# Simulation and User Testing of a Platform for Healthier Public Discourse

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## Background and Objectives

### HodlPal

- HodlPal is building a civic engagement platform that empowers communities with collective trust. HodlPal's topic-specific reputation scores enable people to filter content collaboratively and explore diverse perspectives.

### Background

- People generally obtain information on social networks that algorithmically filter content
- Highly polarizing content or "clickbait" spreads faster through social networks and and is more likely to be shared [1]
- Simulations and empirical studies have been conducted to study dynamics of information propagation in large social networks [2]
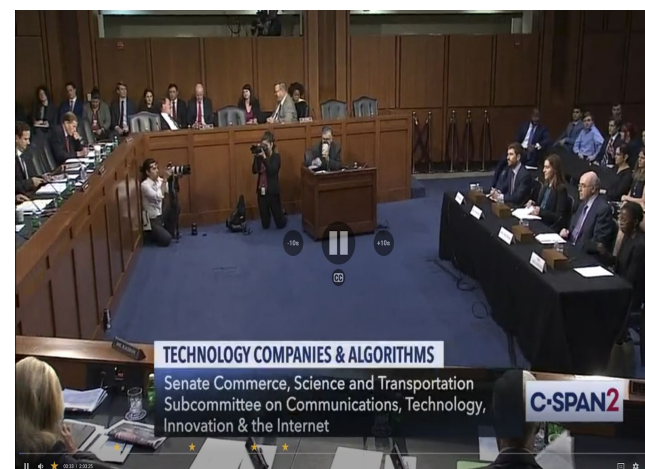

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### Objectives

- Simulate the impact of HodlPal towards accelerating the spread of credible information over non-credible information
- Test how much HodlPal can improve the digital health metrics of shared attention and variety of perspective using its Lens feature and credibility score
- Gain user feedback on platform design and improve UX

## Materials and Methods

### Simulation Setup

- Information diffusion in HodlPal and in a generic social platform were simulated
- Model system consists of a 10k-node social graph with 1-way follow relationships
- Scenario: non-credible information injected into 5 strongly-connected nodes
- Simulation code developed in Python using Linux-based tools and environments
- Based on Soil agent-based social network simulation framework
- Assumptions:
  - Power law distributions of node degrees in directed social graph [3, 4]
  - Power law probability of seeing information if shared [5, 6]
  - Exponential probability of sharing information if seen [7]
  - Reduction in $P_{see}$ of non-credible information by 2x using HodlPal trust system
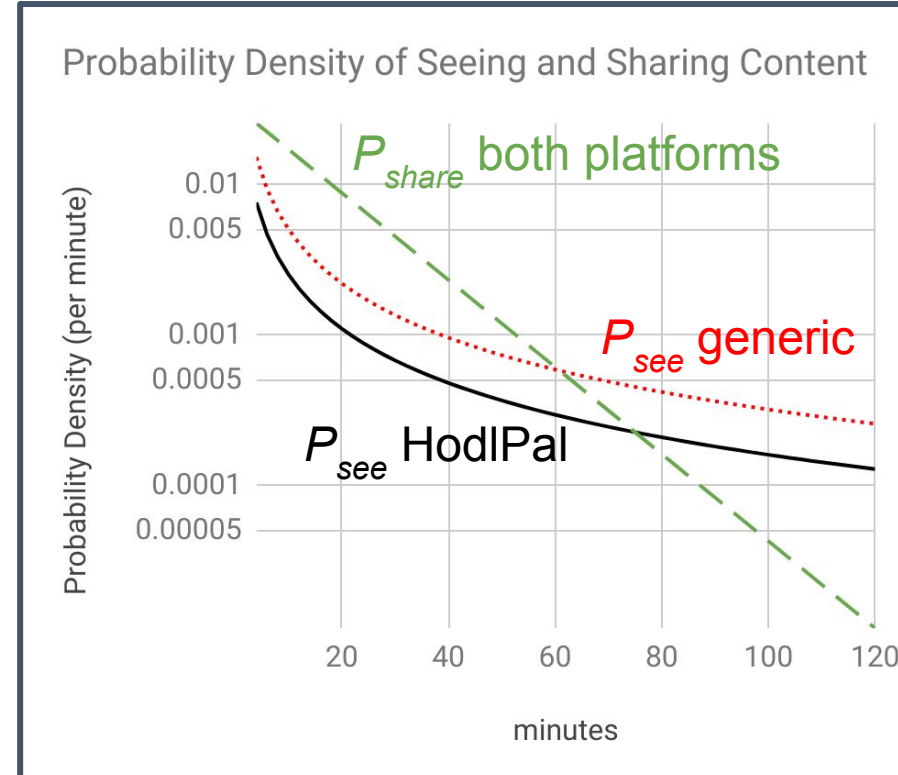
#### Multi-Agent Hidden Markov Model
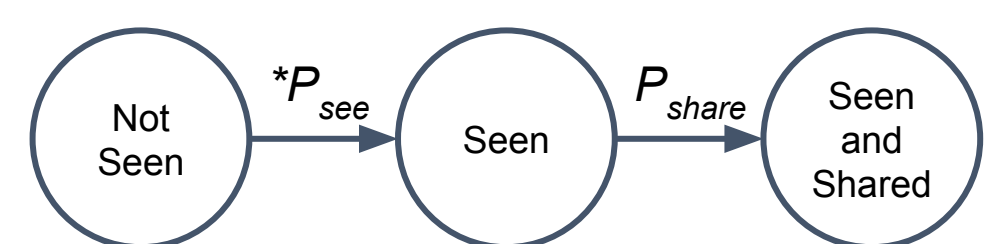


**Transition Probabilities**

- $a_j$ - agent in network
- $N_j$ - # of neighbors of $a_j$
- $t_j$ - time $a_j$ transitioned
- $\{A_j\}$ - agents sharing at $a_j$
- $a, B, C, \tau$ - constants

$$P_{see}(a_j, t) = C\,(t - t_j)^{-a}$$

$$P_{share}(a_j, t) = B\,exp(\frac{t - t_j}{\tau})$$

$$*P_{see}(a_j, t) = \frac{1}{N_j}\sum_{a_k \in \{A_j\}} P_{see}(a_k, t)$$


Probability Density of Seeing and Sharing Content

### 1:1 Interviews with Potential HodlPal Users

- Metrics for digital health were researched [8] and incorporated into design
- Proto.io was used to develop a prototype of the HodlPal UI on a mobile device
- UserInterviews.com was used to survey and screen 88 interviewees as potential power users of the HodlPal platform in as applied towards political discourse
- Screener Questions were designed to pick power users for civic engagement
- Interview Questions designed to test effectiveness of platform in addressing the metrics, including: variety of perspective, receptivity, awareness/self-awareness
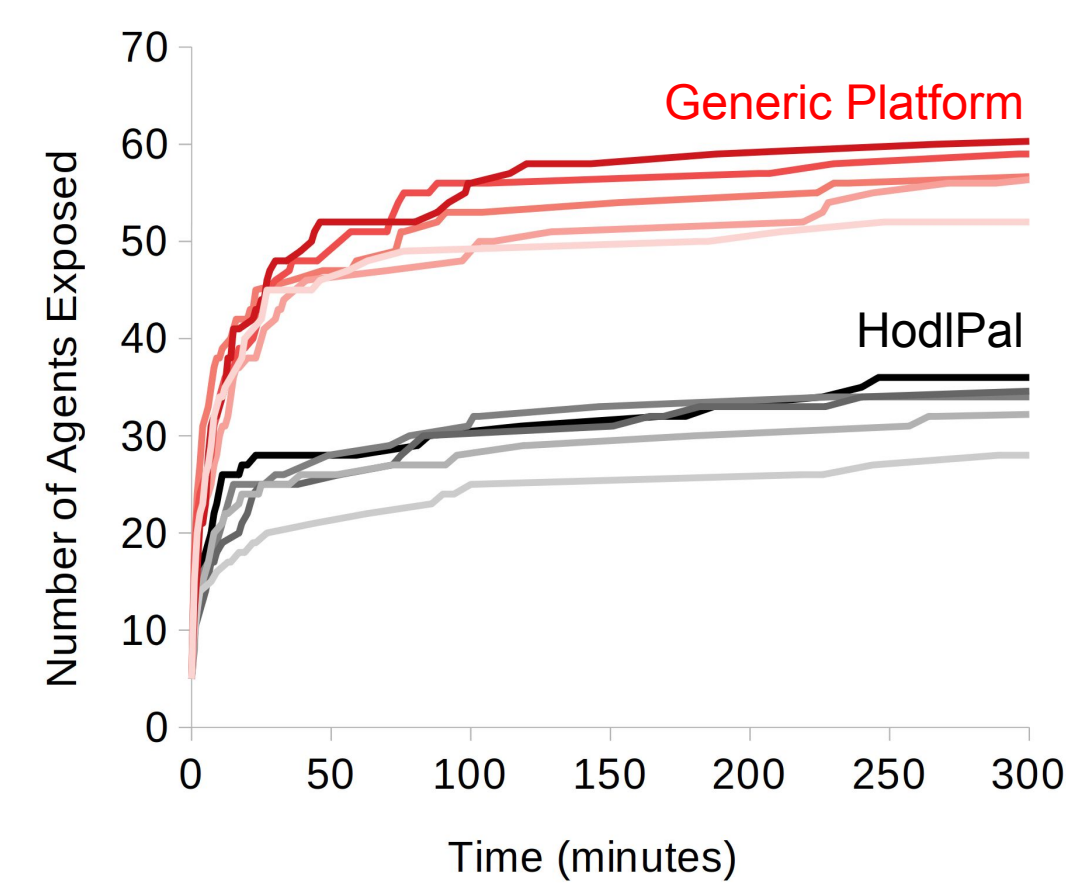- Six potential users were interviewed for 60 minutes each

## Results and Discussion

### 1k-Node Social Graph Subset



### Simulated Spread of Information
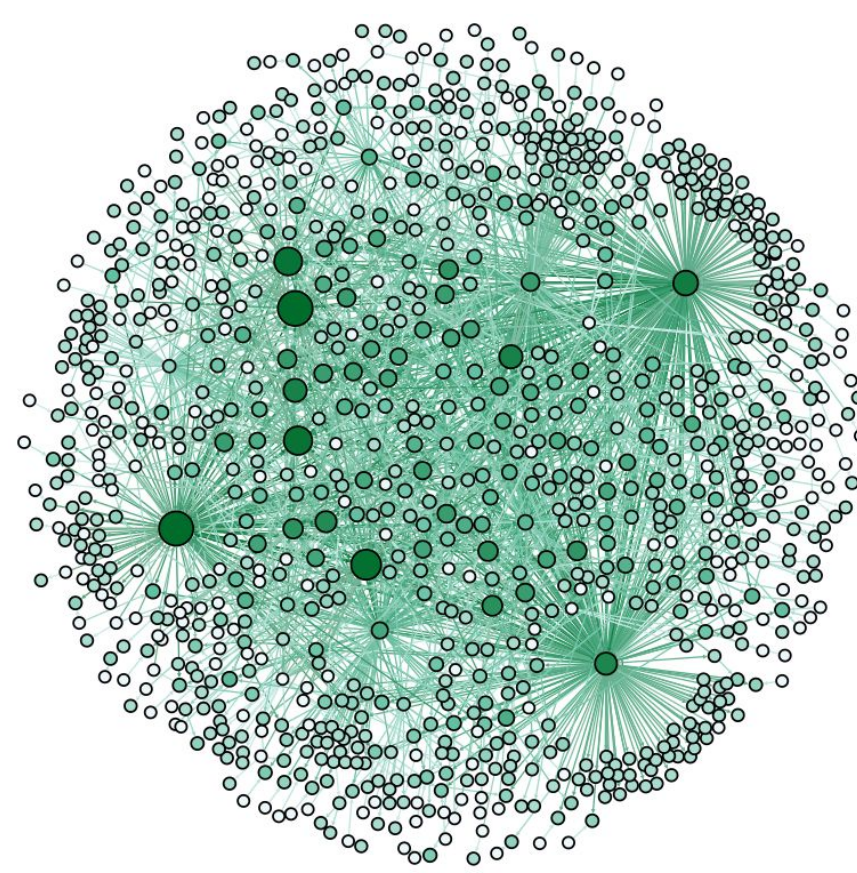


- Larger node sizes and darker shades = more followers
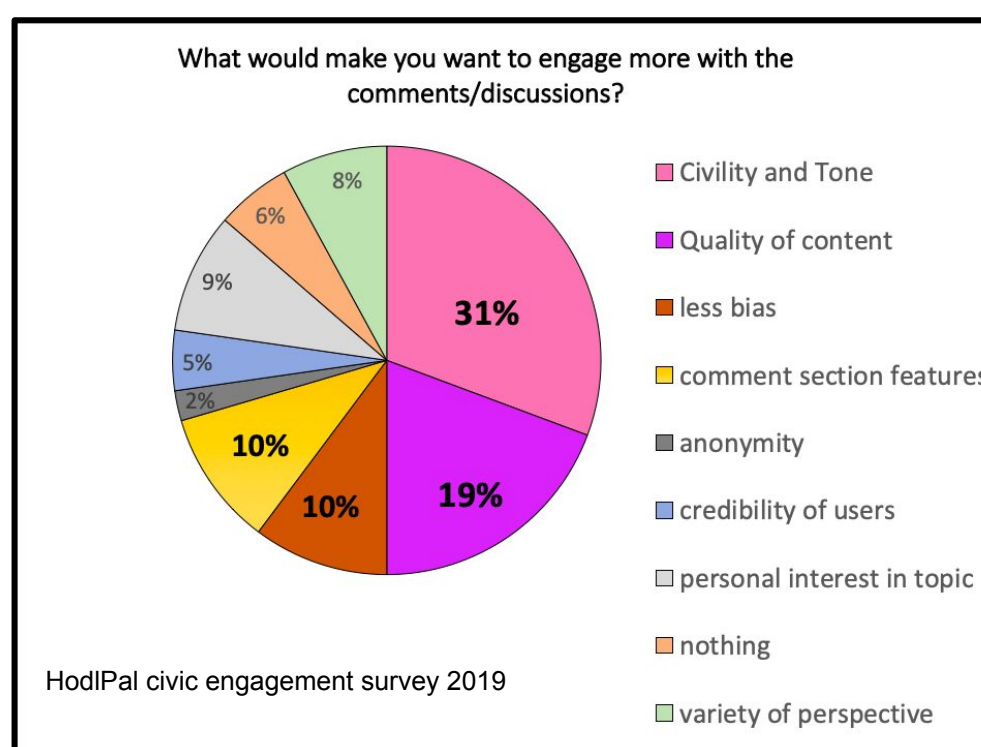- Strongly connected "influencer" nodes are clearly visible

- Stochastic response repeated 10x
- HodlPal suppresses the spread of assumed non-credible information (lower probability of being seen)

### Survey Data

- 47% of survey respondents are not satisfied with social media as an avenue for political news and are looking for a new platform
- 58% of survey respondents read, react or respond to comments online
- 70% of respondents found that political content they see online is at least somewhat biased
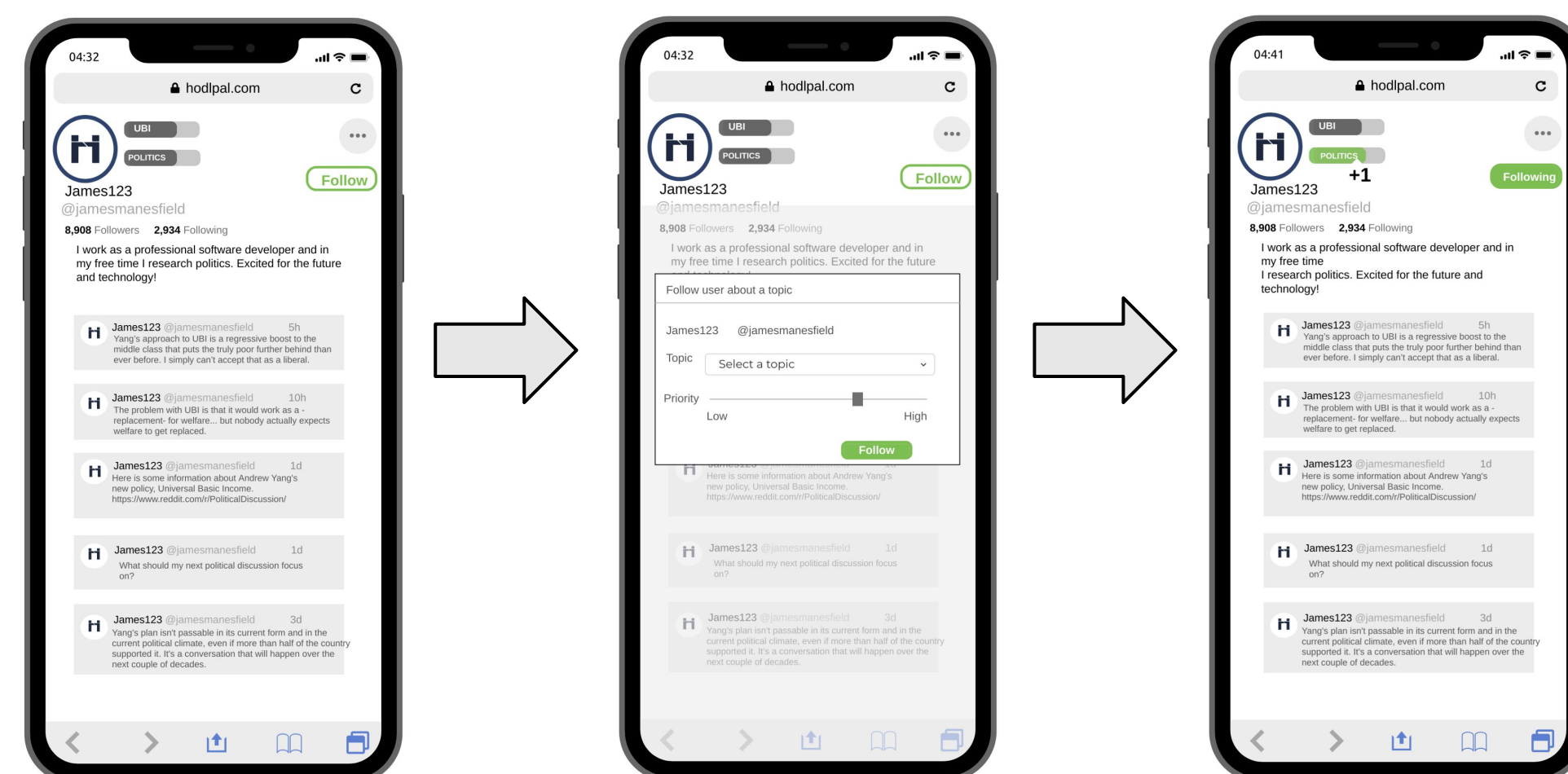
### Survey Findings

Users described experiences in existing platforms. Bias and issues with content in the comment sections gave users problems when engaging with political news. Users either avoid reading comments, commenting their own thoughts or they use multiple sources to compare views on topics.
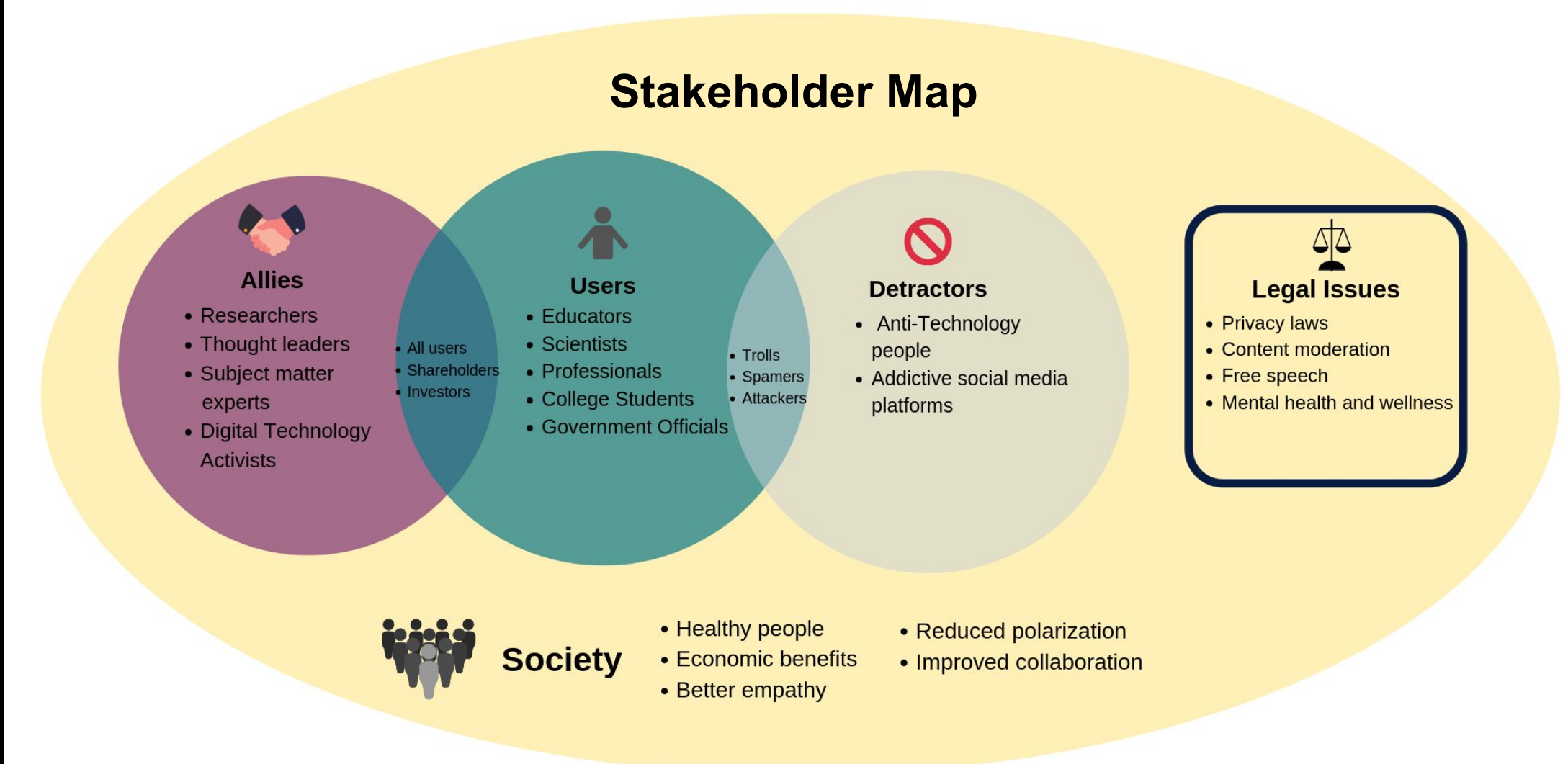

What would make you want to engage more with the comments/discussions?
- 31% Civility and Tone
- 19% Quality of content
- 10% less bias
- 10% comment section features
- 5% anonymity
- 9% credibility of users
- 6% personal interest in topic
- 8% nothing
- variety of perspective

HodlPal civic engagement survey 2019

### Prototype and Interview

Participants were led through the process of following a user on HodlPal by choosing a topic, setting a priority for that topic and seeing the effect on credibility score.



## Social Implications

### Stakeholder Map



**Allies**
- Researchers
- Thought leaders
- Subject matter experts
- Digital Technology Activists

**Users**
- Educators
- Scientists
- Professionals
- College Students
- Government Officials

All users, Shareholders, Investors

Trolls, Spammers, Attackers

**Detractors**
- Anti-Technology people
- Addictive social media platforms

**Legal Issues**
- Privacy laws
- Content moderation
- Free speech
- Mental health and wellness

**Society**
- Healthy people
- Economic benefits
- Better empathy
- Reduced polarization
- Improved collaboration

Through this research, Hodlpal aims to show that it can improve the quality of conversations online. The platform can reduce toxicity, promote the spread of accurate information, and help people circumvent misinformation. Promoting these practices enables people to mitigate the influence of filter bubbles, consequently boosting the potential for collective intelligence to arise on the platform.

## Conclusions

- Stochastic agent-based hidden markov simulation framework was developed
- Empirical data from literature provides a basis for probabilistic simulations
- Explicit separation of agent "see" vs. "share" events enable independent modeling of platform filtering processes vs. decisions made by users, highlighting intentionality
- Based on the survey we concluded that the quality of the news content and its comments have a significant impact on how a user engages with political news
- Interviewees responded positively to HodlPal's Credibility Score and Lens features, designed to provide diverse perspectives while engaging in meaningful conversations

## Future Work

- Add more layers of complexity to the simulation such as edge weights and chance of node creation/deletion, as well as improve existing model methods and parameters
- Gain up-to-date user feedback as additional features are altered or created
- Continue work to release a working test version of the platform

## Acknowledgements

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