

ISDM Project: *AI*-integrated Application System

TUTORIAL 7 GROUP 5

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PROJECT BACKGROUND



Social Housing Allocation System - Overview

- **Background:** Many applicants are dissatisfied with the current application process due to a lack of clarity and long wait times
- **Objective:** Develop an AI-powered system to improve transparency and fairness while bolstering efficiency in the Netherlands social housing process
- **Users:** Applicants, Government Officers, and AI System Developers

Product Description:

- A web-based portal to improve the end-user's experience of applying for social housing
- Provides tailored housing recommendations based on user information
- Offers real-time application tracking and status updates
- Facilitates secure document upload process and identity verification
- **Features:** Explainable AI, user-centered design and accessibility for various users





CONSTRAINTS, RISKS AND TOLERANCES

Constraints

- **Maintain compliance with Netherlands Housing Laws** and EU data privacy laws (GDPR)
- **Seamless system integration** to existing housing and applicant databases
- **Usable across a variety of devices and supports users** of varied digital literacy and language requirements.



Tolerances

- **Minor delays** in non-core features (such as UI enhancements) and **agile iteration changes** are allowed
- Core **functionality is unaffected** without disrupting users
- **Provided schedule and deadline is maintained**, the scope is tightly managed



Risks and Mitlgtation

- **AI Bias in Decision Making**
 - Transparent logic, bias audits and officer override capabilities
- **Public Distrust in Automation**
 - Explainable outcomes, clear appeal processes and human interference in system
- **Data Inconsistency or Downtime**
 - Managed with backup protocols, early-stage API testing and fallback handling



INVESTMENT APPRAISAL

1) Project Cost Breakdown:

- 1.1) **\$1.1M** Development
- 1.2) **\$400K** Implementation
- 1.3) **\$500K** Maintenance
- 1.4) **\$2M** Total Project Cost

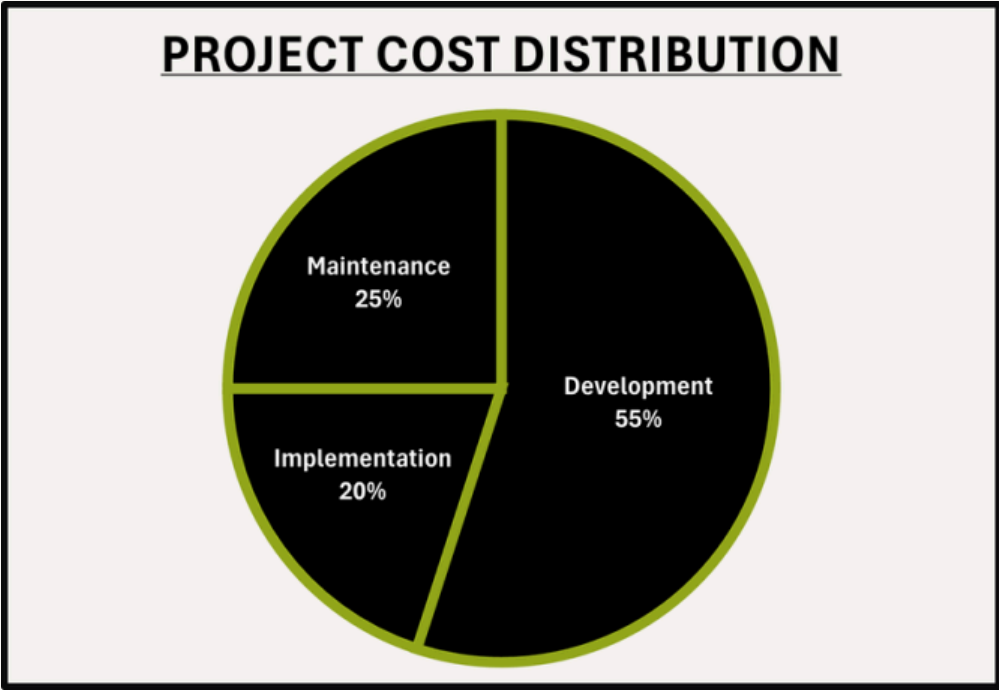


Figure 1 - Project Cost Distribution

2) Total Annual Benefits:

- 2.1) **\$650K** Cost Savings
- 2.2) **\$350K** Efficiency Value
- 2.3) **\$1M** Total Benefits

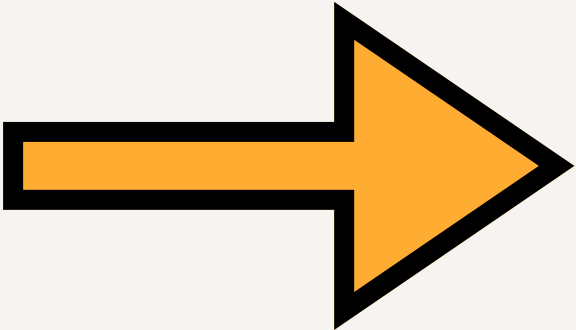


Total Annual Benefit = Annual Cost Savings + Efficiency Value
Total Annual Benefit = \$650,000 + \$350,000
Total Annual Benefit = \$1,000,000

Figure 2 - Calculation of Total Annual Benefits

3) Cash Flow Table (5-Year Period):

→ **Positive cash flow turnover** from Year 2



Year	Cash Flow (\$)
0	-\$2,000,000 (Investment towards new AI housing allocation system)
1	+\$1,000,000 (Expected cash flow from AI Housing allocation system)
2	+\$1,000,000 (Expected cash flow from AI Housing allocation system)
3	+\$1,000,000 (Expected cash flow from AI Housing allocation system)
4	+\$1,000,000 (Expected cash flow from AI Housing allocation system)
5	+\$1,000,000 (Expected cash flow from AI Housing allocation system)

Figure 3 - Cash Flow Table

Key Financial Outcomes:

- **Payback Period** = 2 Years
- **Conclusion** → Fast ROI + Low Risk + Long-Term Value

PROJECT INITIATION - EMPATHY MAPS

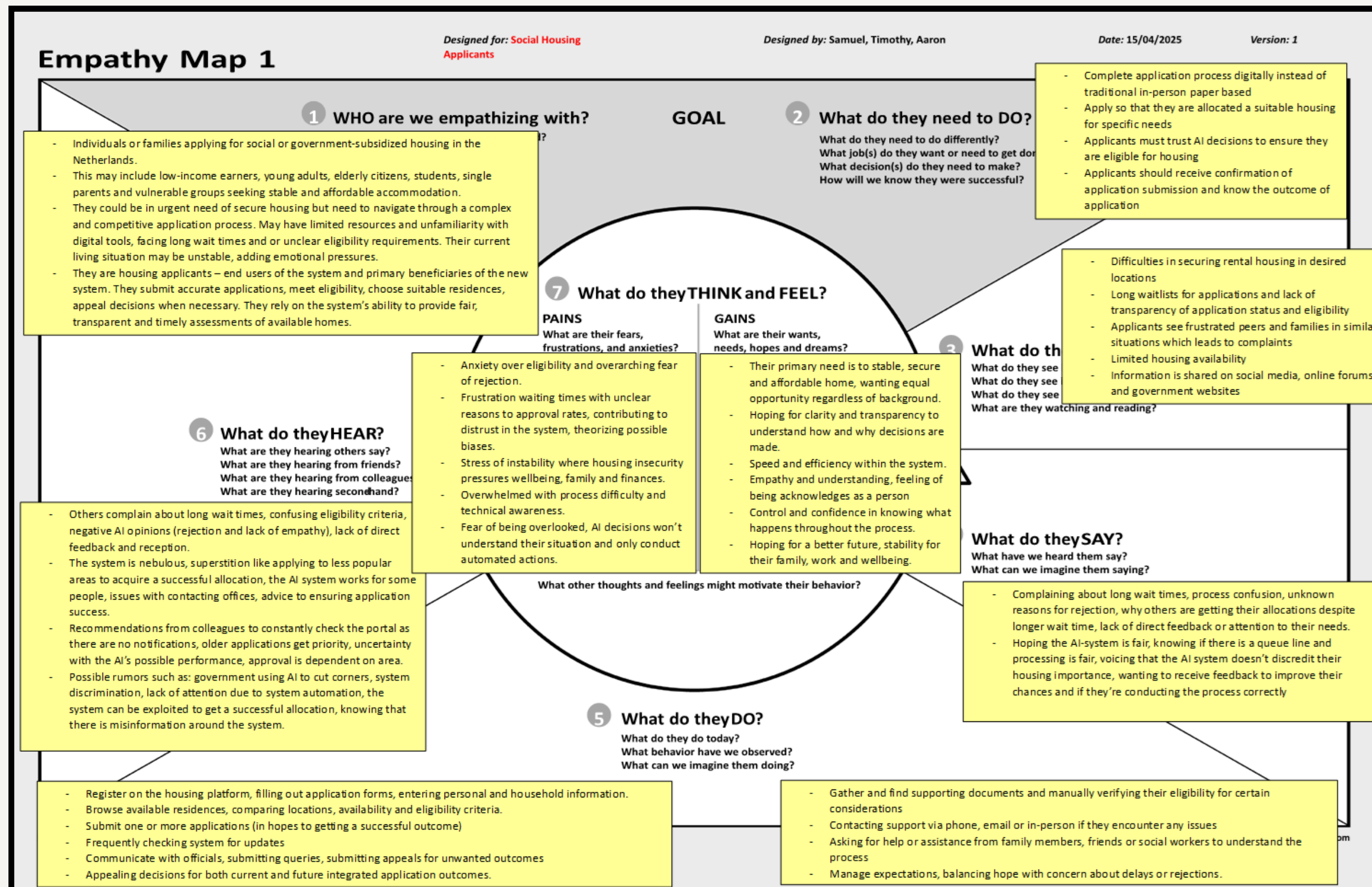


Figure 4 - 'Netherlands Social Housing Applicants' Empathy Map

PROJECT INITIATION - EMPATHY MAPS

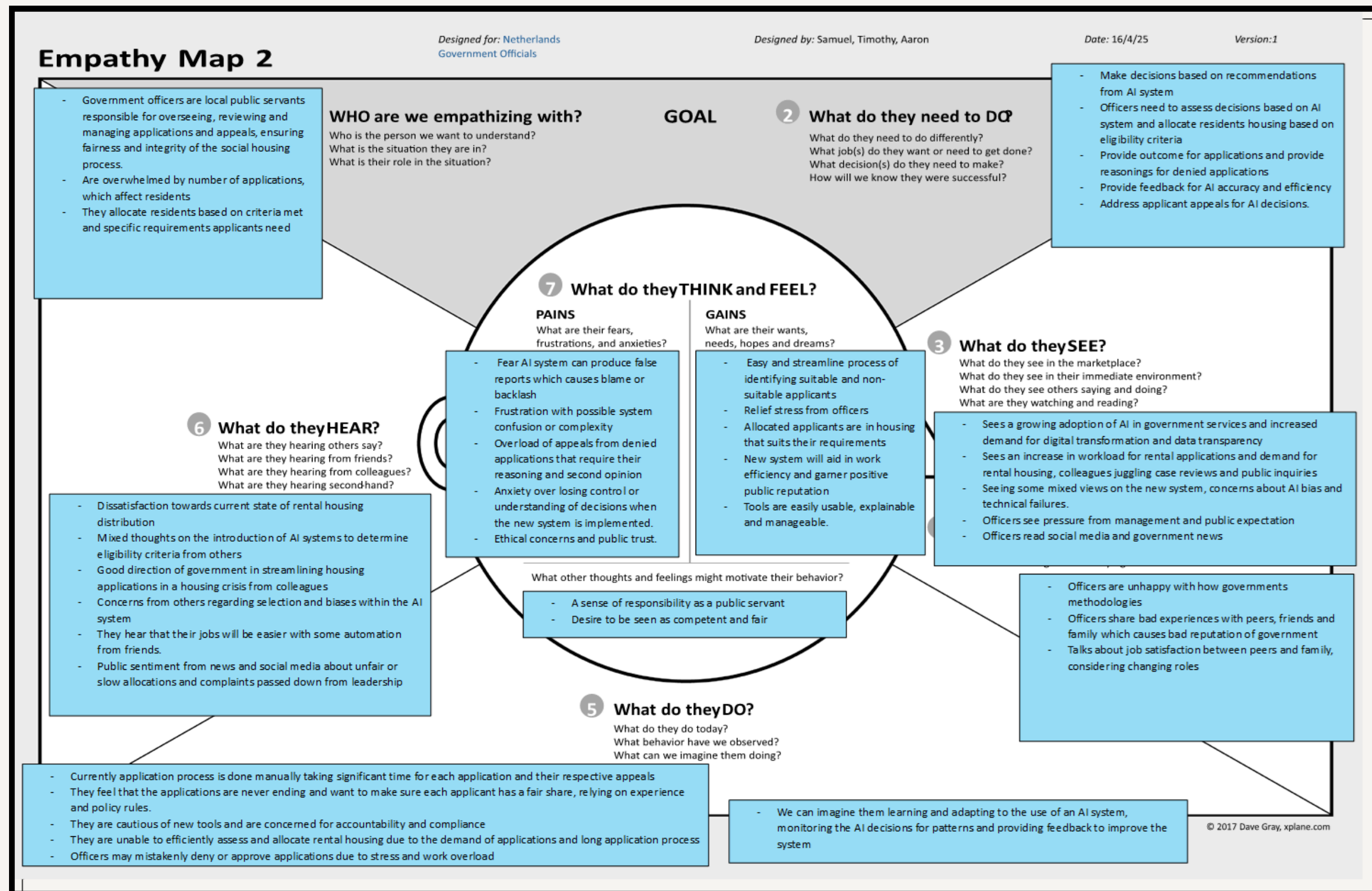


Figure 5 - 'Netherlands Government Officials' Empathy Map

PROJECT INITIATION - EMPATHY MAPS

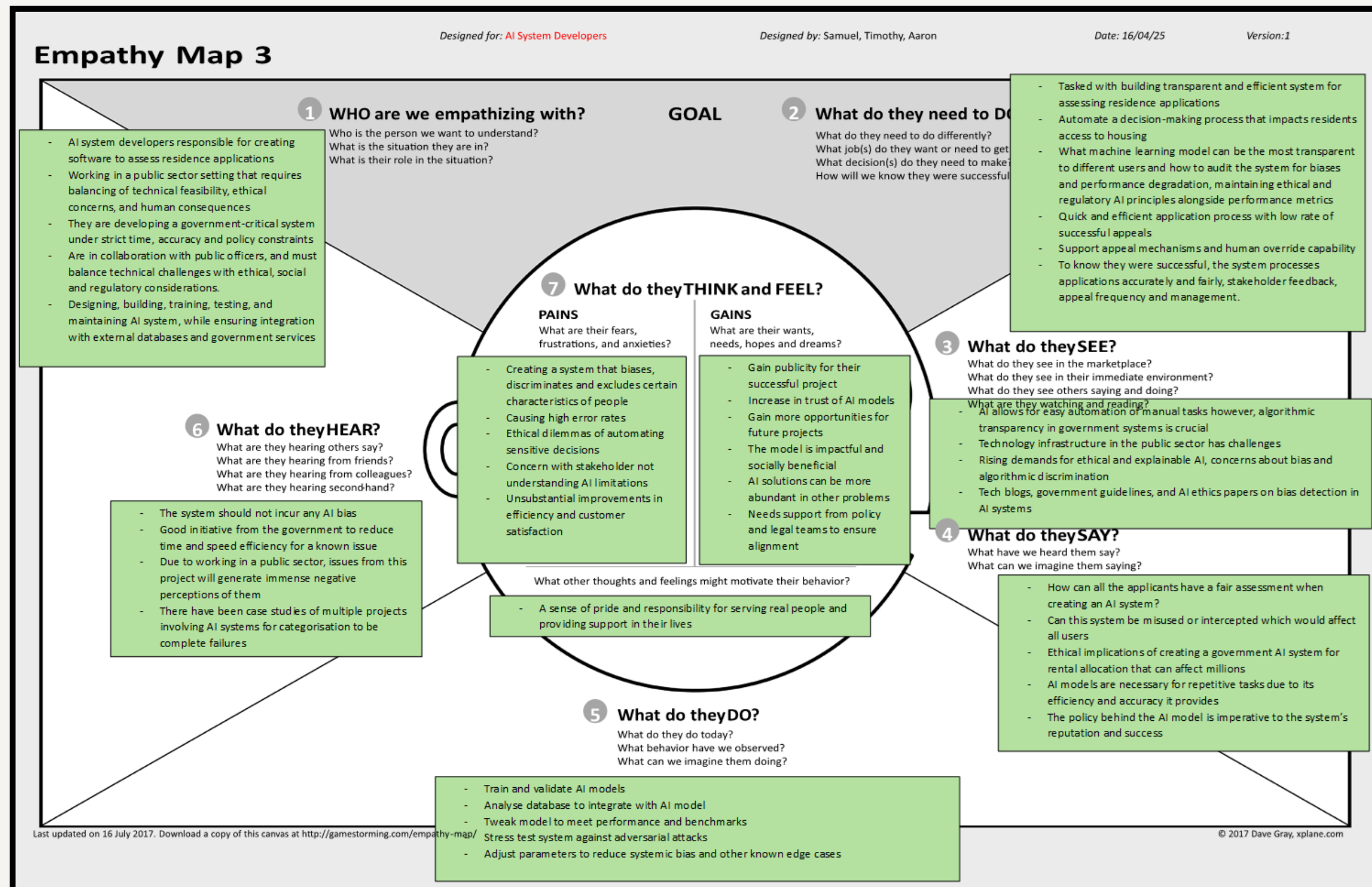


Figure 6 - 'AI System Developers' Empathy Map



PROJECT INITIATION - JOURNEY MAPS

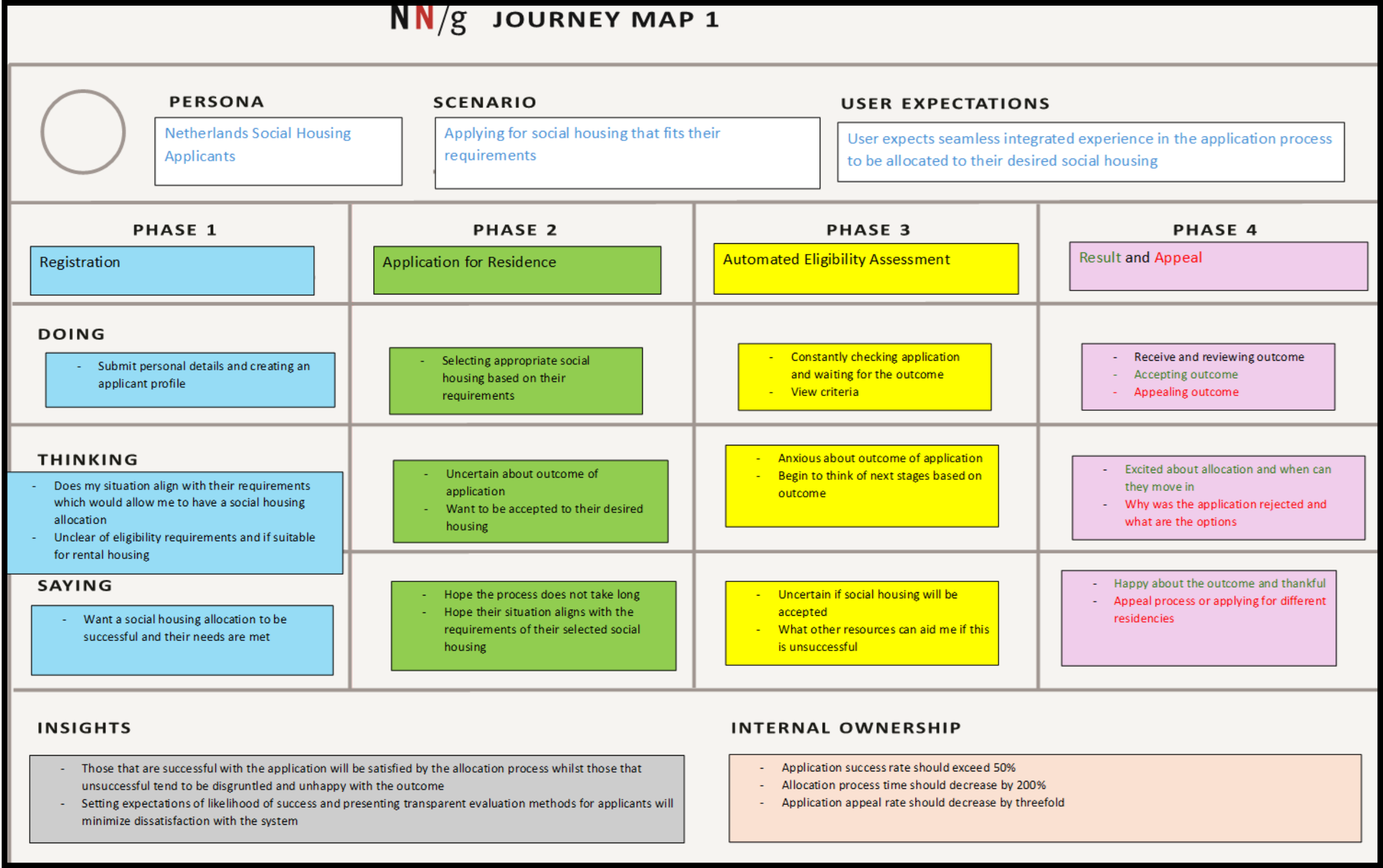


Figure 7 - ‘Netherlands Social Housing Applicants’ Journey Map



PROJECT INITIATION - JOURNEY MAPS

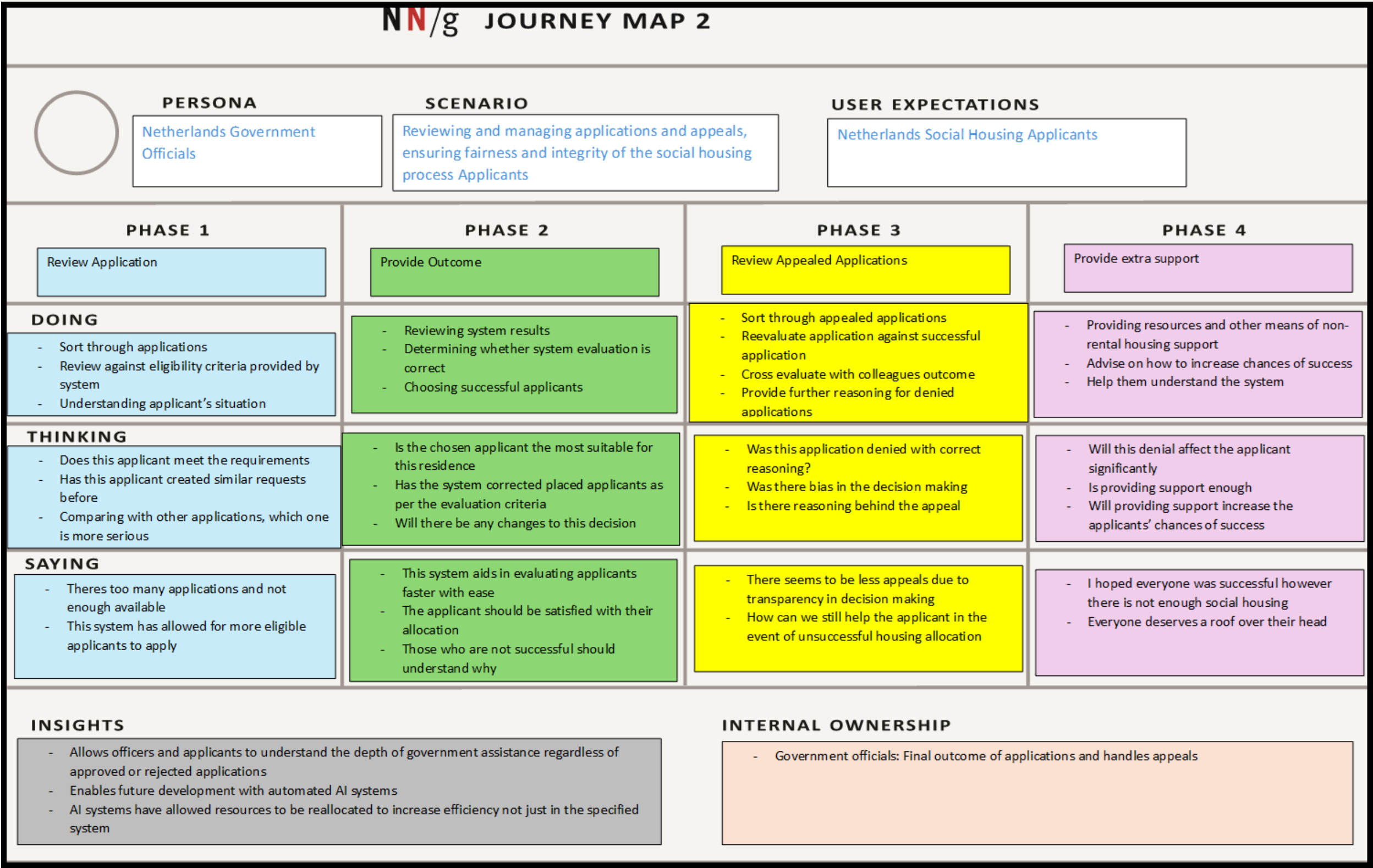


Figure 8 - ‘Netherlands Government Officials’ Journey Map



PROJECT INITIATION - JOURNEY MAPS

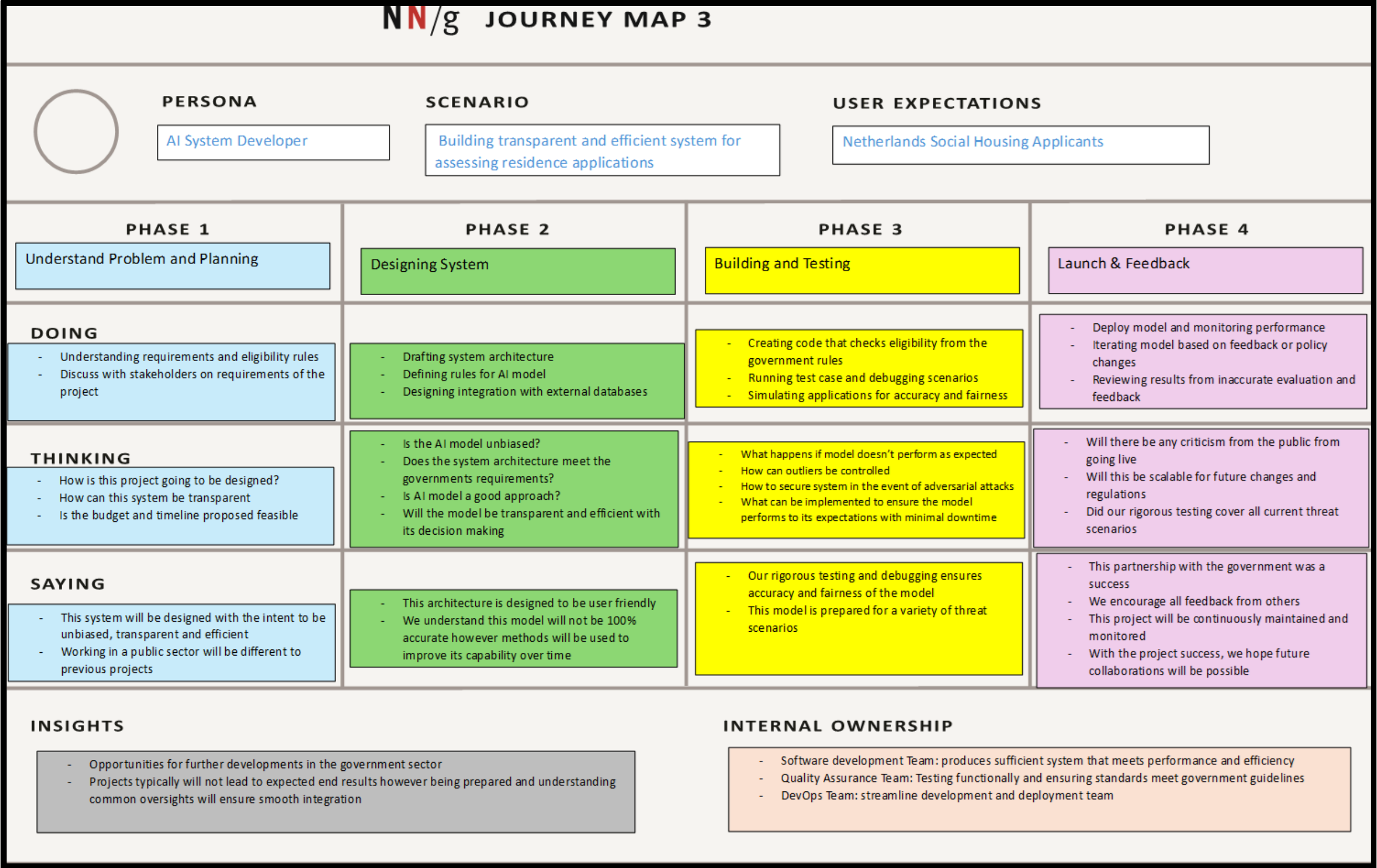
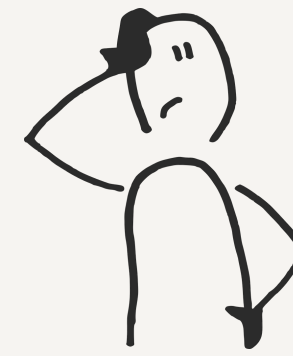


Figure 9 - ‘AI System Developers’ Empathy Map

PROJECT INITIATION-PROBLEM STATEMENTS(POV)



Sam

1.Housing Applicants

POV Statement: “As a housing applicant, I need a fair and fast process that helps me understand my eligibility and notified of my application status. This is because of my extenuating circumstances, stressful situations, and not knowing where I will be situated only adds additional stress and uncertainty to my life”.

2.Housing Officer

POV Statement: “As a housing officer, I need a system that I can easily learn to use, trust and easily audit, because I am responsible for ensuring fair decisions. Currently, I am spending too much time manually checking or responding to preventable appeals that could be avoided with better transparency throughout the process.”

3.AI Developers

POV Statement: “As a developer, I need access to reliable data and clearly defined ethical boundaries, because I am building a system that directly affects people’s lives, and I can’t be liable to risk unintended bias or decisions that no one can explain, defend or be held accountable later.”

PROJECT IDEATION

- The 4 key factors to create assumptions for the various tools used in our project so far



1. Useability



2. Efficiency



3. Flexibility



4. Bias Mitigation

PROTOTYPING - PHASE 1

Step 1

NGH

Netherlands Government Housing

Username

Password

Forgot Password?

LOGIN

Create an Account if you don't have one.

Step 2

NGH

Netherlands Government Housing

Home

Browse

Search

My Account

Inbox

Start Application

Application Outcome

Step 3

NGH

Netherlands Government Housing

Return page

Housing Application

First Name

Last Name

Phone

Email Address

Residential Address

Step 4

NGH

Netherlands Government Housing

Return page

Application submitted!

Figure 10 - Netherland Government Housing Application Process
(Wireframe 1)



PROTOTYPING - PHASE 2

Step 1

NGH

Netherlands Government Housing

Username

Password

Forgot Password?

LOGIN

Call the NGH IT Support on 1800 XXX XXX

Step 2

NGH

Netherlands Government Housing

Search

My Account

Inbox

Application Backlog

Final Review

Call the NGH IT Support on 1800 XXX XXX

Step 3

NGH

Netherlands Government Housing

Search

My Account

Application List

Name	Application Review	Last Submitted	Status
Kim T	Not completed	14/05/2025 11:05AM	Unsuccessful
Justin L	Not completed	20/05/2025 12:45PM	Unsuccessful
Kate W	Completed	17/05/2025 1:30AM	Unsuccessful
Michael V	Not completed	14/05/2025 11:05AM	Unsuccessful

Call the NGH IT Support on 1800 XXX XXX

Step 4

NGH

Netherlands Government Housing

Search

My Account

Final Review

Applicant Name	Justin L
Application Status	Rejected
Employment Status	Unemployed
Phone Number	04XX XXX XXX
Email Address	justinl@email.com
Final Outcome	Successful for housing allocation due to [following reasons]

Submit

Call the NGH IT Support on 1800 XXX XXX

Figure 11 - Netherland Government Official Information Manual Review Process (Wireframe 2)



PROTOTYPING - PHASE 3

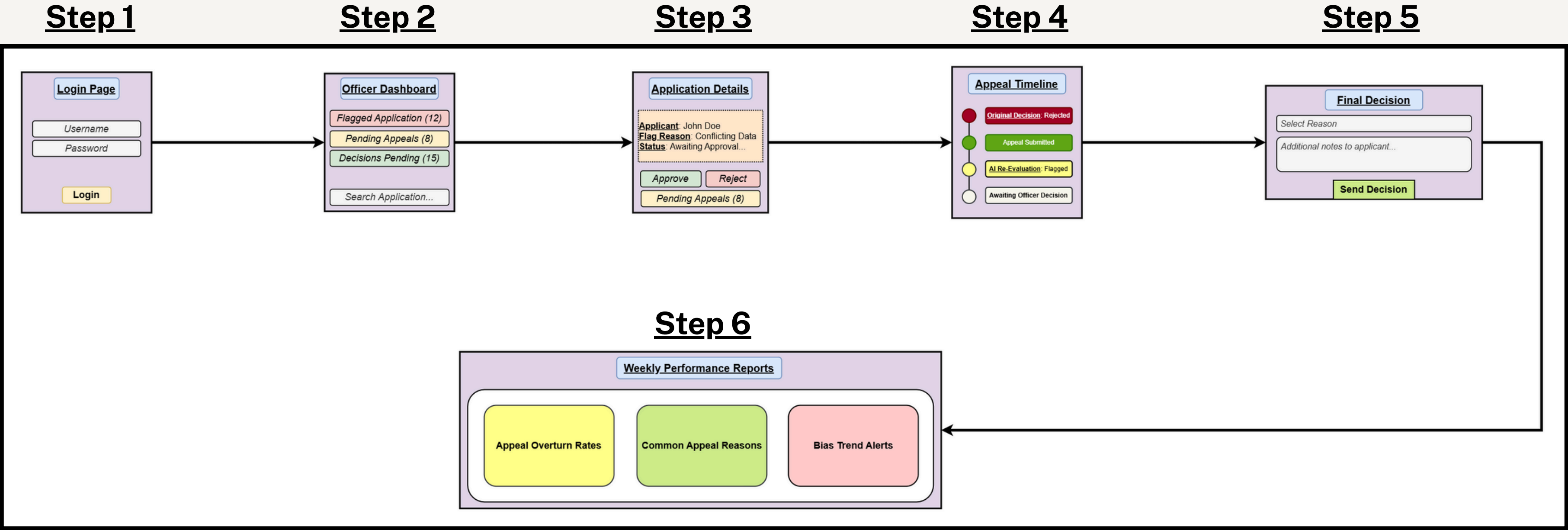


Figure 13 - Netherlands Government Officials Appeal Management and Decision Review (Wireframe 3)



PROTOTYPING - PHASE 4

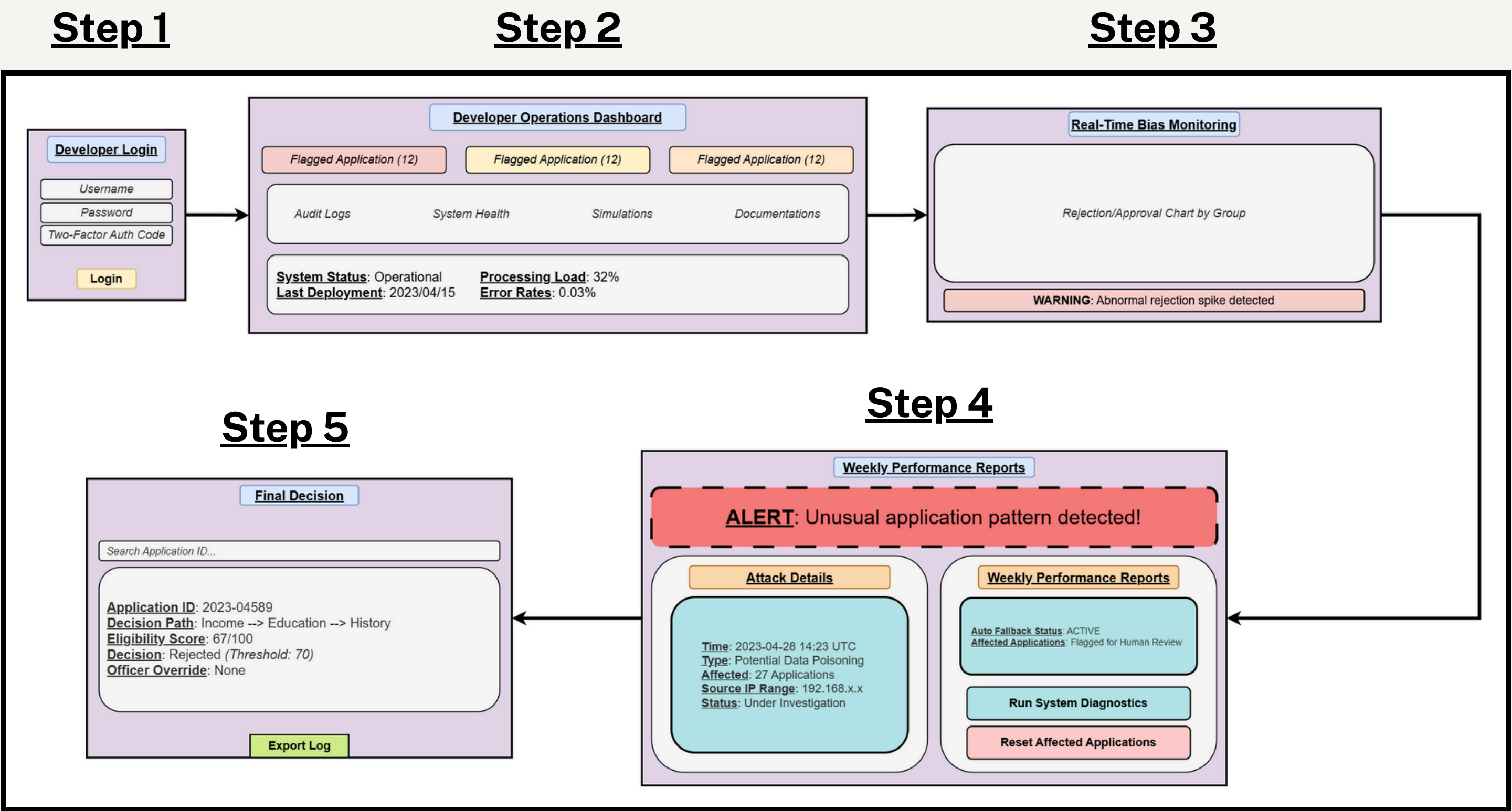


Figure 14 - AI Software Developers Monitoring and Maintenance Process (Wireframe 4)

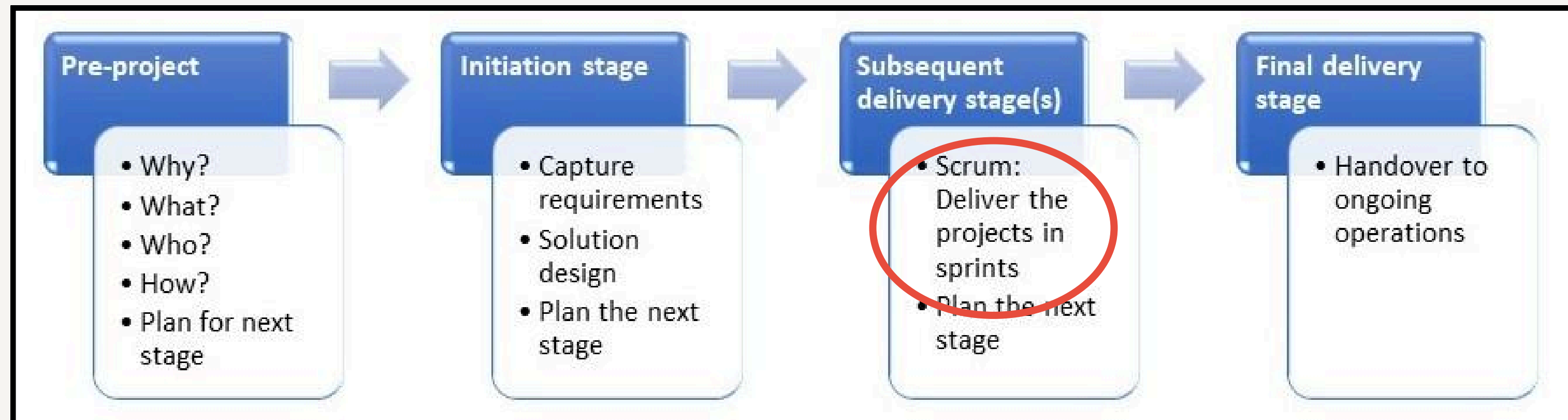


METHOD EXECUTION: OUR INTEGRATED APPROACH

PRINCE2 promotes the “manage by stages” principle.

The figure below is highly inspired by PRINCE2, but we have added the “Deliver the projects in sprints” step in the delivery phase.

We are Combining Design Thinking (DT), Scrum, and PRINCE2 principles to create a Hybrid Methodology.



RATIONAL E FOR METHOD INTEGRATION

- **DT**: Ensures *a user-centered approach to problems for applicants*. We also address human needs and pain points defined in our ‘Empathy’ and ‘Journey’ Maps.
- **Scrum**: Provides *an agile, iterative framework for flexible development and continuous feedback loops*. It eases the project complexity, components, and timeline.
- **PRINCE2**: Offers *essential governance, control, and alignment with overall business objectives* and project tolerances previously defined.

DESIGN THINKING: GUIDING USER-CENTRIC DEVELOPMENT

Nabil

The Phases of DT drive our understanding of the project and the user requirements.

- **Empathise:**

- In the 'Empathise' phase, the ***focus is case study analysis and the tools of “Design Thinking”***, like our maps. Here, we build an understanding of stakeholders' mindset

- **Define:**

- In the 'Define' phase, the ***focus is on synthesising insights into POV statements*** that define user needs.

- **Ideate:**

- The 'Ideation' phase is ***used to generate diverse solutions to our now defined problems***. Converting POV statements into "How Might We" questions.

- **Prototype & Test:**

- Lastly, the 'Prototype & Test' phase ***allows us to develop wireframes/mock-ups, perform user testing, and*** use this data to ***inform the Sprint Backlog***.



SCRUM: ITERATIVE DEVELOPMENT AND SPRINT FOCUS

The development of the project in the ‘Delivery’ phase will flow as follows:

- **Step 1 - Iteration:** The project is structured into timeboxed Sprints linked to user needs (1-4 weeks)
- **Step 2 - Sprint Planning:** The team selects user stories based on a prioritised Product Backlog
- **Step 3 - Sprint Execution:** The Development Team works on selected items (design, code, and test)
- **Step 4/5 - Sprint Review/Retrospective:** The team demonstrates a completed work increment to stakeholders and reflects to improve processes

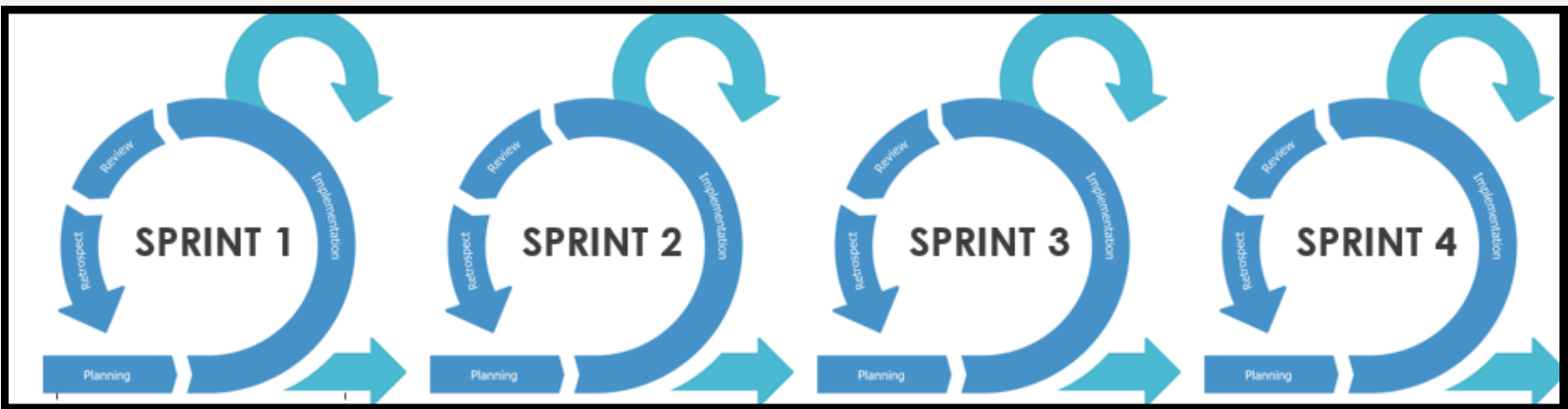
SPRINT BREAKDOWN

The details of each sprint phase can be found within the full project report.

However, an example of sprint content is as follows:

Sprint 1 - Foundation & Applicant Registration:

- 1. Establish infrastructure,
- 2. integrate Applicant DB,
- 3. develop registration

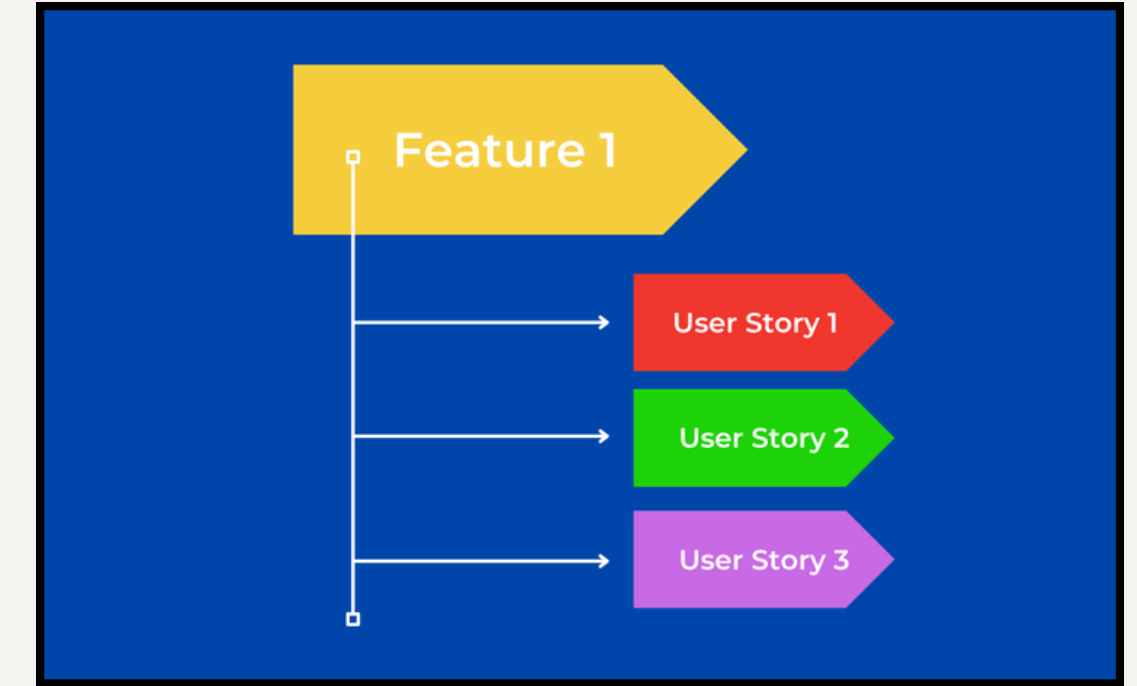


This is in line with the ‘Social Housing Applicants’ Journey map.

PROJECT TRACKING & GOVERNANCE

- **Tracking Mechanisms:**

- **Team Level:** Digital "diary" for daily progress/decisions;
 - Digital board for user story status (To Do, In Progress, Done).



- **Project Level:** Issue and Risk Log (actively maintained & reviewed); Monitoring against schedule and product descriptions.

- **Project Board Interaction (via PRINCE2):**

- **Sprint Reviews:** Hold key points for stakeholder inspection and feedback on working software.
- **Highlight Reports:** Regular summaries of progress, issues, risks, and forecasts provided by Project Manager.

Thank you!

