

A Appendix: Research Method

A.1 Knowledge Questions

1. What could happen if online identities are poorly verified?
 - Digital platforms could become more secure.
 - **Fake accounts, bots, and fraud could increase significantly.**
 - Users could feel more confident and trusting in online environments.
 - Privacy could be better protected across online services.
2. What are Personhood Credentials (PHCs)?
 - **Digital credentials that confirm a person's identity**
 - A method for storing personal data online for easy access
 - Credentials issued by social media platforms to verify account authenticity
 - A tool used by online services to track user activity and preferences
3. What is the primary goal of PHC?
 - To reduce the number of online accounts.
 - To track a user's online activity across platforms.
 - **To verify a person's identity without exposing personal information.**
 - To simplify the process of logging into multiple services.
4. To whom do you provide minimal personal information during the PHC process?
 - Online service providers (e.g., social media)
 - Entities handling data storage for online accounts
 - Third-party platforms
 - **PHC issuers (e.g., governments or trusted organizations)**
5. Which of the following options are considered as credentials of PHCs? Select all that apply.
 - **Government credentials (e.g., passport, driver's license)**
 - **Biometric indicators (e.g., face, fingerprint, iris)**
 - Email address
 - Phone number

A.2 Post-Survey

1. **Credential Preference:** Which types of credential would you prefer to use as personhood verification for each scenario? Select all that apply. *(This question is displayed in a multiple choice grid, prompting responses for each scenario: Finance Service, Healthcare Service, Social Media, LLM Application, Government Service, and Employment Background Check.)*
 - Government issued ID (e.g., SSN)
 - Passport
 - Driver's license
 - Face scan
 - Fingerprint scan
 - Iris scan
 - Phone number
2. **Issuer Preference:** Which type of issuer would you prefer to issue and manage your PHC for each service provider? *(This question is displayed in a multiple choice grid, prompting responses for each scenario: Finance Service, Healthcare Service, Social Media, LLM Application, Government Service, and Employment Background Check.)*
 - Government
 - NPO (nonprofit organization)
 - Private Companies
 - Financial Institution (e.g., banks)
 - Educational Institution (e.g., universities)
3. Do you have any other issuer in mind that you would prefer to issue PHC? *(This question is open-ended.)*
4. **Architecture Preference:** Which type of system would you prefer to issue and manage your PHC for each service provider? *(This question is displayed in a multiple choice grid, prompting responses for each scenario: Finance Service, Healthcare Service, Social Media, LLM Application, Government Service, and Employment Background Check.)*
 - Centralized
 - Decentralized

B Appendix: Interview Protocol

B.1 Section 1: Current practices regarding digital identity verification

1. Can you tell me about any online platforms or services you have used before or currently using that ask you to verify your identity, like uploading your ID or

confirming your identity in other ways?

2. You mentioned using online platform X. Can you tell me what method you used to verify your identity for platform X? [repeat question 2 for other services mentioned Y, Z, ...]
3. Can you share your experience with that verification method? Was it easy to use, or did you run into any issues?
4. Did you encounter any challenges when using this method?
5. Have you ever used services where you had to verify yourself through face, fingerprints, or iris scans, or other biometrics?
6. Can you tell me more about your experience with those methods? What worked well? Were there any concerns you had?

B.2 Section 2: Users' perception of PHC (RQ1)

B.2.1 Pre-Understanding of Personhood Credentials

1. Do you know the term 'Personhood Credentials'? If not, can you explain what you think it means by just hearing the term?
2. Have you used any 'Personhood Credentials' before? If you say yes, then ask, What are those?
3. Do you know how 'Personhood Credentials' work within the services you use?
4. Do you know how the service providers handle the credentials you provide as 'Personhood Credentials' so you can access the service?

(Participants are asked to fill the online survey to assess their pre-understanding of personhood credentials.)

B.2.2 Educational Session

(Participants are shown a 2-minute educational video about the concept of personhood credentials. The video can be accessed in the following link: <https://anonymous.4open.science/r/PHC-user-study-14BB/>)

B.2.3 Post-Understanding of Personhood Credentials

1. After reviewing the educational materials, how would you explain your understanding of personhood credentials?
2. Can you think of any benefit of a personhood credential based on your understanding? Why?
3. Can you think of any risk of a personhood credential based on your understanding? Why?

(Participants are asked to fill the online survey to assess their post-understanding of personhood credentials.)

B.3 Section 3: Scenario Session (RQ1)

Now, we will go over some specific application scenarios of personhood credentials to understand your perception and how we can better design the personhood credential for different services.

Scenario 1: Financial Service Imagine you are opening a new bank account with a bank that offers a fully digital onboarding experience. The bank requires you to verify your identity using personhood credentials, such as facial recognition for a liveness test, and then uploading a government-issued ID (like your passport or driver's license). Once verified, you can open a bank account access your bank account, and manage your funds.

1. How did you feel about using personhood credentials to verify your identity when opening your bank account?
2. **Benefits:** What potential benefits do you see in using PHC in this online banking context?
3. **Security:** Do you think using personhood credentials improves the security of your bank account?
4. **Privacy:** Did this method of identity verification make you feel more confident about your privacy?

5. **About Data:** Were you comfortable providing your government-issued ID and using facial recognition?
6. **Concerns:** What concerns do you have in providing your government-issued ID and using facial recognition, is being stored and used by the online bank?

Scenario 2: Healthcare Services Imagine you are using an online healthcare platform to schedule appointments and receive virtual consultations with doctors. To provide access to the platform, the healthcare service requires you to verify your identity using personhood credentials, such as a biometric verification using a fingerprint for a liveness test, and then upload a government-issued ID (like your health insurance card or passport). Once your identity is verified, you can access your medical records, schedule appointments, and have virtual consultations with healthcare providers.

1. How did you feel about using personhood credentials to verify your identity when using an online healthcare platform?
2. **Benefits:** What potential benefits do you see in using PHC in this healthcare context?
3. **Security:** Do you think using personhood credentials improves the security of the healthcare platform?
4. **Privacy:** Did this method of identity verification make you feel more confident about your privacy?
5. **About Data:** Were you comfortable providing your government-issued ID and using fingerprint?
6. **Concerns:** What concerns do you have in providing your ID and fingerprint information, is being stored and used by the healthcare platform?

Scenario 3: Social Media Imagine you are creating a new premium social media account. You are required to verify your identity with personhood credentials, such as a video call or selfie for a liveness test (or proof you are a real, unique user), and then upload your government-issued ID (SSN, national ID card). Once your identity is verified, you can access social media.

1. How did you feel about using personhood credentials to verify your identity when creating a new premium social media account?
2. **Benefits:** What potential benefits do you see in using PHC in this social media context?
3. **Security:** Do you think using personhood credentials improves the security of the social media platform?
4. **Privacy:** Did this method of identity verification make you feel more confident about your privacy?
5. **About Data:** Were you comfortable providing your government-issued ID and a video selfie?
6. **Concerns:** What concerns do you have in providing your ID and using a video selfie, is being stored and used by the social media platform?

Scenario 4: LLM Application Imagine you are signing up for an AI language model application like ChatGPT to assist you with tasks and information. Identity verification is also crucial in LLM-based applications because the interaction between multiple users and its model can significantly impact the reliability and safety of the platform. For example, malicious users could submit harmful prompts or requests that might lead to biased or damaging outputs from the model. With identity verification, the platform can confirm that each user is legitimate, thereby reducing these risks. Thus, imagine to sign up for the application, the LLM service requires you to verify your identity using personhood credentials, such as a biometric verification using an iris recognition scan for a liveness test.

1. How did you feel about using personhood credentials to verify your identity when signing up for the AI language model application?
2. **Benefits:** What potential benefits do you see in using PHC in this AI application context?
3. **Security:** Do you think using personhood credentials improves the security of the AI language model application?
4. **Privacy:** Did this method of identity verification make you feel more confident about your privacy?
5. **About Data:** Were you comfortable providing your iris scan?

6. **Concerns:** What concerns do you have in using iris scan, is being stored and used by the LLM application providers?

Scenario 5: Government Service Imagine You are applying for government assistance or social benefits (e.g., healthcare, unemployment benefits) to government portal (e.g., USAGov, Your Europe). To ensure that only eligible citizens access these services, the platform asks you to verify your identity using personhood credentials by using an iris scan for a liveness test and then uploading your government-issued ID to confirm your identity for government benefit.

1. How did you feel about using personhood credentials to verify your identity when using a government portal?
2. **Benefits:** What potential benefits do you see in using PHC in this government portal context?
3. **Security:** Do you think using personhood credentials improves the security of the government portal?
4. **Privacy:** Did this method of identity verification make you feel more confident about your privacy?
5. **About Data:** Were you comfortable providing your government-issued ID and iris information?
6. **Concerns:** What concerns do you have in providing your ID and using iris scan, is being stored and used by the government portal?

Scenario 6: Employment Background Check Imagine you have received a job offer from a company, and as part of the final hiring process, they require an employment background check. To confirm your eligibility and verify your work history, the background check service asks you to submit personhood credentials using fingerprint verification and uploading your government-issued ID to verify your identity.

1. How did you feel about using personhood credentials to verify your identity for an employment background check?
2. **Benefits:** What potential benefits do you see in using PHC in this background check context?
3. **Security:** Do you think using personhood credentials improves the security of the employment background check?
4. **Privacy:** Did this method of identity verification make you feel more confident about your privacy?
5. **About Data:** Were you comfortable providing your government-issued ID and fingerprint information?
6. **Privacy Concerns:** What concerns do you have in providing your ID and using fingerprint, is being stored and used by the background check service?

B.4 Section 4: Users' preference of PHC (RQ2)

We talked about several scenarios where different types of potential credentials to issue you PHC that could verify yourself as a unique human. In this section, we would like to discuss on different types of credentials you might prefer in issuing personhood credentials for you and how you might want to manage those based on your privacy and security need.

If you were to use PHC for identity verification,

1. What types of credentials would you prefer to use as personhood verification?
2. Which organizations or stakeholders would you prefer to issue and manage your PHC?

B.5 Section 5: Design Session(RQ3)

In the former session, we discussed the concerns/potential risks in PHC. I wrote down these potential problems in the top of whiteboard. We would like to brainstorm the idea how we can solve these problems by sketching your ideas. For sketching, you can use this digital whiteboard, or use pen and paper in your desk if you prefer. (As shown in Figure ??, we send the link to the zoom whiteboard where pre-arranged components like the PHC issuer and database are placed on the left, while potential concerns or risks suggested by participants during interviews are noted as topics in the top right.)

1. In your opinion, how can we improve the design for PHC to address issues/concerns we discussed? Could you sketch a solution?
2. Could you explain your drawing?