The First International Workshop on Software Engineering for Healthcare (SEH at ICSE '19)

On Gamifying an Existing Healthcare System

Method, Conceptual Model and Evaluation

Anderson Uchôa, Eduardo Fernandes,
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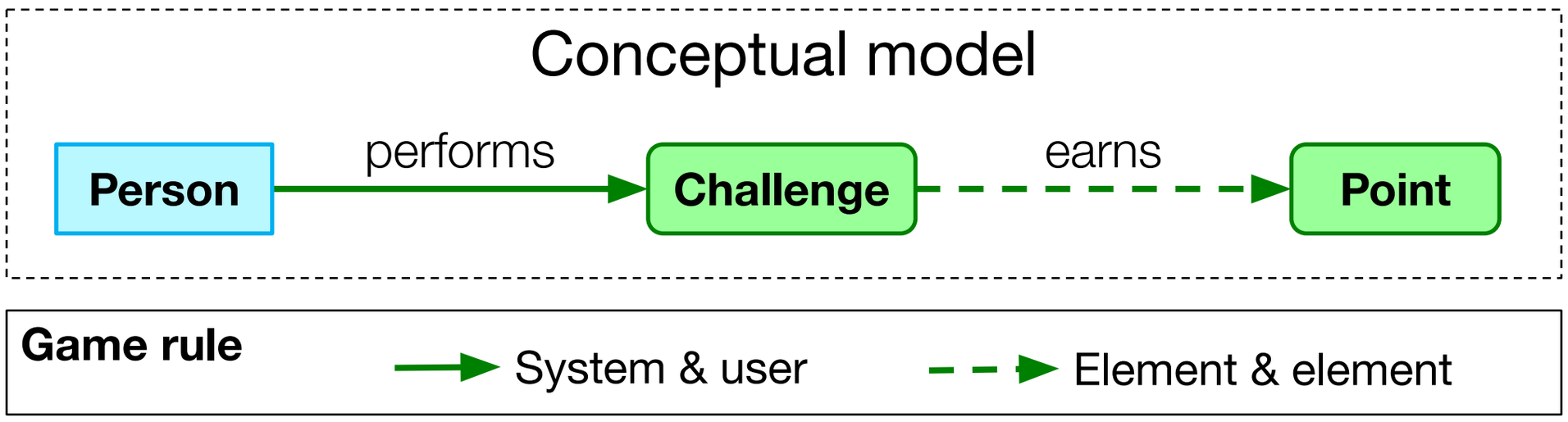
Gamification: An ally of user engagement

Game elements (points, etc.) aim to challenge and reward system users

Game rules define how users and game elements interact (e.g., user earns points)



Gamification can support healthcare tasks

VazaDengue: web + mobile apps for combating diseases like Dengue and Zika

Citizens	Health agents
report mosquito breeding sites	monitor disease outbreaks

The **rapid decrease** of views and reports made it **hard** to support public health agents' work

Limited support to gamify existing systems

No method to gamify existing systems

- Most methods are domain-specific
- Poor guidance to key development activities
- Refine requirements, rethink users, etc.

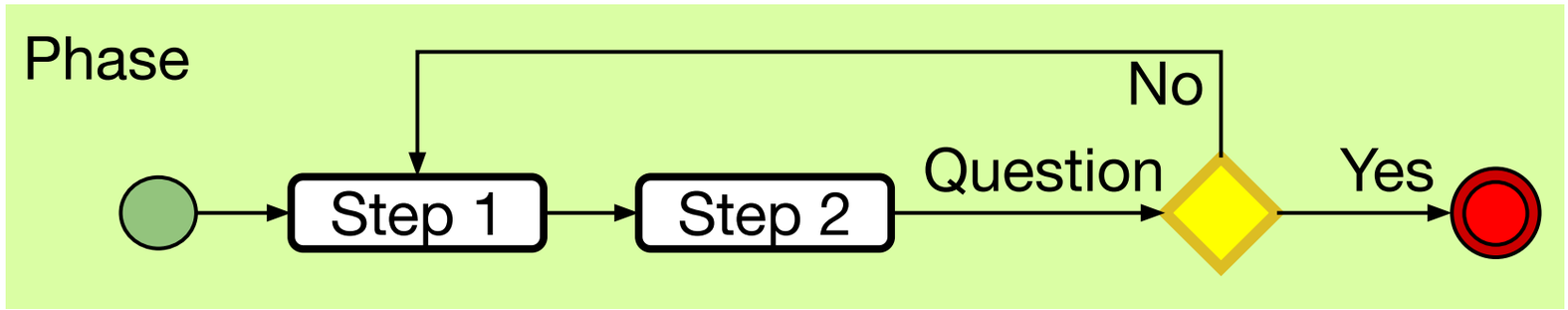
Few conceptual models to gamify healthcare systems

- Poor and non-explicit documentation
- Scarce insights to prevent mosquito-borne and other transmitted diseases
- Reuse is not trivial

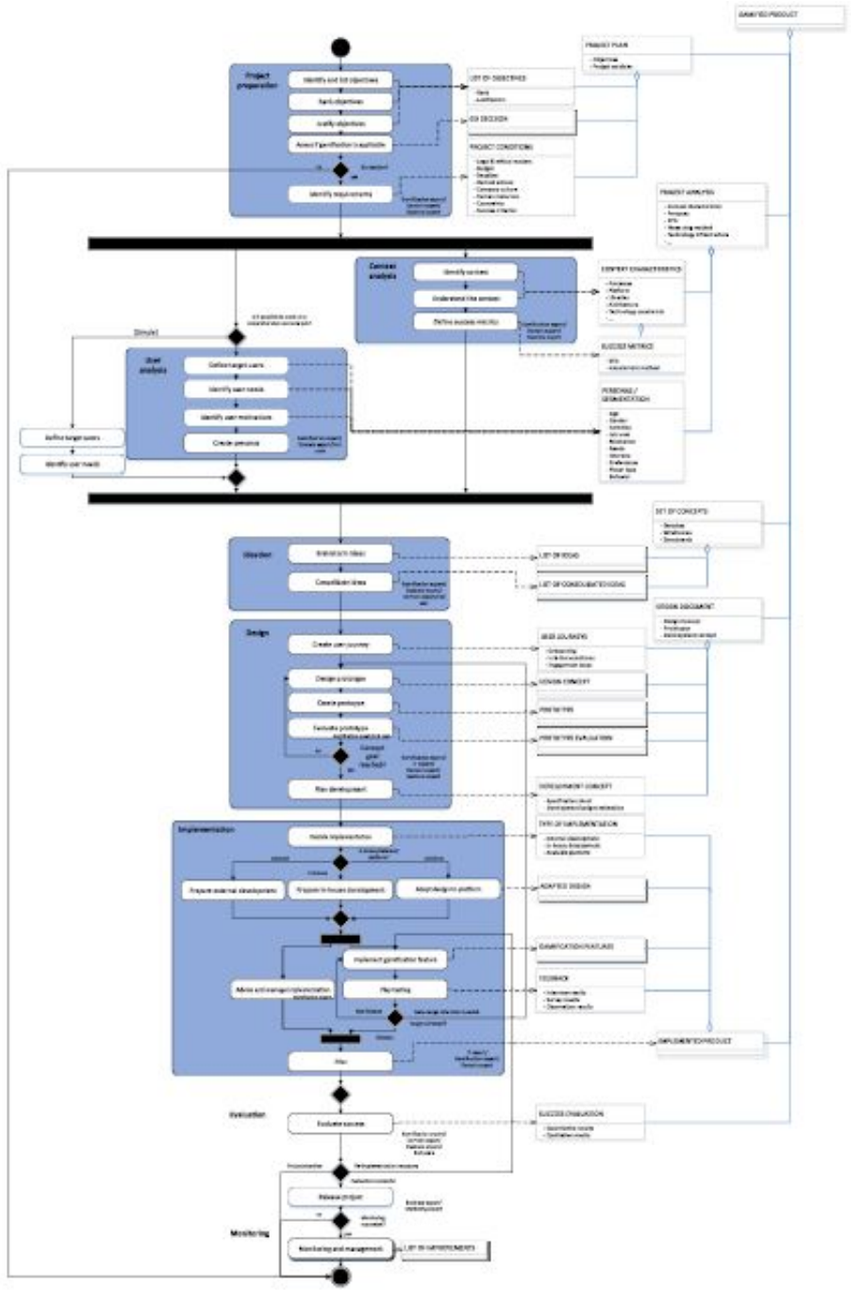
A **new method** based on a real-world experience

A **conceptual model** with 12 elements and 16 rules

Our method for gamifying existing systems



Morschheuser's: A state-of-the-art method

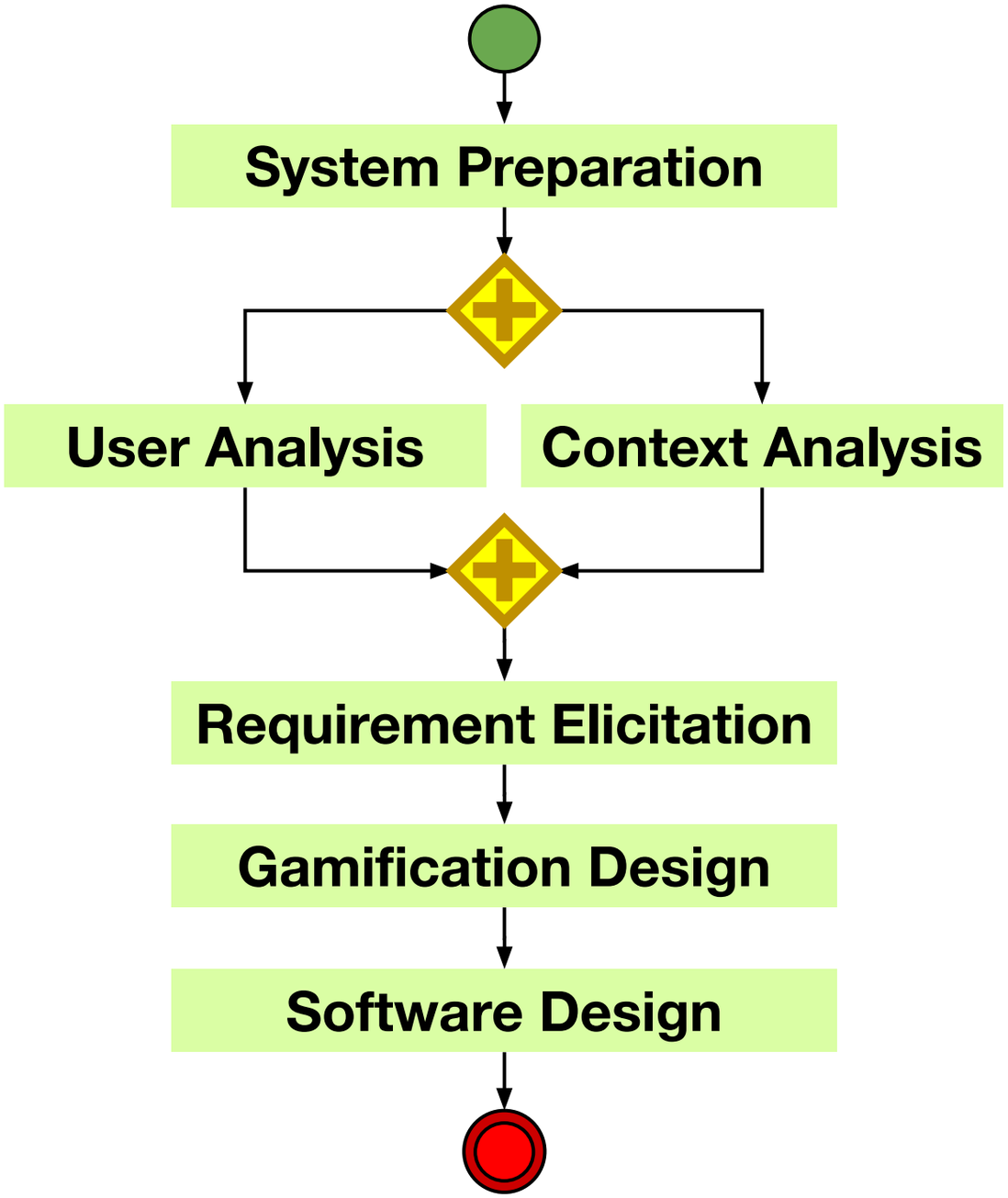


Eight development phases for gamifying **from scratch**

No support to key activities of gamifying existing systems

How to **refine** this method based on the VazaDengue experience?

Our new gamification method

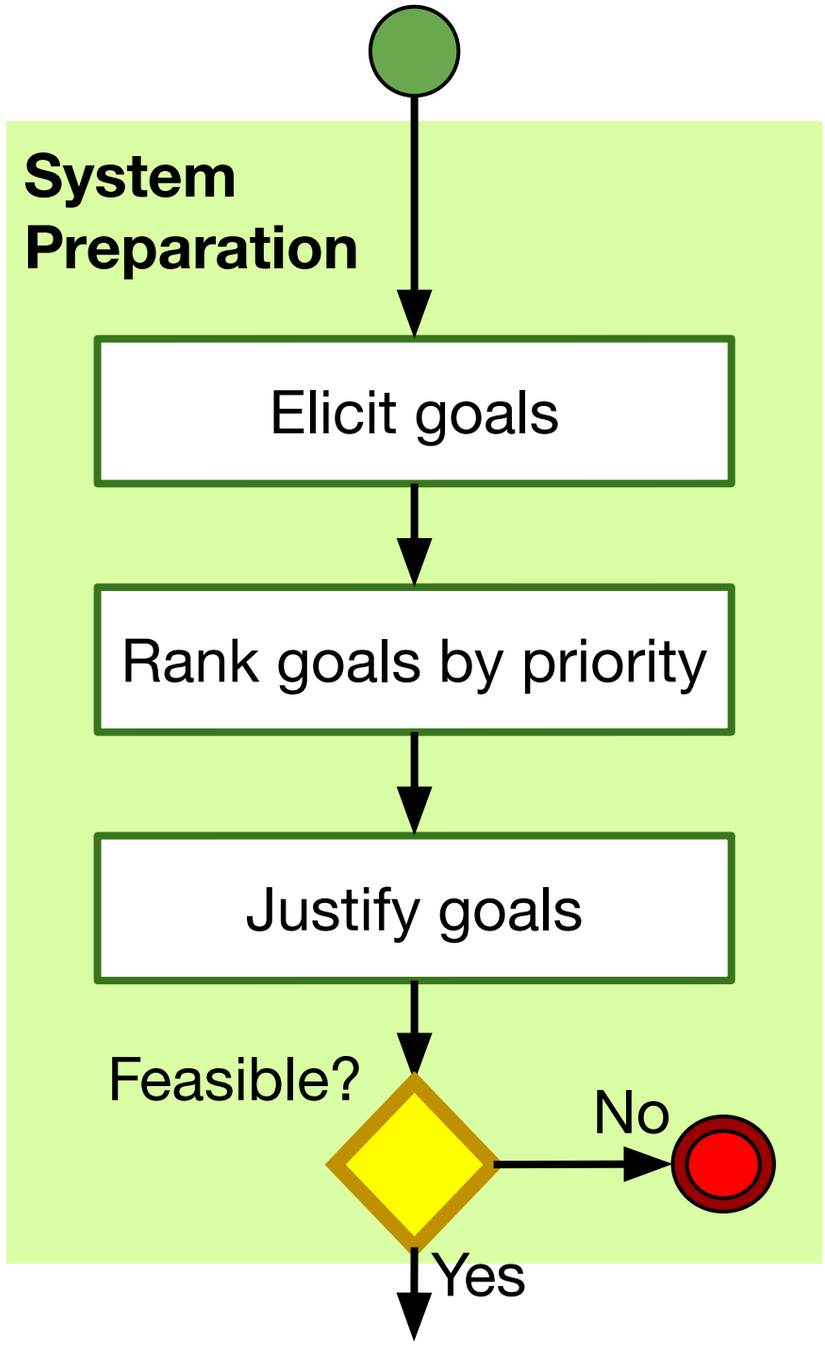


6 development phases
(without coding & testing)

Shaped based on experience
(VazaDengue gamification)

Refinements in many levels:
activities and phases etc.

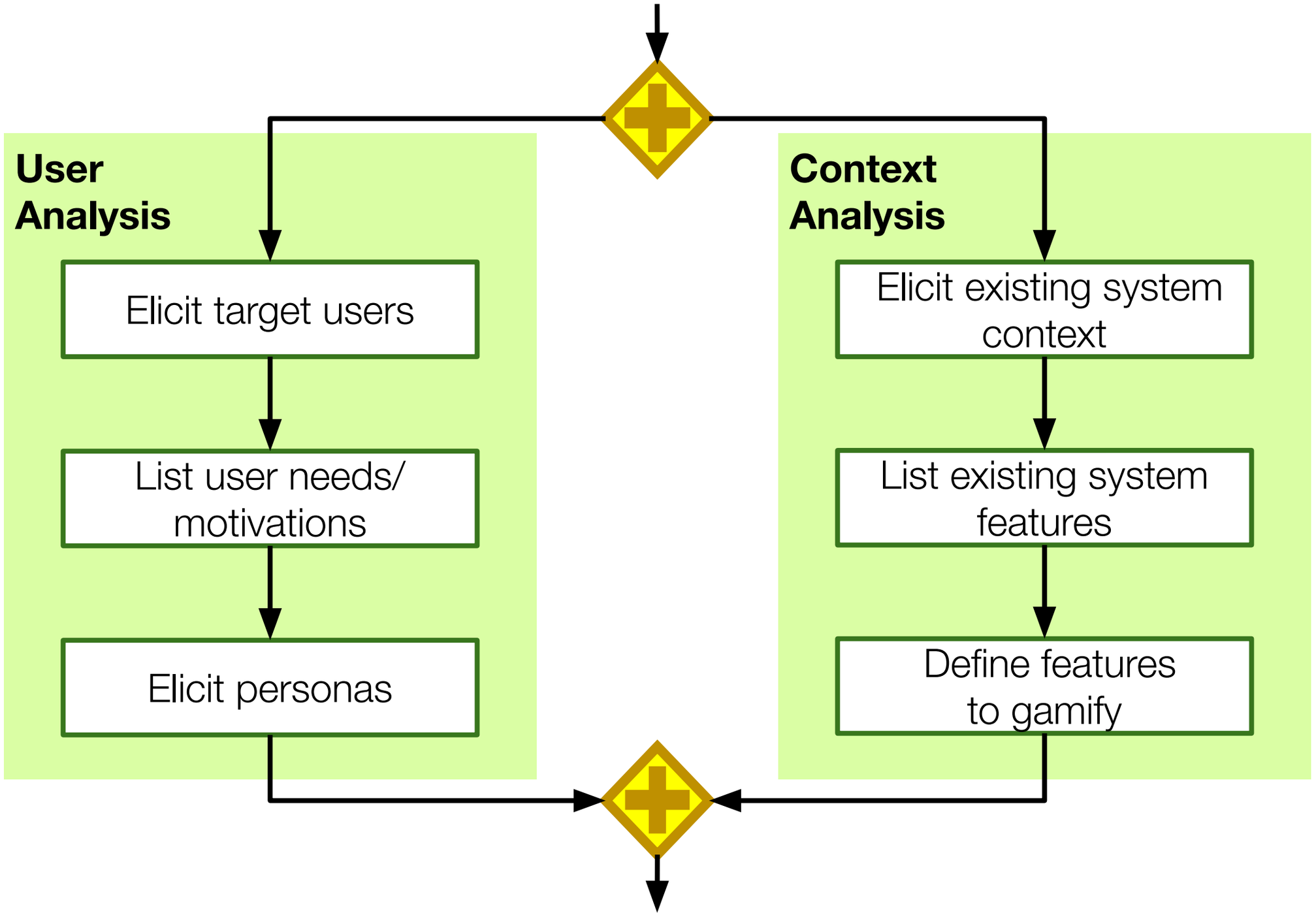
Phase 1: System preparation



We have discarded the report of diseases cases

We have prioritized the report of mosquito breeding sites

Phases 2 and 3: User & context analysis



Phases 4 to 6: Requirements & design

Requirements elicitation

- Evolve (non-)functional requirements
- Elicit gamified requirements

Gamification design

- Elicit game elements elsewhere
- Pick useful game elements
- Define game rules
- Draw the model

Software design

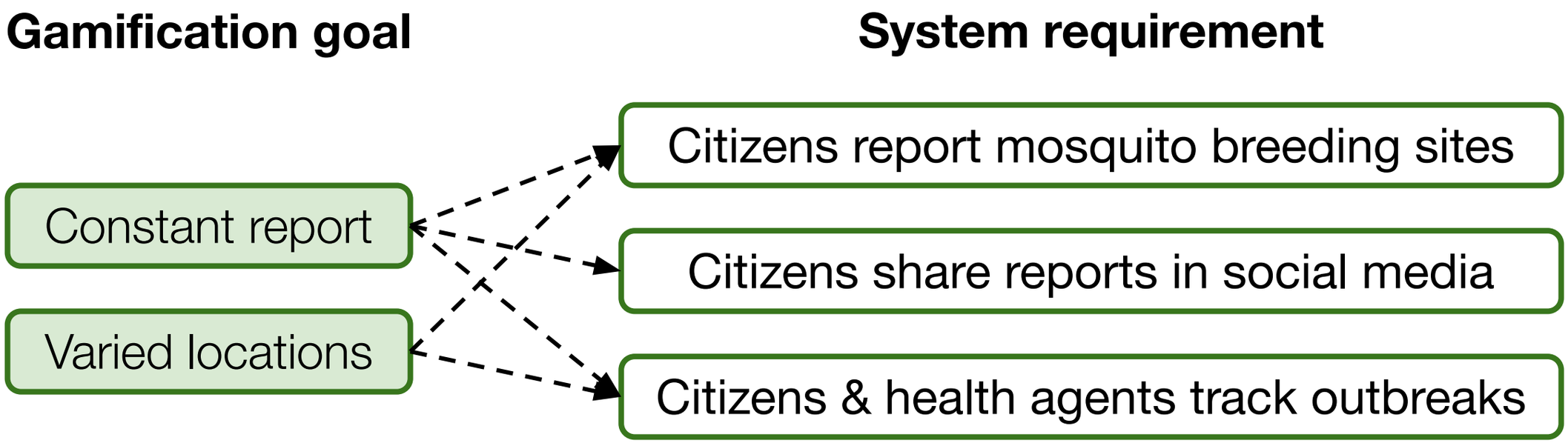
- Design prototyping

Coding and testing

Our conceptual model for preventing mosquito-borne diseases

Existing models for healthcare systems

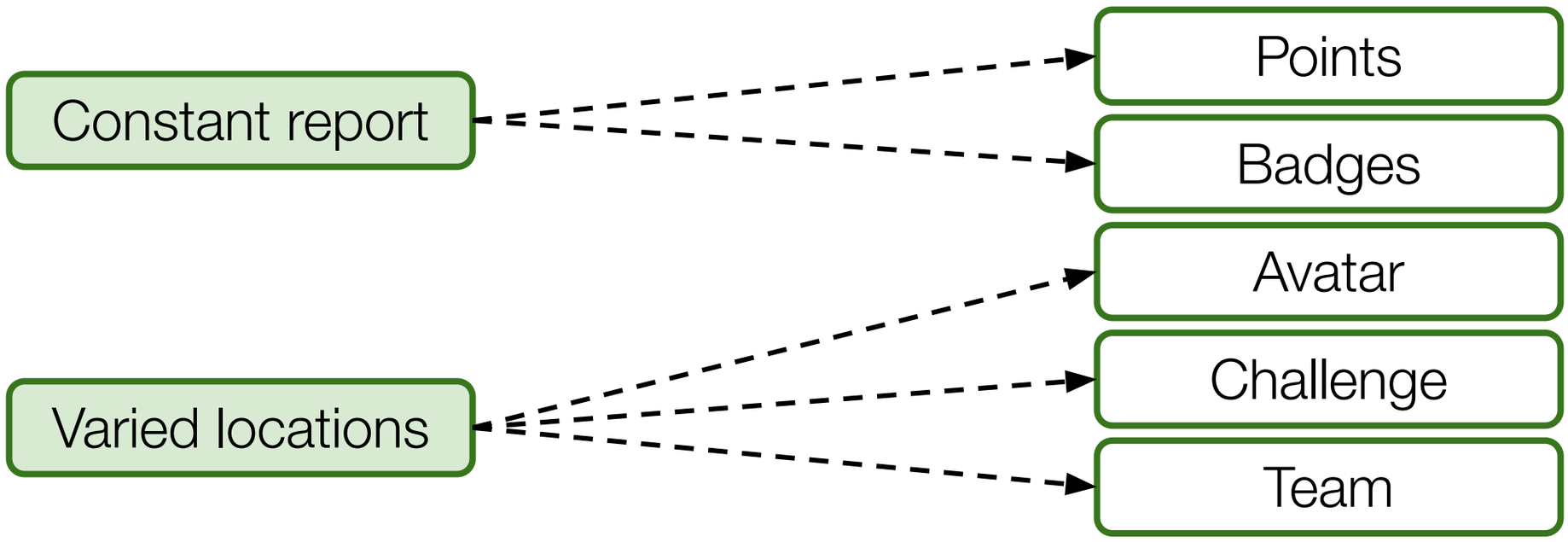
Little support to promote goals that are crucial for preventing transmitted diseases like Zika



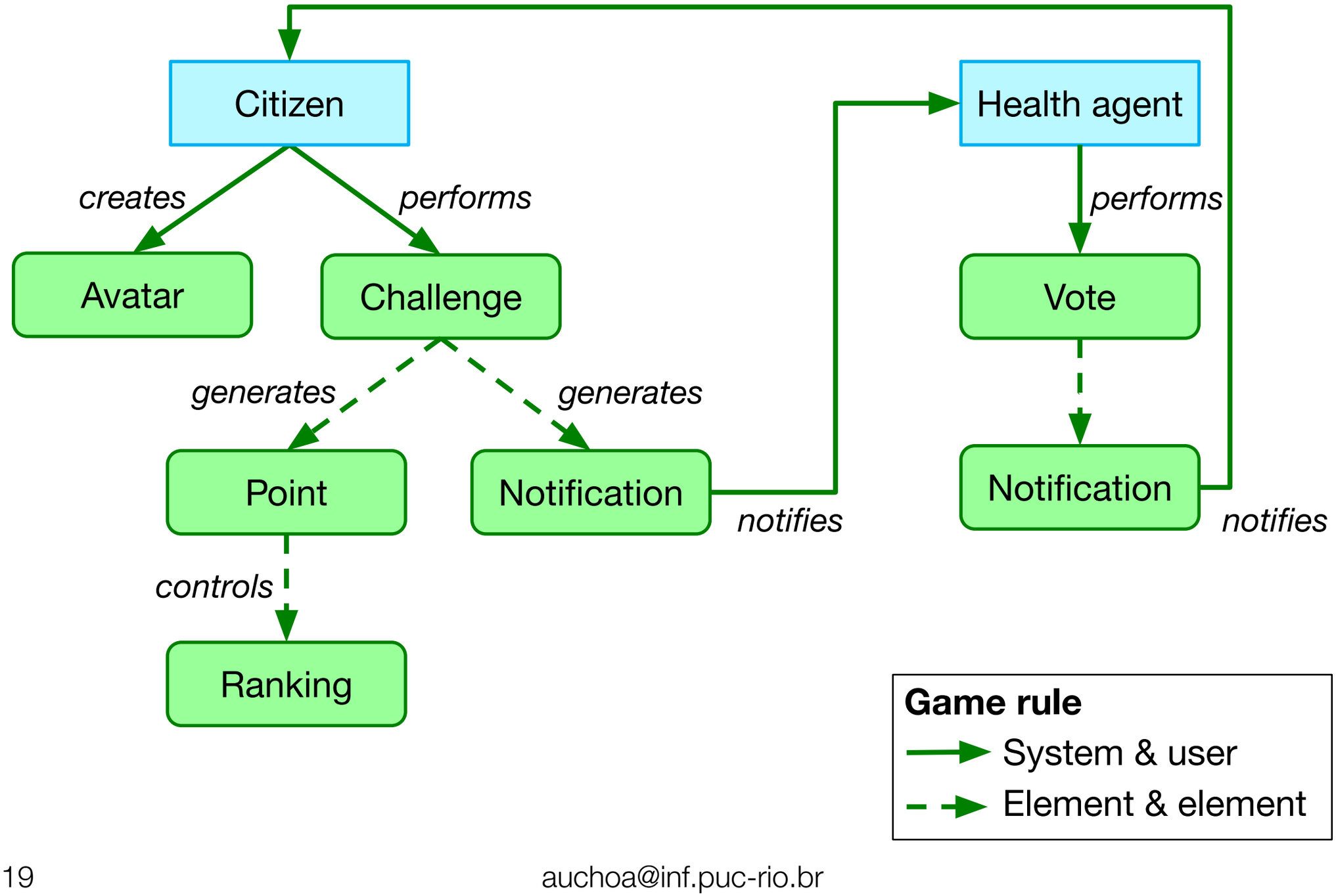
Selection of game elements

12 game elements, including popular ones like avatars, points, and votes

Inspired by 10 popular apps



Gamification model: A partial view



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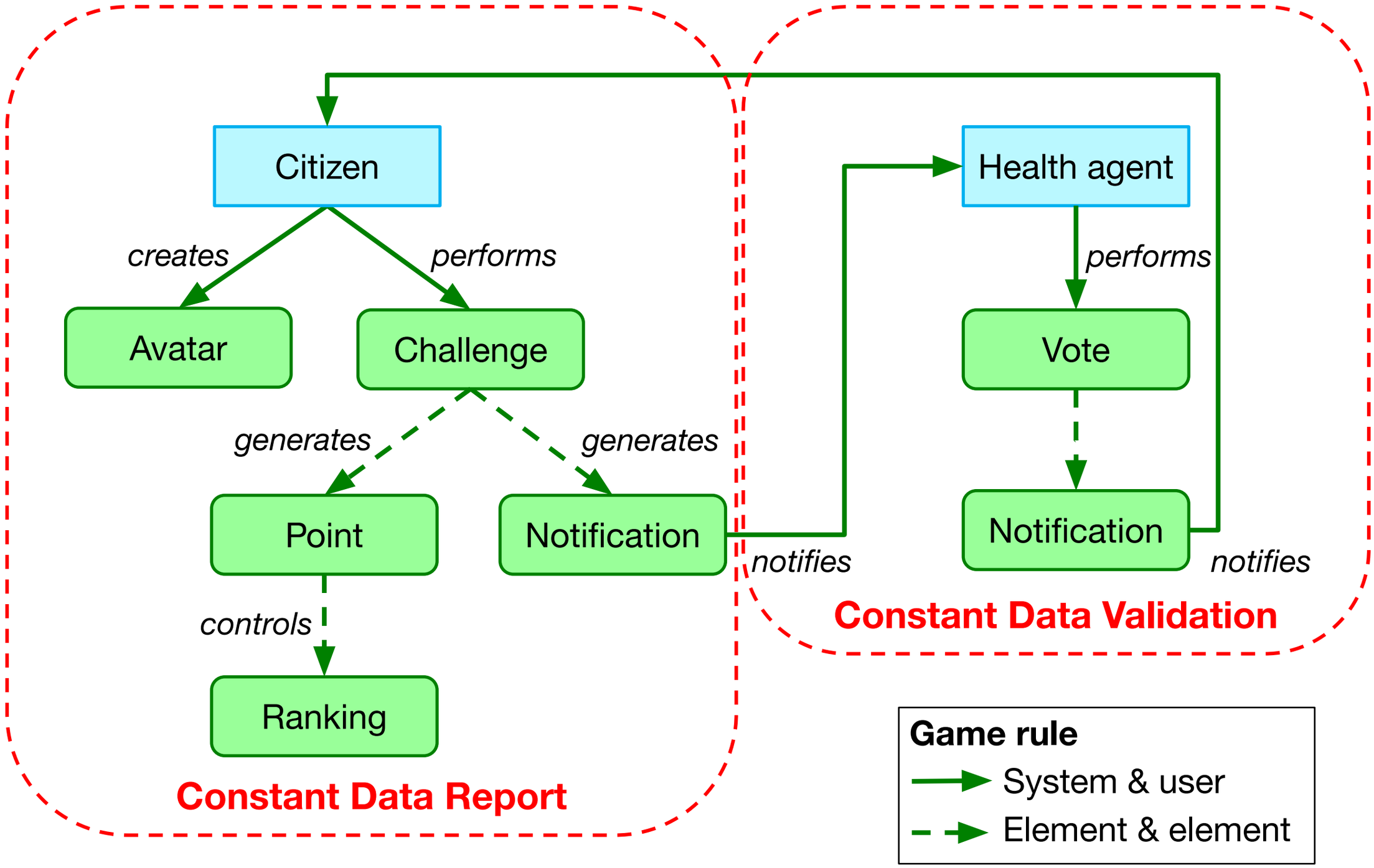


Evaluating our gamification model

Through the VazaZika **mobile** app, which allows to report mosquito breeding sites

Is the app **easy** to use?

Did users feel **engaged**?

Correlation ease to use x engagement?

Experiment with **20 citizens**: avg. 23 y/o and 29 h of mobile app use by week

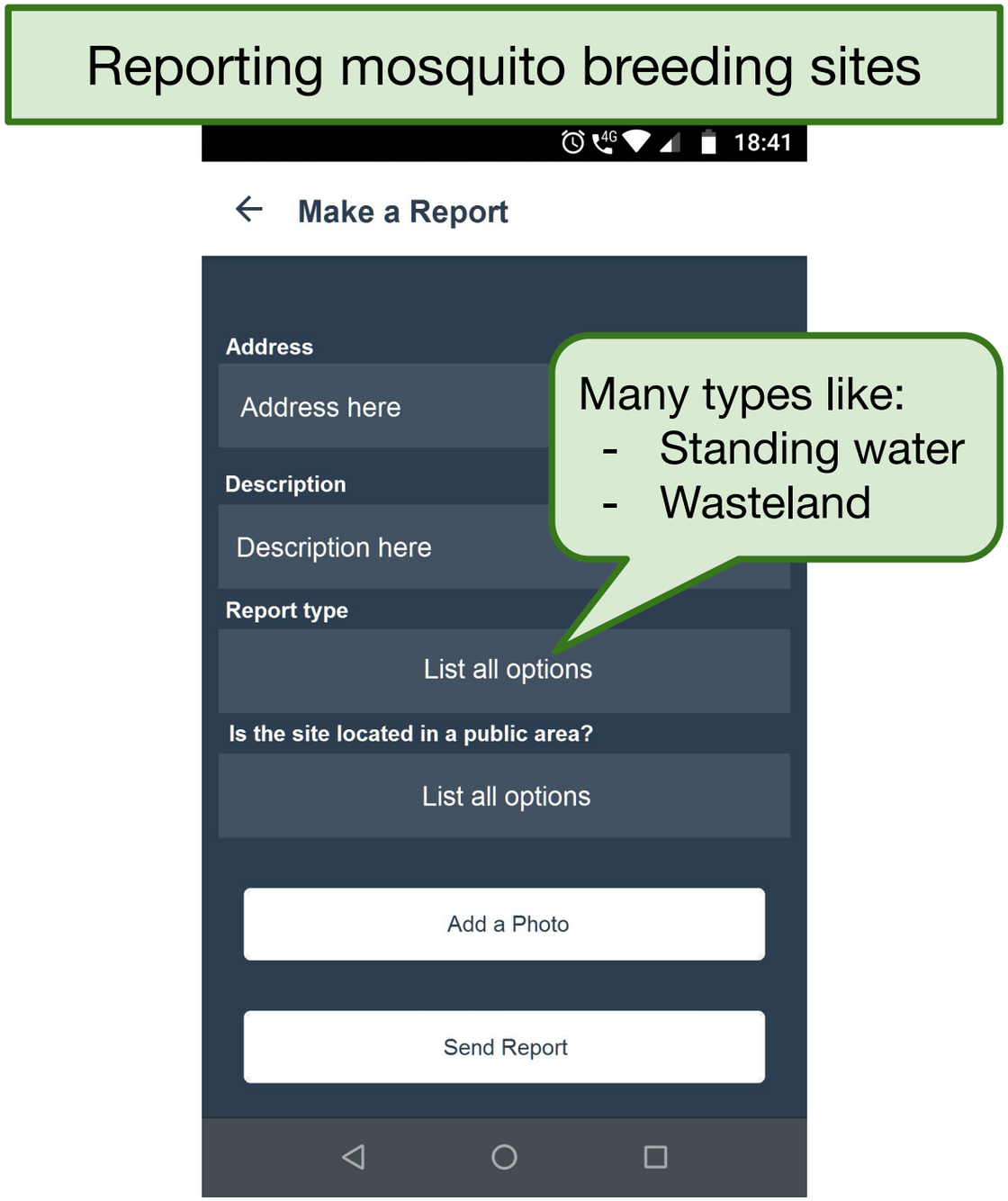
Crossover study: 3 activities that cover most elements & rules

Is the app easy to use?

From 5 to 50% of citizens said the app is **easy** to use

45% of citizens related game elements with ease of use

“I found the system easy to use, especially **voting**”



Did users feel engaged?

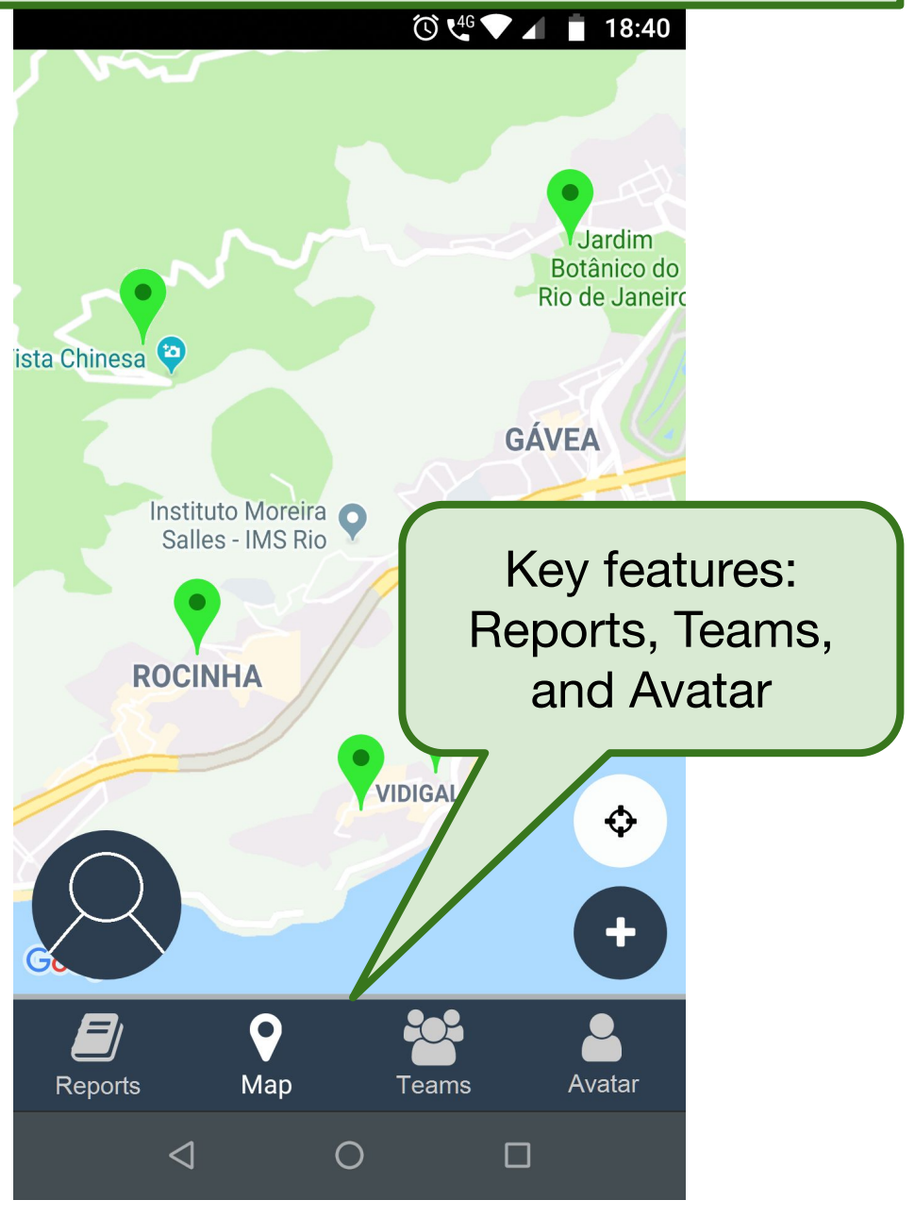
Up to 65% of citizens found the app **fun** to use*

Up to 55% of citizens felt **motivated** to repeat tasks*

Fun and motivation **strongly** correlated with ease of use*

***Except for a task without rewards**

Monitoring disease outbreaks



Threats to validity & future work

All study artifacts were **double-checked** in order to avoid errors

Crossover design applied to reduce the learning bias along experiment activities

We plan to evaluate our **method** in the industry

We will refine our **model** based on experiment insights

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