award payments (claimants). These were used to inform the design and evaluation of two digital prototypes, one for Universal Credit (UC) in this *Research Briefing №3*, and one for Personal Independence Payment (PIP) in *Research Briefing №4*. Intentionally, these interventions go beyond concerns about the presented digital interface, to include aspects of claimants' wider ecosystems and how these contribute to service access. This work, undertaken primarily with claimants, attempted to examine how citizen controlled digital tools could mitigate identified/perceived harms and improve the digital interactions between government and claimants. Together with the earlier work, findings from the design and evaluation of the prototypes contributed to the final harms identified (*Research Briefing №1*) and implications for design which intend to counter the harms (*Research Briefing №2*).

Considerations for the choice of technology

It was necessary to consider which harms the artefact could mitigate, what was practical and ethical to undertake, and what was legal in the context of the public service. Participant wariness about any adverse effects on their own claims, participants' own technology use and that the research participants were distributed across the UK and only able to be involved remotely (due to coronavirus) affected the choice of digital technologies for the prototype. There were also constraints resulting from UC Online: it is a closed system only accessible to the majority of claimants as authenticated users via a website application; its design and operation is opaque, lacking trial or test environments or publicly available specification, architecture or code, but with some limited information in the form of DWP internal guidance, case law, and responses to Freedom of Information requests (e.g., ability for government officials to delete Journal messages, types of To Do items); and the citizen-facing self-service website UC Online assumes the only user role is individual claimants or their officially-authorised individual proxy, and credential sharing is not permitted. It seemed that designing an artefact using the identical technology to UC Online (i.e. web application) would be optimal since this is already accessible to the remote participants, and likewise by the wider online claimant population. While a web-based artefact could be something inherent in the existing website, or completely separate to it, these would both likely require involvement of the state ministry, the UK's Department for Work and pensions (DWP), and/or use of user credentials, neither of which were possible. To progress without involvement of the state or third parties, it was decided to investigate web browser extensions which fall between these two extremes. The choice to focus on the idea of an UC Online-specific web browser extension as an augmentation because it potentially permits the claimant to remain in control and might be able to be used without the state's knowledge to mitigate worries about usage that could be viewed detrimentally and affect a claim. To reflect participants' concerns about their personal information and their UC awards, further restrictions were imposed on the prototype: to counter any sharing of account details, not to use of claimant authentication credentials; to counter any risk of misrepresenting information, not to alter inherent UC Online page content or functionality; to counter concerns that claimants' own accounts might be altered, not to submit any data into UC systems; to counter privacy concerns, not to make any inbound network connections to the extension; to counter feelings of loss of control, not to make outbound network connections from the extension unless the action is initiated manually by the claimant; and to counter concerns about surveillance, not to use cookies or other technology which could be used for tracking.

All these constraints were considered during an investigation into what might be possible in a web browser extension to address the harms identified in earlier steps of the research. It was also

necessary to limit features to a small range of harms to address because the artefact's purpose was to generate knowledge, not to be a solution to all problems itself. Thus mitigations were filtered out which could not be developed and used independently, such as affecting internal DWP processes, government official attitudes and matters such as appeals involving other state agencies offline. Also, anything that would require sharing authentication credentials, and issues related to achieving access alone since the prototype was intended for use by those already using UC Online (like my participants), and anything unimplementable using current web browser extension capabilities. The remaining issues were broadly related to one of the earlier design recommendations (*Research Briefing №2*) DR-A (support claimants' own ecosystems), and the related design implication A(i) (Recognise how wider ecosystems contribute to social protection service delivery). This led to an initial set of features as a starting point for discussions with claimant participants. These illustrated possible capabilities of a web browser extension which could address some of the harms identified in study 1 and would be consistent with my previous design recommendations and implications.

The web browser extension was not the only digital artefact required for the study. The following supporting components were also created.

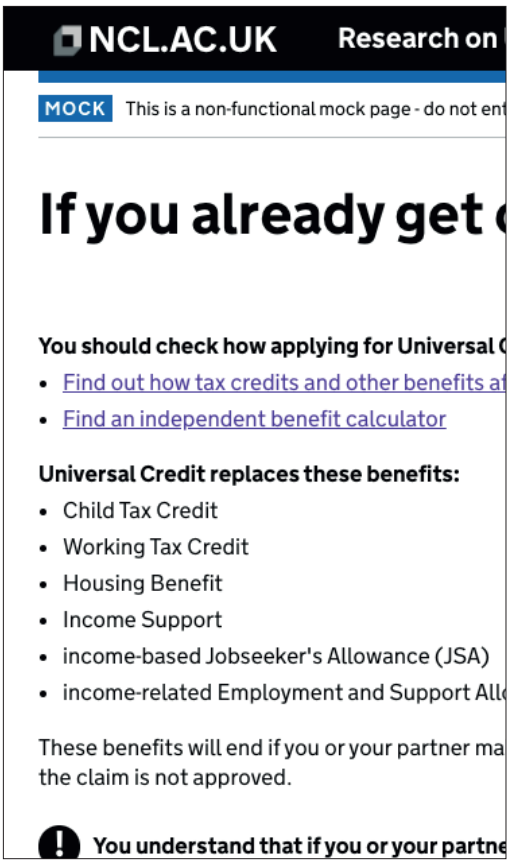
- Online chat. A free account was created with a third-party chat service provider to provide capabilities to demonstrate real-time support using UCX's Live Chat feature. During evaluation, the ability to send queries and receive responses was demonstrated.
- Email forwarding. A custom Python script was written to receive, validate and forward text and PDFs submitted using UCX's Send Page feature. This script was hosted on the research project's website.
- Print forwarding. An account was set up with a UK-based online mailing service provider which offered PDF to post, and a small amount of money credited to the account. A custom Python script was written to receive, validate and forward, via the provider's API, text/PDFs submitted using UCX's Send Page feature. This was not demonstrated during evaluations.
- UC Online web pages. One claimant participant assisted with the creation of a set of pastiche web pages, mirroring the look and feel of UC Online as stylistic imitations, by using the claimant's knowledge, published design standards and by examining public pre-claim UC web pages using public sector information licensed under the Open Government Licence. The pastiche pages created were branded to distinguish them from the real UC Online website and incorporated realistic but fake claimant data (see example in Figure 1). These were published on a dedicated website for the study, fully navigable through hyperlinks allowing UCX to be tried and evaluated without use of any claimant credentials or data exposure.

Additionally, structured data files were created for a range of fake tip content providers, comprised of three types of tips:

1. General tip data, about standard UC Online page content for all claimants
2. Contextual tip data, to indicate the possibility of tips being shown only when particular words and phrases appear in dynamic UC Online content, such as phrases used to describe deductions on payment pages, or the names of To Do List items
3. Personal tip data, to suggest the possibility of how UCX could be changed to permit individual

per-claimant tips being shown, but the requiring some personalisation during installation or authentication during use which were not implemented in the current prototype.

Figure 1: One of the pastiche UC Online web pages, using the Government Design Standards, illustrating the university branding.



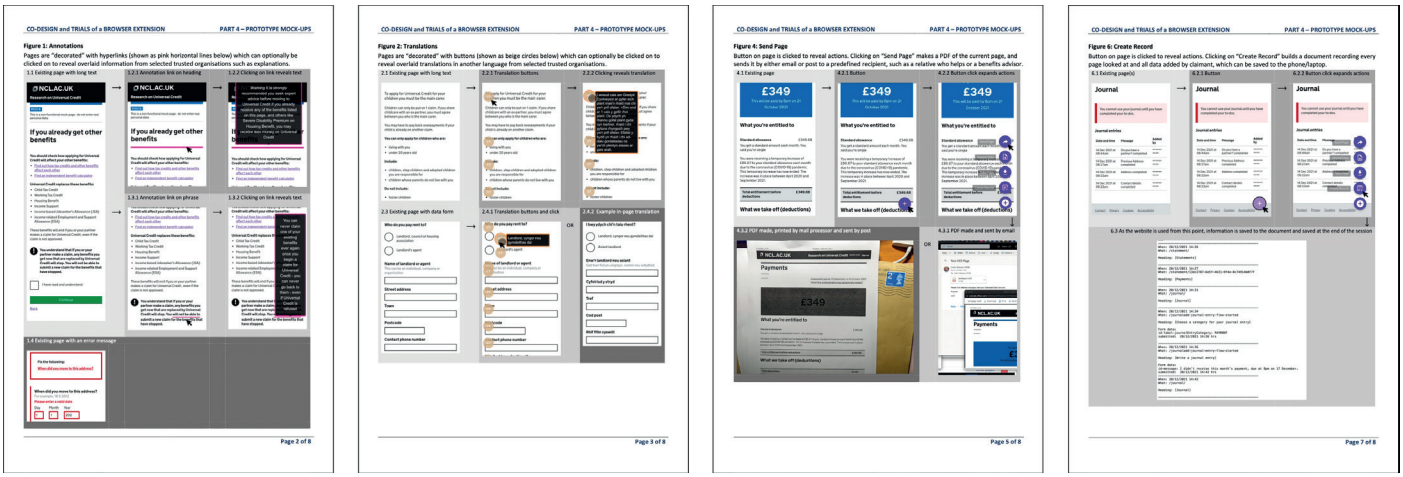
The processes and mechanisms for creating, maintaining and distributing updates to data administered by content providers was not created for the prototype.

Design process

The subsequent design of UCX was undertaken iteratively with claimants, and then evaluated by claimants and advisors. Additional data gathering was undertaken to gather feedback on existing UC Online web pages accessed when making and maintaining claims. This then contributed to making mock-ups of the proposed web browser extension features (see Figure 2) to gather feedback from claimant participants. On the basis of this feedback, and recruitment of additional participants to fill knowledge gaps, the first version of UCX was specified, coded and tested.

Two workshops with advisors performed formative evaluations, to consider the features and suggest modifications, additions and deletions, which resulted to two further iterations of coding and testing. The final UCX version was subjected to summative evaluation by claimants and advisors, each undertaken remotely and individually. The data collected during the whole design and evaluation process were used to contribute to further harms identification and resultant design recommendations and associated design implications.

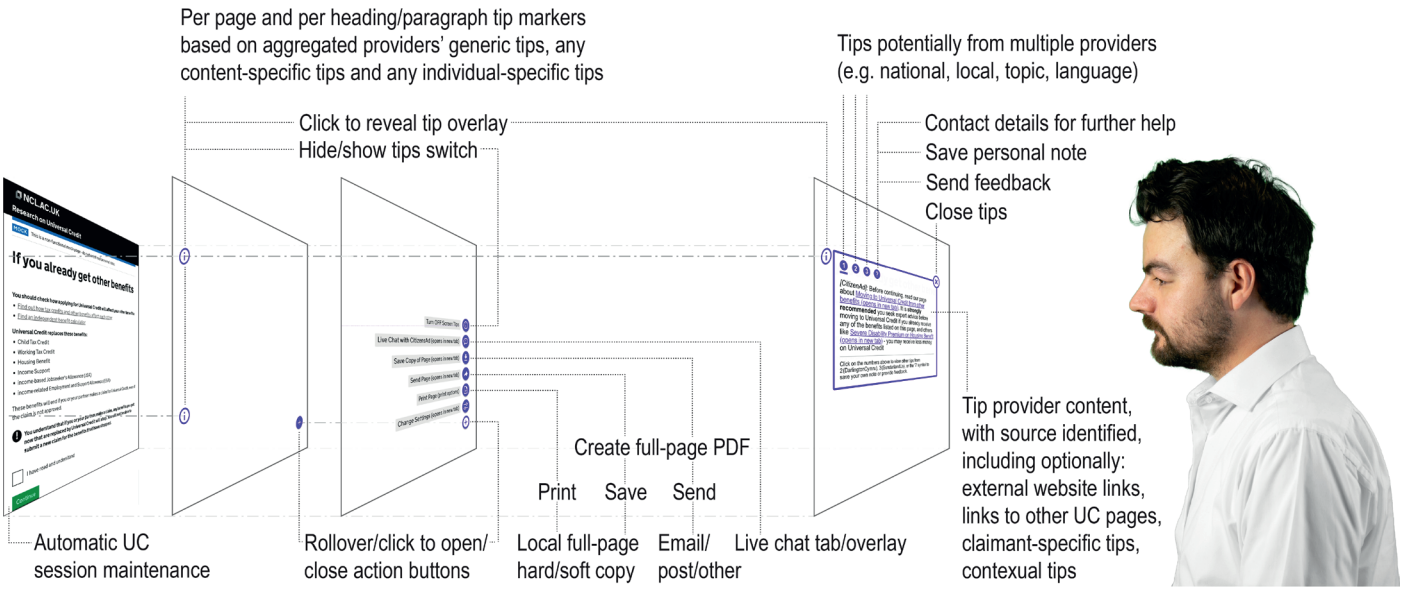
Figure 2: Four example pages from the prototype mock-ups used with an online survey to gather feedback on choice and design of proposed features for the web browser extension, each comprising a short description and multiple mobile device screens and some with other supporting materials such as example file content or a photograph.



Summary of the final Universal Credit eXtension (UCX)

The features included in UCX, the prototype web browser extension, are illustrated in Figure 3 below and are listed in Table 1 on the following page.

Figure 3: Isometric overview diagram of UCX web browser extension providing functional overview, which conceptually sits as an augmentation layer between the web pages of UC Online and the claimant.



Settings page can be used to define which tip providers to include, which action buttons to show, set saved email and postal addresses for sending copies of pages, and display options (all also configurable during installation)

Table 1: Interface elements and other features implemented in UCX.

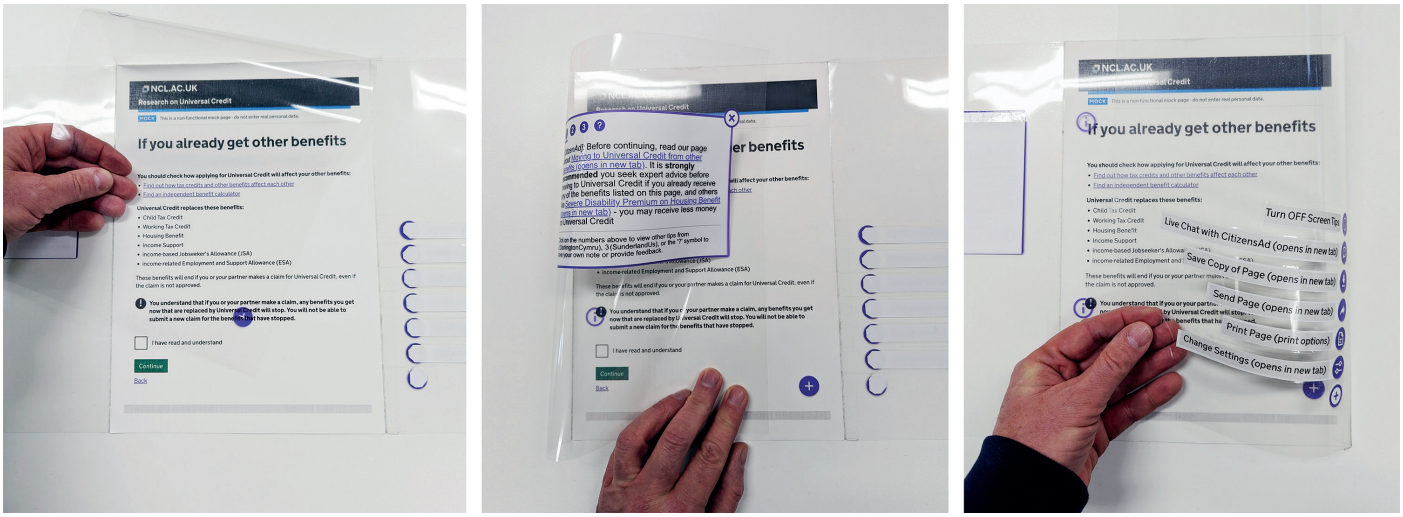
Feature Element		Sub Element		
ⓘ	Tip Inline Button(s)	Zero, one or more Tip Overlay buttons per page, at absolute positions of defined heading or paragraph elements. Click changes visibility of Tip Overlay to visible.		
		①	Tabs 1–n	Each tab in the Tip Overlay is a generic Tip about the heading or paragraph a single Tip provider, containing information such as explanations, warnings, internal (UC Online) and external links, with the Tip's provider named and their contact details (e.g., email, telephone, website) for further assistance shown and hyperlinked where possible; multiple providers supported with one provider per numbered tab; provision for content-specific tip; provision for claimant-specific Tip (first tab only).
		?	Last Tab	Information tab includes Feedback form tip (using custom form to email script) and ability to save a Personal Note per tip (to local browser storage).
		⊗	Close	Click changes visibility setting of Tip Overlay to hidden (i.e. reverses Tip Overlay inline button click).
+	Floating Action Button (FAB)	The FAB always visible, positioned relatively at bottom right of browser tab window. Click toggles open/closed state to reveal/hide action buttons. Rollover of each action button displays its label.		
		ⓘ	Tips	Click toggles whether inline buttons for Tip Overlays are visible or hidden.
		💬	Live Chat	Click opens Live Chat with one nominated provider (new browser tab; overlay for mobile devices) utilising demo third-party chat service provider.
		⬇	Save Page	Click creates PDF of currently viewed UC Online web page, saves this to device's download folder, and opens new tab to display listing of all files in the folder.
		↗	Send Page	Click creates PDF of currently viewed UC Online web page, redirects to a new tab which displays form to select or edit recipient (email or post), add optional message and choose whether to include log of pages claimant has visited during their current session. Recipients listed in address book (see Settings) are pre-populated as choices and are editable. Submission sends form data with PDF to forwarding service (custom form to email script, or third-party PDF-to-post service provider).
		🖹	Print Page	Click opens print dialogue box of web browser being used to access UC Online.
		⚙	Settings	Click opens settings form in new browser tab. Form provides options to select which Tip providers to include, to administer email addresses and postal addresses in address book; and to select web page accessibility options (text and background colours, text font style, text size) and whether these are applied to UCX only or UCX and UC Online. Settings are saved to local browser storage.
—	Log	Background log of UC Online pages visited during current session (optional attachment to Send Page).		
—	Session	Periodic background HTTP request for an image on UC Online website to maintain claimant's authenticated session and prevent time-out.		

Scope, purpose and limitations of prototype

The choice to utilise a web browser extension, and implement the features shown in Figure 3 and Table 1, were the result of the study plan, findings from earlier stages of the project and through input from claimants and advisor participants. UCX was intended to be available for optional use at any time when a claimant accesses the UC Online website i.e. before creating an account, while making a claim, and while maintaining a claim. For the purposes of the research, the functionality was implemented as a demonstration web browser extension, but the same functionality could be, and might better be, delivered in alternative ways as discussed in the thesis. Despite its fully-working nature, the prototype is neither fully complete nor meant to be deployable software; instead it is intended to inspire reflection and offer inspiration for digital technology which advances the needs of claimant citizens, to improve the digital welfare state.

A low-fidelity mock-up (Figure 4) of UCX was also created. This was used when commencing each summative evaluation of UCX to support an explanation of what web browser extensions are and demonstrate the separation of UCX features from the underlying DWP content.

Figure 4: Low-fidelity UCX prototype comprising a single example pastiche UC web page printed on card combined with printed plastic overlays to demonstrate the tip indicators, tip content and floating action buttons with their keys.



The features as implemented in code are illustrated below.

UCX screen captures

Screen captures of UCX deployed in a laptop web browser and in a mobile phone web browser follow, while browsing the pastiche UC Online website, are shown in Figures 5–9.

Figure 5: Screen captures of UCX's overlaid tip markers and floating action button (FAB) which expands to reveal other actions (left tablet/laptop view, and right mobile phone view).

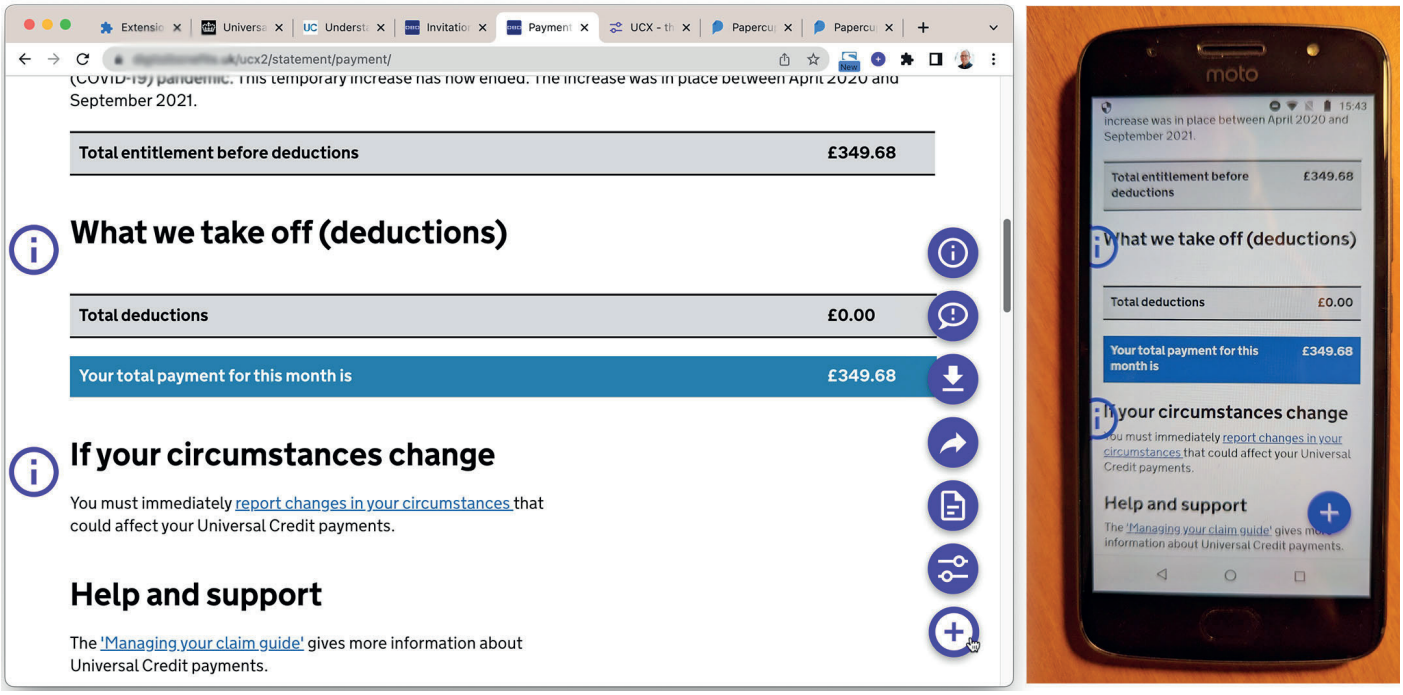


Figure 6: Screen captures of UCX's multi-card tips showing how the source of each is attributed.

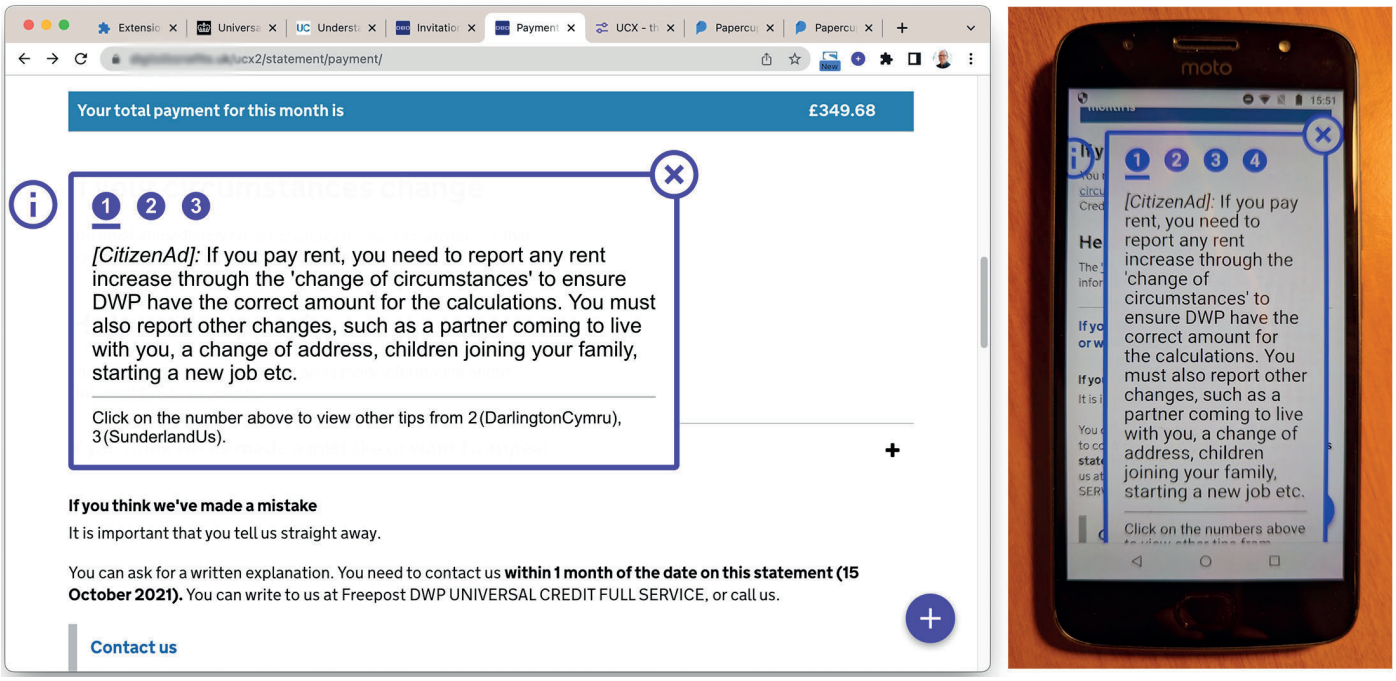


Figure 7: Screen captures of UCX's listing of all the recently saved page PDFs, displayed after selecting the 'Save Page' action.

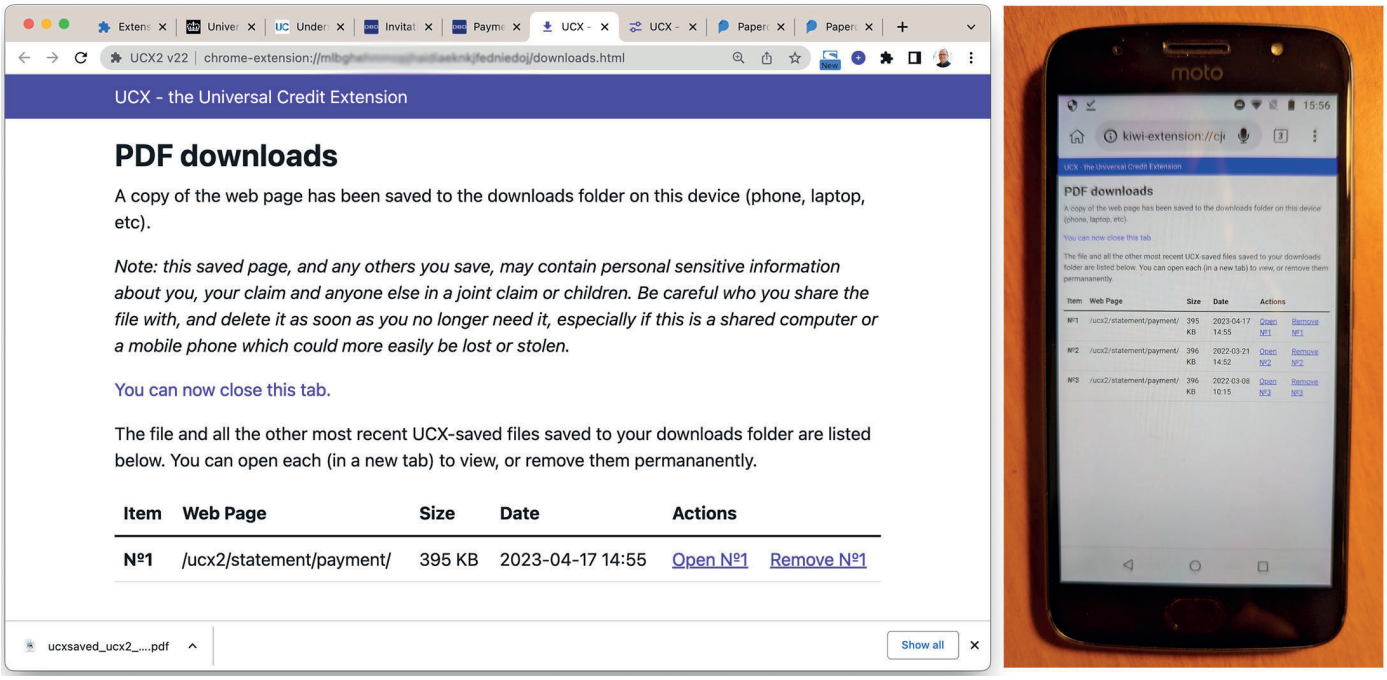


Figure 8: Screen captures of UCX's settings window showing tip data provider options.

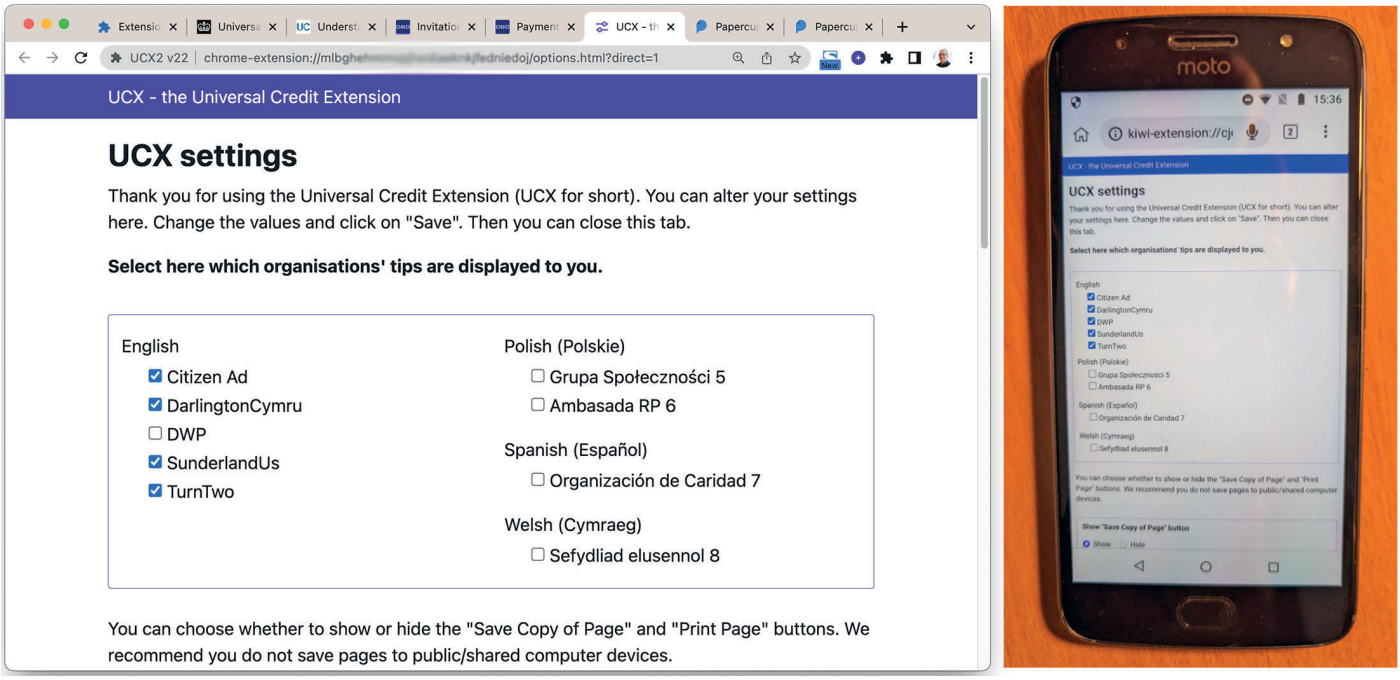
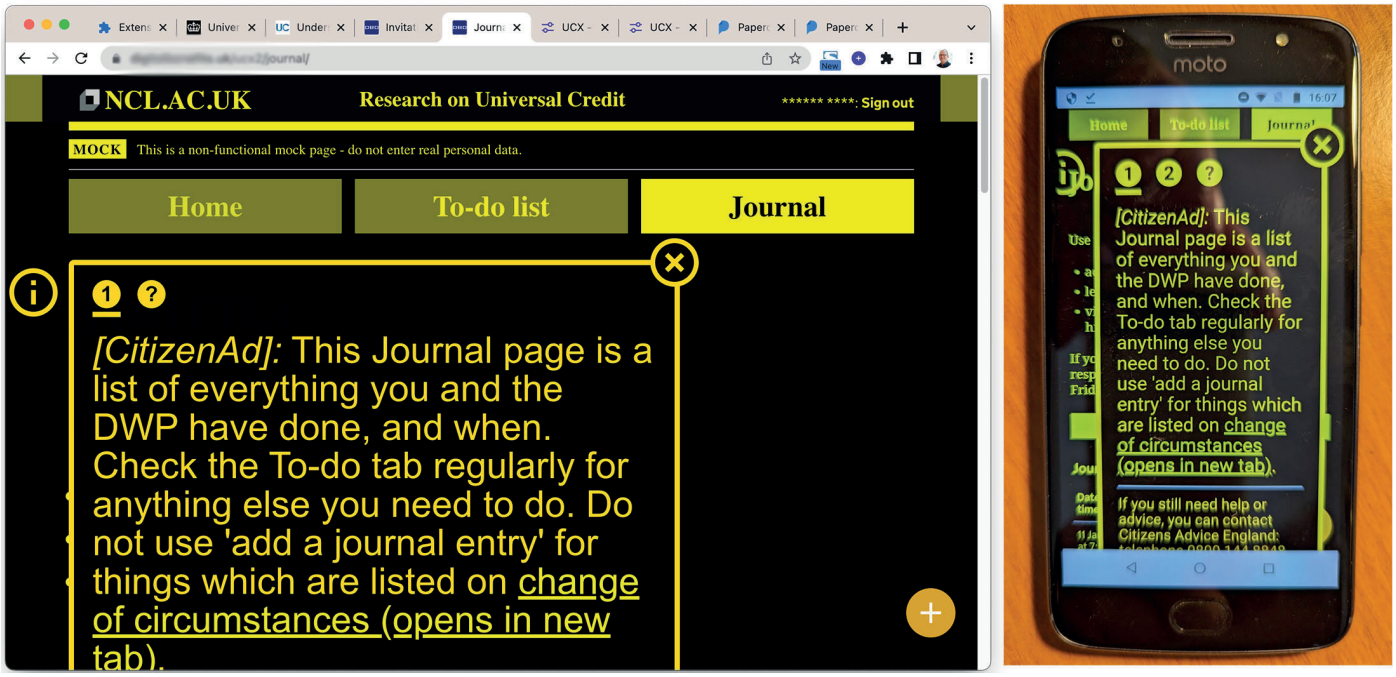


Figure 9: Screen captures of UCX visual accessibility changes to itself and optionally also the UC web pages (here larger yellow text on a dark background); also visible is the branding of the pastiche web pages as research artefacts.



Poster

A separate poster has also been created about UCX web browser extension, and which is available at https://www.digitalbenefits.uk/universalcredit/

Outcomes from the design and evaluation of the UCX digital prototype

The digital prototype added to knowledge about how harms arise in the existing UC Online system and across claimants' support networks. The design of a prototype which alters the system permitted exploration of how harms can alter as the result of changes.

The work validated the categories in the Taxonomy of Harms (*Research Briefing №1*) and contributed to new implications for design (*Research Briefing №2*). In turn, these contributed to the design of the second digital prototype (*Research Briefing №4*) and helped answer the research questions (*Research Briefing №5*). All the research briefings are available on the Digital Benefits and Disbenefits (DBD) project website at https://www.digitalbenefits.uk/

Subsequent to the research, to help disseminate the findings, a practical tool has been created for those designing and implementing e-government services. DBD Cornucopia helps teams review their work to identify where and how harmful effects can arise, using gamification. Further information and downloads are available at https://www.digitalbenefits.uk/cornucopia/

Research Briefing №3: UCX Web Browser Extension
This is one of five documents describing outputs from Colin Watson's doctoral human-computer interaction (HCI) research project *Digital Benefits and Disbenefits,* undertaken 2019–2023 at Open Lab, Newcastle University, UK. These research briefings draw on findings, analysis and discussion published in his thesis *Understanding and Reducing the Negative Effects of Digitisation on Claimants' Access to Online Social Protection Services through the Design of Citizen-Controlled Digital Tools*, supervised by Dr Ahmed Kharrufa (Open Lab, Newcastle University) and Professor Ruth McAreavey (Sociology, Newcastle University). Colin Watson qualified for the award Doctor of Philosophy in the School of Computing on 18 March 2024.

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