ID8: A System for Open Innovation and Ideation

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***Abstract*—Feedback from users is an important component of an organization's ability to understand how to improve their processes and products. Online feedback platforms are a common tool used to gather information from users, but the design decisions made in these platforms have a large impact on how useful the platform is for the organization and for its users. This IQP, sponsored by WPI's User Experience and Decision Making (UXDM) lab, assessed the feasibility of implementing a centralized feedback system to aid ideation and collaboration in the WPI community. A review of existing industry feedback platforms was conducted to identify key features and design choices, as well as their impact on the usage of these platforms. Based on this review, the ID8 system was designed as an implementable framework for a future feedback system.**

***Index Terms*—User feedback platforms, user experience, design.**

I. Introduction

In order for businesses and organizations to optimize the quality of their processes and products, it is essential to collect feedback from customers, employees, and other users on what works well and what can be improved [1]. While data on the usability of software products can be collected even without the user's direct knowledge through automated usability testing methods [2], these methods provide limited insight into the user's thinking while using the software. They may not identify which components of the software the user enjoys interacting with, or which frustrate the user. Moreover, there is no way for these methods to discover new features or changes that the user would like to be added.

Some organizations address this issue by providing a simple feedback form where users may submit comments reporting problems or suggesting features or changes. However, these forms isolate the feedback into a single unit. The user is not informed as to whether the developer has seen, considered, or decided on the feedback. The user does not know how many others have said the same thing, and the developer can only find that out by manually analyzing feedback. These limitations restrict the ability of these forms to provide useful insights.

Instead, many organizations have turned to more comprehensive feedback platforms, such as forums where users can interact with others by sharing their input on a suggestion, creating opportunities for collaboration in coming to a solution [3]. These platforms may also feature a system for the organization in charge of the relevant product to provide their users with updates on the progress of requests, keeping the users engaged. As a result, these feedback platforms greatly expand the possibilities for an organization's engagement with its users, improving its ability to respond to their needs [4].

This more comprehensive interaction with users and customers supports the principles of open innovation [5] by strengthening the connection between organizations, their users, and the rest of the outside world. Feedback platforms encourage participation from users by sharing the organization's internal suggestions and by acknowledging suggestions from those users [6], which is beneficial as many innovations come from outside sources [7]. It is notable that the ideation stage is perhaps the best stage of the design process in which to solicit outside suggestions [8], because planning and implementing ideas is highly complicated and not all suggested ideas will be practical to implement. However, involving users in other stages of the design process may provide analogous benefits as it does in ideation.

This paper will be organized as follows: In Section II we will discuss the background surrounding the subject, including discussing the existing software we referenced and their defining features. In Section III we discuss the specific details of ID8's design and the justification that led to them. In Section IV we will discuss necessary future work that must be done before ID8 is actualized. Finally, in Section V we will provide our conclusions about the process of designing ID8 and what we expect out of the system.

II. Background

Numerous feedback systems are in use within corporate, academic, and government industries [3]. These systems vary in development, such as being produced by the organization itself to fit its particular use-case, while others have been developed by third-parties and offered to other organizations as a service. The design decisions of each platform affect how users interact with the platform, therefore it is important for these choices to fit the company's intended use for the platform. To consider these factors, an assessment of design decisions for six major feedback or discussion platforms was performed.

Three corporate feedback forums (LEGO Ideas, Microsoft Feedback, and UserVoice Feedback) were chosen because they are run or used by large corporations to receive input from their customers. LEGO Ideas, run by The LEGO Group, is used by customers to present their ideas for new LEGO building block sets. If an idea receives enough interest from other users, it is assessed further by the company in consideration for being made into a real product. Microsoft Feedback is a platform created by the multinational technology company for its customers to request changes to or new features on its product range. UserVoice is a Software-as-a-Service company that produces customer engagement tools. UserVoice Feedback, a forum, is offered as a paid service to other companies who use it to collect feedback from their customers. UserVoice Feedback's usage and configuration varies by client company, but the general features supported by the platform are consistent. A UserVoice Feedback instance of a client customer was chosen to observe by viewing UserVoice's "Customers" page and finding a customer whose instance is publicly available to view.

Additionally, three major social media or discussion platforms (Reddit, Stack Exchange, and GitHub Issues) were selected. While these are not all directly focused on feedback, they are popular platforms with features designed to support complex and/or focused discussions. Reddit is a social media website where users participate in communities called "subreddits", each of which are dedicated to a particular topic or subject. Reddit is used primarily as a casual website for discussion and news aggregation, but communities have appeared dedicated to particular companies or products, which

some organizations participate in directly and actively observe for user feedback. Stack Exchange is a network of Question & Answer websites with separate websites dedicated to different topics. Stack Exchange features a complex set of design choices designed to enforce high-quality answers and discussion. GitHub Issues is a platform used by software developers to receive reports of issues and requested features for open-source software. This is in order to discuss implementation of those features with a community of developers and project followers, as well as to share development progress in fixing issues.

Each platform was assessed to understand its user experience. Common features shared by most or all of the platforms were identified, then this list was filtered down to features that play a significant role in how discussion occurs on the platform: The role of official participants; enforcement of deadlines/timelines; use of categories/subjects; use of voting systems; and options for replying to comments. The choices made for these key features and how they affect usage will be discussed for each platform in this section.

A. Official Participation

The input of members associated with the organization that feedback is directed at (typically current or former staff members) plays a unique role in discussion about features or products that users would like added or changed, because they have access to internal information that may inform what is possible to implement, and they can filter feedback to the group(s) at the organization who have the ability to make changes. As such, feedback platforms treat official participants differently.

In LEGO Ideas, official comments are displayed entirely separately from community comments. This prevents discussion between community members and officials on the design, which may reflect LEGO's preference to primarily use their staff for refining and finalizing the design. Other platforms combine all comments. Some, including Microsoft Feedback and UserVoice, distinguish official comments from unofficial comments by displaying the official user's role at the company, which makes the platform better suited for corporate use by ensuring that customers know that the company has seen the feedback and is considering it. GitHub Issues, despite having a clear official group in the project's organizers, does not automatically display official members differently from anyone else. This supports detailed collaboration between all members in coming to a solution to the problem by not privileging the input of any particular user over another, representing a more level playing field.

B. Timelines

The time required to answer a customer's question or add a feature that a customer requests can vary substantially. Feedback platforms sometimes implement controls to ensure that posts remain active and continue moving forward towards a resolution. Depending on the purpose of the platform, different controls and different timelines of required activity are optimal. Too loose of a timeline will result in feedback not being addressed fast enough or the platform being cluttered by posts that have been abandoned, while excessively stringent restrictions will stifle discussion of complex feedback that requires time and effort to address.

Deadlines are a key component of the LEGO Ideas platform, with newly-posted Ideas receiving a limited amount of days to gather supporters and the days remaining prominently displayed. Ideas can receive generous extensions (hundreds of days) if they meet engagement metrics within set periods of time, but if they fail to meet these requirements they will expire and be closed. This system allows The LEGO Group to determine which Ideas have the most interest and would be most likely to succeed as a product, but is not designed to support the creator working directly with LEGO to refine the design. Some Reddit communities will automatically lock posts after a set period of time, with no way to extend this time. This system firmly sets the standard that discussion on posts is not meant to be continued for a long time. Many organizations on GitHub Issues will use bot accounts to post reminders on inactive posts, notifying that if they remain inactive the post will be locked. This strikes a balance between preventing old posts from cluttering the system, while still permitting feedback about things that will take months or years to implement.

Other platforms, such as Microsoft Feedback and UserVoice, do not have clear deadlines for how long posts may stay active. UserVoice may be configurable to add this feature for the client company if desired. These platforms sometimes exhibit posts that have been present for years, and often users continue to comment on them, voicing their support for the change or feature for the entire lifetime of the post. When it comes to changes on large, complex products, this timeline is often necessary because it takes the organization a long time to design, implement, test, and release changes. A delay of two years from a user's request being posted to the request being closed as "completed" is not unheard of. If the post were locked before this, it would give the user the impression that it is being ignored. However, this choice may also result in old posts continuing to be cluttered by comments not contributing any useful input. Additionally, if the suggestion being made is time-sensitive, a request may remain alive for long after it has become practically obsolete. Therefore, the intended subject matter of the feedback platform informs what level of strictness on and enforcement of timelines is necessary.

C. Categories/Subjects

Once a feedback platform covers a broad enough range of topics, a system to categorize posts and direct them at particular subjects becomes essential. In our assessment, two common systems of "bucketing" were observed. Most platforms have a system with a set of predefined buckets, where the user is permitted to select only one for their post. This system was most often referred to as choosing "categories." Some platforms have a different system, where the organization or the users define a set of buckets as the platform is used, and the user is permitted to choose zero, one, or more buckets for their post. This system was most often referred to as choosing

"tags" for the post. Platforms may have both a category and a tag system simultaneously. Note that not all platforms refer to these systems using the same terms, which changes how the user interprets the semantic meaning of the choices.

Most corporate feedback platforms use a category system, with the categories identifying either the company's product or the type of problem/task (e.g. Financials, Account Settings, New Features, etc.) that the feedback is related to. This method, used by Microsoft Feedback and UserVoice, limits the depth with which a user can direct their post. However, this also makes it simple for the company to direct the post towards the appropriate department or team to be addressed.

Stack Exchange uses both categories and tags: Each Exchange website is dedicated to a broad category, while tags identify the products, technologies, or other concepts that the particular question is related to. LEGO Ideas also uses both categories and tags, but its categories are presented with a different semantic meaning—titled "Themes"—allowing users to browse for designs based on their favorite concepts. The combination of both categories and tags allows detailed organization of posts, and permits other users more flexibility in finding posts that are relevant to them.

D. Voting

Many feedback platforms allow users to respond to posts through a simple voting system, rather than exclusively requiring users to write comments. This may be to mark posts that they agree with or feel are relevant to them, or it may be to mark ideas that they believe were described poorly or should not be implemented.

If a platform includes just one option to vote on a post (a unary voting system), it typically represents supporting or agreeing with the post's content. This system is used by all of the corporate feedback forums mentioned earlier (LEGO Ideas, Microsoft Feedback, and UserVoice). By contrast, GitHub Issues has no voting system at all. GitHub Issues may have chosen to omit this feature because it is focused on contribution to actively-developed projects: Every suggestion or issue should be evaluated manually, as even knowing that others have experienced a given problem as well is not enough without knowing how their situation matches or differs from others'. For feedback platforms where the organization merely wants to become aware of a request—so they can design and implement the solution themselves—the detailed information from every user who agrees is not as important, so a simple voting system provides most of the needed information.

Some feedback platforms include an additional, opposing vote option (a binary voting system), often representing a statement that the post did not describe its content well or disagreement with the suggestion of the post [9]. Reddit and Stack Exchange both feature this option, and both calculate a "net" score based on the votes for each post, which is displayed to other users. The net score is also used to prioritize posts with high net scores and de-emphasize or hide posts with low net scores.

This option adds an additional layer of complexity to a user's interaction, and the semantic meaning of the negative vote is important to how it is used. Reddit states that downvotes should be used if the post "does not contribute to the subreddit it is posted in or is off-topic in a particular community" [10]. On Stack Exchange, downvotes are meant to be used if the post is low-quality or deemed "low-effort" [11]. Additionally, on "meta" platforms, which discuss the functioning of Stack Exchange websites rather than the topics the websites are focused on, the votes have an additional purpose for Feature Request posts: To represent agreeing or disagreeing with the suggestion. However, not all users use the voting buttons in line with their intended purposes, [9], [12] which can harm the effectiveness of the platform because it assumes the user felt one way about the post and prioritizes it accordingly, while the user actually meant something different. Enforcing proper use of the voting system is a major challenge, but the use of a unary system reduces the difficulty by significantly reducing opportunities for misuse. Additionally, some argue that a downvote does not provide value because it does not require the user to respond explaining why they disagree [13].

Platforms may also support voting on comments responding to a post. This allows users to make the same judgements of other comments as they could on the overall post without having to write an additional comment detailing their response. As with voting on posts, users can indicate whether they agree or disagree with an expressed opinion or can make a judgement on the quality of the comment. This feature supports deeper discussion in the comment section. Intuitively, it should support higher quality discussion by allowing high-quality comments to be emphasized and low-quality comments to be hidden, though the votes a comment has received are not always found to be a reliable indicator of comment quality [14].

Of the observed platforms, three feature a comment voting system. LEGO Ideas and Stack Exchange [15] use a unary voting system with only positive votes, while Reddit uses the same binary voting system as for posts with a positive "upvote" and a negative "downvote". Based on our assessment, these three platforms represent a spectrum of how complex discussions in the comments could get: LEGO Ideas comments exhibited only simple discussions; Stack Exchange comments could exhibit moderately complex discussions, particularly when a comment critiqued a detail of an answer; while Reddit comments frequently supported long and highly complex discussions, with deep discussion through comments being the core focus of some subreddits. While one could conclude that binary comment voting as on Reddit allows for the discussion to be more detailed [16], there are many other aspects of these platforms that may also affect the level of discussion that occurs in comments.

The depth of comment discussion on platforms with comment voting can also be compared to those that do not have this feature. Our assessment found that the three comment voting platforms each had equal or higher levels of discussion complexity than Microsoft Feedback and UserVoice, neither of which have comment voting. GitHub Issues, however, frequently experiences highly complex and detailed discussions in its comments, comparable to or greater than that of Reddit. This may be explained by GitHub Issues being

populated by developers and users who take an active role in the development of the product in question, thus having a motivation to converse in great detail. This lends evidence to the idea that platforms can encourage or discourage discussion in many ways, comment voting being just one of those options.

E. Replies

Most feedback platforms support comments from unofficial users responding to a post, as it is important to receive input on how changes should be made from as many users as possible. However, there is significant difference in the complexity of discussion between unofficial users that feedback platforms allow and encourage via their design choices.

All observed feedback platforms support commenting on a post, allowing users to provide their own input. For example, a user may explain how a suggested change would help them, or critique an aspect of the suggested change and give ideas on how it could be improved. To support more complex discussion, some platforms allow a comment to reply to another, displaying this relationship in the user interface and making it clear that the new comment is intended to respond directly to the content of the original. This can make it easier for readers to follow a response that agrees with or refutes a particular point. Microsoft Feedback, UserVoice, and Stack Exchange do not allow comments to reply to others, which discourages discussion from drifting away from the post's original topic.

The platforms with reply functionality are distinguished from each other by how deep they allow replies to nest. Nesting refers to a comment being able to reply to another comment, which may in turn a reply to another and so on. Nesting aids intuitively following complicated discussions with multiple trains of thought being discussed at once, but also increases the complexity of the user interface. LEGO Ideas and Reddit both support indefinite levels of nesting. Due to the long discussions that can occur, Reddit frequently experiences deep nesting chains where the interface struggles to display all of the levels of nesting. An example of this phenomenon is illustrated in Figure 1.

Even in platforms that do not have comment Reply functionality, reply behavior is sometimes observed. Users typically perform this "pseudo-reply" by starting their comment with the name of the user they are responding to, and then continuing to the content of their response, as seen in Figure 2. While this behavior suggests that there is desire for a reply system, the lack of a full system for it still succeeds in limiting reply behavior as these pseudo-reply chains rarely continue past a few messages.

III. Design

Analyzing existing industry feedback platforms reveals that many design choices affect their usage significantly. As such, it is important to consider the goal of the platform when designing a new system. Without synergy between the purpose of the platform and the impacts of the design choices, the product may not support intended discussion as best it could.

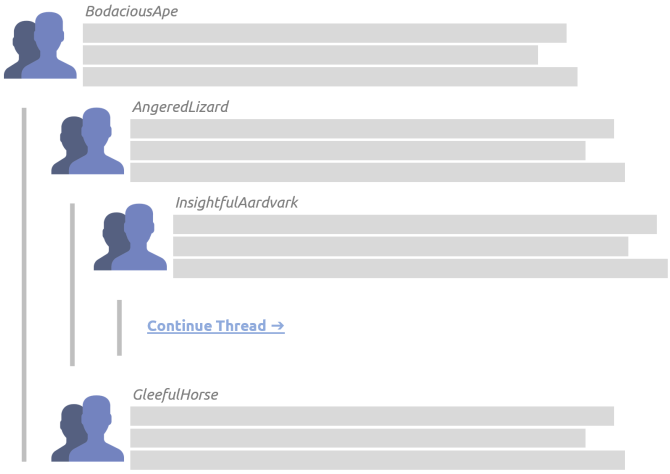

Fig. 1: A mockup of a scenario with deep comment nesting. The comments nest too far for the interface to display, requiring an interface element that will show the user the deeper nested comments individually.

Fig. 2: A mockup of a pseudo-reply scenario: User 3 is responding to User 1 and indicates this by starting their comment with User 1's name.

ID8 is first and foremost a platform for organizations at WPI to receive feedback from the community, but it is intended to be one that allows as deep and complex of a dialogue between the two parties as possible. Many corporate feedback platforms are not designed to encourage users to collaborate with staff members on arriving at a solution, so it was important for ID8's design to avoid the choices that limit such interaction.

A. Ideas & Solutions

The primary focus of ID8 centers around the concepts of Ideas and Solutions. Ideas and Solutions refer to the two different types of posts that users can make on the platform: Ideas are posts which propose potential problems or ideas in need of consideration by an organization. Ideas can be directed at a particular department within the organization or be more general thoughts desiring public feedback. By contrast, Solutions refer to posts that propose potential solutions to certain problems. The problems associated with a Solution may or may not be part of existing Ideas. Further, one Solution may be associated with multiple Ideas, and an Idea may be associated with multiple Solutions.

To explain how Ideas and Solutions work in practice, consider the following example: User A posts an Idea highlighting an issue within the department they work in. User B, who works in a different department, posts a Solution linked to User A's Idea which explains how User B's department handles the same problem. Simultaneously, more users may come in and propose their own, separate solutions to the problem. This allows for one Idea to receive large amounts of feedback, making it more likely to find a viable solution to the problem.

To describe how a Solution can be associated with multiple Ideas, consider another example: Users A and B post two separate Ideas, both of which focus on how communications are handled within their respective departments, likely with slight differences (hence not being the same Idea). A third user, User C, posts a Solution in response to User A's Idea, after which they realize that it also applies to User B's Idea. User C can link their Solution to both Ideas so both Users A and B see User C's proposed solution to their problem.

This bi-directional system for the posting and association of Ideas and Solutions is expected to be greatly beneficial toward the ideation of new concepts and solutions to practical problems.

B. Comments

Similar to other forum-like platforms, we felt it was important to add commenting as a feature of our design. Comments allow users to add on to, clarify, ask questions about, or otherwise collaborate on existing Ideas and Solutions. In contrast to Ideas and Solutions, which can each link to an arbitrary number of the other, each Comment is exclusively linked to one Idea or Solution. This is done so that users can specifically reply to certain Ideas or Solutions and give their personal input on the subject. Note that our design does not support comment nesting as described in Section II-E. This allows us to take an exclusively lateral approach to commenting, similar to how Stack Exchange handles comments, as opposed to the hierarchical approach utilized by Reddit. This is intended to assist in ensuring that the comment conversations on an Idea or Solution are more likely to stay on topic. That said, the validity of this choice is somewhat of an open question in need of future research (see Section IV-D).

C. Voting

Voting is a central system in many forum-like platforms. All of the platforms we looked at (see Section II) make use of some sort of voting system to indicate helpfulness, agreement, support, or approval with respect to user-generated content. The use of votes in all forms allows for a number of benefits, namely (a) an easy way to display user sentiment, (b) a simple way to sort posts to find well-supported Ideas and Solutions, and (c) a strong means of identifying concepts deserving official consideration. We designed ID8 such that users can vote on Ideas, Solutions, and Comments (for implementation details, see Section III-E5). We chose a unary voting system with only positive/agreement votes, akin to how LEGO Ideas, UserVoice, and Microsoft Feedback handle voting, as this allows us to better identify sentiment and engagement on user posts. This differs from the binary voting system of Reddit and Stack Exchange, which allows users to express disapproval or disagreement with a post. We decided not to allow this, as we believe it is important on this platform that users who disagree post a response describing their concerns, and a negative vote does not encourage that comment. However, this is not definitive and could use further research (see Section IV-I).

D. Anonymity

Anonymity is a common feature among forum-like platforms and social feedback systems, providing tangible benefits to users and the platform: Anonymity encourages users to look at posts holistically, independent of the poster's identity; it reduces the mental barrier to participation for users that may be concerned about associating online content with their identity; and it makes it easier to discuss more sensitive, but very critical topics which users may not want to be publicly involved in. That said, there are also benefits to not utilizing anonymity, namely giving explicit credibility to users making posts relevant to their domain of expertise; being able to associate potentially problematic content with real users for safety or moderation purposes (see Sections III-E4 and IV-G); and encouraging users to only post content which they are comfortable and confident enough with to associate their identity with.

In order to get the best of both worlds with respect to the benefits of anonymity, we designed ID8 such that the level of anonymity can be specified on a per-post basis. Specifically, when a user posts a new Idea or Solution, they can select an Anonymity Level which will be enforced on all Comments on the post (as well as on the initial Idea or Solution). To this end, we propose three anonymity levels:

1) **Level 0:** No Anonymity. Users' names and Roles (see Section III-G) are visible.
2) **Level 1:** Name Anonymity. Users' names are replaced by automatically generated pseudonyms, but Roles are still visible.
3) **Level 2:** Full Anonymity. Users' names are obfuscated behind automatically generated pseudonyms and Roles are omitted entirely.

These Anonymity Levels are also illustrated in Figure 3. Note that the generated pseudonyms (used in Levels 1 and 2) are directly associated with an Idea or Solution, such that every Comment a user makes on a post will display the same pseudonym in place of their name. This is done so that users can identify which comments on a post are made be the same person. For example, suppose we have Users A and B: User A comments on an Idea which is using Anonymity Level 1, all of User A's comments will share the same pseudonym. If User B comments on the same Idea, they will receive a different pseudonym from User A, but their pseudonym will be shared across all of their comments on the Idea. If User A were to then comment on a different Idea or Solution using Anonymity Level 1 or 2, they will be given a new pseudonym only for use on that post. For more information about the back-end mechanism that makes this work, see Section III-E4.

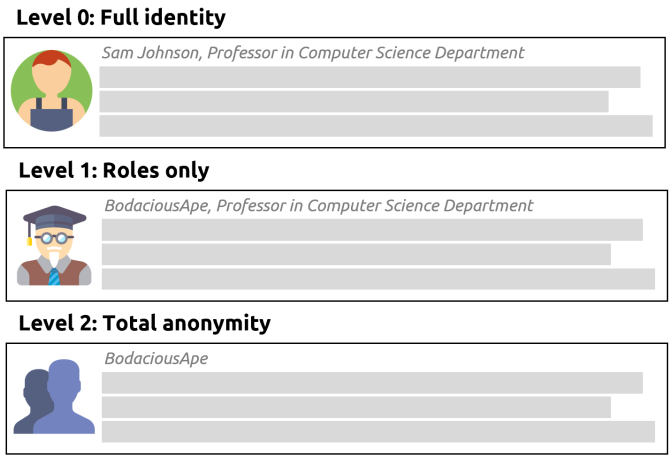

Fig. 3: An example post at each level of anonymity. At Level 0, the user's identity is fully revealed. At Level 1, the user's name is replaced with a pseudonym, but their role at WPI is still displayed. At Level 2, their role is hidden and their name is replaced with a pseudonym.

E. Database Schema

The database schema for ID8 was designed to be scalable and simple to adjust in the event of future changes. An Entity Relationship Diagram describing the schema is visible in Figure 4.

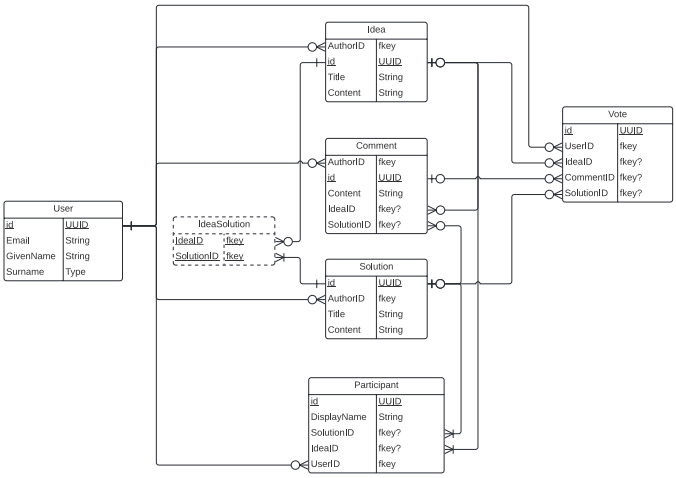

Fig. 4: Entity Relationship Diagram

1) User: The User table will store information regarding each user of the platform. As of right now the only information we will have stored here would be the user's email, their given name, and their surname. Because this system will integrate with WPI systems for authentication using Passport.js and SAML2, we do not need to personally manage storing login information. This also means that we can dynamically update the user's listed given name and surname whenever they log in. Note that each User will also have Roles associated with them, indicating the department(s) a user works in and potentially their position(s) in that department (see Section III-G).

2) Idea & Solution: The Idea and Solution tables will store information regarding a specific Idea or Solution post, respectively. They will have title and content fields as necessary, as well as a reference to the original author of the post so that we can easily query a given user's Ideas or Solutions. Because multiple Solutions may be associated with a particular Idea and vice-versa, the relationship between Ideas and Solutions is managed using the IdeaSolution table, each entry in which will only contain the ID of an Idea and the ID of a Solution. Note that it is technically currently possible to combine the two tables, using an additional boolean field to distinguish whether the entry represents an Idea or a Solution. However, we decided separating them was more advantageous: By separating the tables it is easier to adjust the schema if changes are made to ID8's design.

3) Comment: The Comment table stores information about comments on Ideas and Solutions. At this stage, it does not make sense to distinguish Comments on Ideas from Comments on Solutions, as the behavior is identical in either case and we do not foresee any features specific to either situation that would affect the schema. Note that a comment cannot link to both an Idea and a Solution simultaneously. While not specified in the schema beyond allowing the foreign keys to be null, this must be handled either in SQL or in the business logic of ID8.

4) Participant: The Participant table stores the information associating how to display information about a particular user with respect to a given Idea or Solution. This will include a reference to the associated user, a pseudonym for that user, and a reference to the Idea or Solution on which to use that pseudonym. This will allow us to dynamically manage anonymity on a per-Idea/Solution basis (see Section III-D). The generation of pseudonyms and enforcement of Anonymity Levels can be handled either using SQL procedures or via ID8's business logic.

5) Vote: The Vote table records whether a particular user has voted on an Idea, Solution, or Comment. This is managed simply by the presence of an entry in the table denoting a vote. This makes querying the number of votes on a post or if a particular user has voted on a post trivial. Note that, if desired, enabling a binary voting system with negative-sentiment votes would be as simple as adding an additional boolean field denoting if the vote is positive or negative.

F. Subjects & Tags

An important feature of many of the platforms we analyzed is the use of subject and tagging systems (see Section II-C). The primary example of this is Stack Exchange, which makes use of curated subjects to organize posts by their broader topic, such as Mathematics, Academia, English Language & Usage, and most notably Stack Overflow for programming, among others, as well as a tagging system to improve search engine optimization (SEO).

1) Subjects: Subjects make it easy to find posts related to topics of specific interest to a given user, and allow for dedicated subscriptions so users can explicitly be notified about and follow topics of their choice. With ID8 we specifically intend for subjects to refer to departments within an organization. When creating a new Idea or Solution, a user

can pick from a curated set of Subjects to apply to their post to categorize it. This allows for Ideas and/or Solutions to be directed at specific departments of an organization to which they are relevant. This also means that we can potentially leverage Roles to manage dynamically and automatically subscribing users to certain topics so they can more easily see posts that are relevant to them (see Sections III-G and IV-E).

2) Tags: Similarly to Subjects, Tags provide a simple means of improving users' abilities to find relevant posts. While Subjects are curated and managed by the organization operating ID8, Tags can be created at will by users. This enables an additional layer of granularity in categorization. Specifically, when a user creates a new Idea or Solution, they can add Tags to the post, selecting from Tags that already exist or creating entirely new ones. This provides two important benefits: (a) crowdsourcing of categorization, as administrators cannot be fully aware of all the relevant categorization options users may desire; and (b) improved SEO as Tags can be utilized to promote posts which are relevant to user search queries [17]–[19].

3) Subscriptions: Users may wish to receive automated notifications when an Idea or Solution is posted on a topic that they are interested in. Subjects and Tags enable an easy method for implementing this: The user may subscribe to a particular Subject or Tag, after which the system will notify them when an Idea or Solution with that Subject or Tag is posted. For example, an employee that works in food catering may be interested in seeing posts relating to food catering. As such, the employee can subscribe to the "Catering" Subject, as well as Tags like "Food", "Eating", or "Lunch". This will result in the employee receiving notifications (likely emails) when new posts are made using the relevant Subject or Tags. Additionally, using integration with Roles, a user may be automatically subscribed to certain Subjects based on the department(s) they work in (see Sections III-G and IV-E).

G. Roles

Roles are an important feature of many support and/or feedback platforms. More often than not, roles are limited to labeling certain users as official staff of an organization, giving them authority on the platform. Because ID8 would be used throughout an organization internally, we altered this idea to manage and display each user's department and/or position. By displaying the department that a user works in, we are able to provide a degree of social authority to those users on posts that directly pertain to their department or relevant Subjects. This can also allow for filtering posts by the position of the creators. For example, in the case of an academic institution like WPI using ID8, a user may filter the Ideas they look at based on if they were posted by students in order to specifically see what students on campus want.

H. Internal Systems Interfacing

When designing ID8, it was important to interface with existing internal systems to minimize unneeded complexity, prevent potential security vulnerabilities, and leverage information already managed by other systems. As a primary example, for account authentication we made use of the Passport.js library using the SAML2 authentication strategy to manage user log-ins and verification. Because WPI uses Microsoft Azure for the vast majority of its systems, we can make use of Passport.js and SAML2 to offload account authentication from ID8 to WPI's existing account infrastructure. This provides improved security due to not needing to implement and manage a dedicated authentication system; automatic updating of account information like names and emails, as account details are given to ID8 by Microsoft on authentication; and improved user experience due to the ability to use single sign-on (SSO). SSO allows users to log in once with their WPI credentials on any WPI system, after which they will be automatically authenticated and logged in whenever they open another WPI service.

Additionally, ID8 was designed to use WPI systems for dynamic management of user Roles and interests. For example, if a user is a member of a specific department, ID8 can communicate with internal systems like Workday to retrieve their department(s) and position(s) and automatically add that information as necessary (see Sections III-E1 and III-G).

IV. Future Work

While much of ID8's design has been finalized, we also identified a number of questions and concerns that need significant consideration before the system is to be implemented in full. Many of these questions require testing to identify the impact of various design decisions, while others require that further thought be put into how certain features are designed. While ideally we would have considered these questions as part of our initial design, we found that we unfortunately did not have the necessary resources or expertise to do so.

A. Anonymity Options

As described in Section III-D, ID8 will make use of selectable Anonymity Levels which vary how much user information will be displayed on a given Idea or Solution. While we believe offering multiple levels of anonymity provides the best possible compromise with regards to the benefits and drawbacks of anonymity on public forums and feedback platforms, this is ultimately an assumption in need of additional investigation.

1) User Engagement: It is possible that varying levels of anonymity may have a direct, tangible impact on user engagement. For example, it is generally accepted that anonymity induces greater user engagement due to decreased barrier for entry [20]–[22]. As a result, allowing for users to disable anonymity on some posts may actually be counterproductive towards receiving high-quality, engaged responses and feedback. As such, it may be beneficial to remove non-anonymous options (i.e. Anonymity Level 0) from ID8 in order to avoid unintentionally compromising engagement.

2) Usage Disparities: In a similar vein to concerns about user engagement expressed in Section IV-A1, it may be the case that users will significantly prefer higher levels of anonymity, making providing options for decreased anonymity irrelevant. In general, users prefer to make use of some form of anonymity or other identity obfuscation whenever possible

[23]. This being the case, it may turn out in practice that the vast majority of users will never opt to use lower Anonymity Levels in the first place. While on its own this does not inherently warrant explicit action to change ID8's design, it brings into question how future implementers of ID8 may want to approach Anonymity Levels.

3) Overchoice/Analysis Paralysis: A common problem faced by users when given a number of options for products or features is that of Overchoice and Analysis Paralysis. In simple terms, these concepts refer to mental states where people delay decision-making or become completely unable to make a decision due to an excess of options or difficulty assessing the merits of different options to reach an optimal decision [24]–[26]. By offering several different options for anonymity, we run the risk of "paralyzing" some users as a result of them being unable to decide which option is optimal for their purposes. Simultaneously, with the relative simplicity of the design, it may be the case that sufficient labeling and explanation of anonymity options will make the effects of Overchoice and Analysis Paralysis negligible.

B. Visual Design

With a system like ID8, the visual design and user interface (UI) is a critical component. This is particularly notable as the UI and visual elements of digital software is critically important toward the semantics of how a system is used, as well as its effectiveness. As part of our initial experimentation and brainstorming we made a handful of UI mockups (available in Appendix B) to assist in picturing how ID8 should operate. However, as the underlying system itself was the primary focus of our work, rather than the visual aspects, we did not finalize the visual design aspects of ID8. Future work on ID8 should more deeply consider the UI and examine how different visual elements and design choices may impact usage.

C. Managing Solution–Idea Linking

A notable concern about the Idea and Solution system we devised is the quality of connections between Ideas and Solutions. Because Solutions can be arbitrarily associated with as many Ideas as a user wants—and may be added to more Ideas after the fact—the quality of these associations will be a matter of contention. While a Solution may address one linked Idea extremely well, it is possible that the same Solution will be a very poor response toward another Idea it is associated with. This introduces a number of design-problems that need consideration: How do we go about rating and moderating the associations between Ideas and Solutions? How do we prevent overzealous linking (i.e. users associating a Solution with more Ideas than are relevant or vice-versa)? How do we mitigate bad associations having an adverse effect on voting? This particular subject will require significant thought and experimentation before ID8 is realized and implemented in full.

D. Comment Nesting

A defining feature of Reddit, one of the platforms we referenced when designing ID8, is that of comment nesting. The ability for a comment to reply directly to another allows for multiple threads of conversation to happen simultaneously. For the current iteration of ID8 we opted not to allow for comment nesting. Firstly, we believe it may result in conversations trending off-topic from the subject of the original Idea or Solution: Conversation threading via comment nesting allows for infinitely many parallel conversations to occur, many of which will not be relevant to the original Idea or Solution that the comments are posted on. By contrast, having exclusively lateral comments encourages conversations to self-correct and remain on topic. Secondly, comment nesting would undermine the existence of Solutions and make their use confusing: The benefit provided by having Solutions be distinct from Ideas is that it allows for multiple Solutions to be posted on a single Idea, as well as having those Solutions potentially relate to multiple Ideas. This means that conversation about different thoughts can be cordoned off by their respective Idea or Solution and reinforce the relevant content. By contrast, comment nesting would encourage users to discuss more on individual posts. This may result in valuable user input being buried or being otherwise underutilized.

However, these thoughts are primarily conjecture. It is possible that the assumptions we have made about user behavior may not be true or that they can be mitigated via effective interface design. The ability to allow parallel conversations is incredibly beneficial toward ideation and may prove more beneficial than initially hypothesized. Comment nesting has proved itself a valuable feature on other platforms, such as Reddit, suggesting it may be applicable in the case of ID8. Future work should consider the benefits and drawbacks of Comment nesting and whether or not it may be beneficial or detrimental towards ID8.

E. Automatic Subscriptions

Subscriptions, as described in Section III-F3, are a good way to maintain engagement in the platform and alert users about new content they may care about. To further add on to this feature, we considered that it may be beneficial to leverage information about Roles to automatically enable Subscriptions for relevant Subjects. Specifically, if a user has or acquires a Role directly related to a specific Subject, the user can be automatically subscribed to the Subject so they will be notified when Ideas or Solutions that are relevant to them are posted. Similarly, if a user changes positions and no longer has a certain Role, they can be asked if they would like to be unsubscribed from the relevant Subjects. We believe this would be a convenient feature to ensure that users learn about and use Subscriptions, in addition to automatically performing beneficial tasks on the users' behalf.

Despite this seeming like a good idea on paper, it also runs the risk of inundating users' inboxes with information they do not care about until they disable the subscription. As a result, this has the potential to harm public opinion about the platform. That said, it is equally possible that the feature may be designed in such a way as to minimize the possibility of this occurring. A particular point of consideration here is how the choice of Opt-In vs Opt-Out may address these concerns

and affect feature usage and user sentiment. However, this is a subject of active research [27]–[30], and thus experimentation and exploration need to be conducted to identify an optimal solution—if one exists—as to how to implement this feature.

F. Role Highlighting

A feature of the design that we actively debated is that of Role Highlighting. Specifically, we believe it would be possible to leverage information related Roles and Subjects to highlight content created by domain experts with respect to the subject of the post. For example, if an Idea were posted with the subject of "Catering", and a user that works in Food Services were to post a comment on that Idea, their comment could be highlighted. The intent behind this feature is the belief that the highlighting of content made by domain experts would provide more social weight to their thoughts. That said, there are a number of potential concerns with this idea:

1) Novel Feature Design: While some platforms, such as Microsoft Feedback and UserVoice, label posts made by company employees as official responses, this system does not provide the same level of emphasis for the official response. Moreover, these platforms do not apply the system when also trying to support active dialogue between official members and unofficial members. This means this would be a novel feature in need of an original design, as we have nothing to compare against for the usability or effectiveness of a feature like this. Experimentation would need to be done into the aesthetic and functional implementation of this feature.

2) Effectiveness: Probably the most important concern about this feature is whether or not it will actually be meaningful or effective. Theoretically, it is possible that this feature may not provide any meaningful impact on the usage of ID8 or how users see content. Whether or not a feature like this will provide anything worthwhile for the platform is an open question in need of exploration and experimentation.

3) Potential Counter-productivity: Another concern with respect to this feature is that it may actually be counter-productive and induce the inverse effect from what we desire. Specifically, in environments where there is a distrust for authority, it may be the case that highlighting posts made by domain experts would reduce trust in their responses. This would be because the highlighting would bring unnecessary attention to their position in the organization, leading users to put less merit on the content of the post. This being the case, the value of Role Highlighting and its effect on user trust needs to be explored. Additionally, the use of highlighting may appear as if the platform is privileging the opinions of authority figures over others, undermining the open discussion that ID8 intends to support. This may actually only be a problem when considered in conjunction with the display of Roles at Anonymity Levels 0 and 1, however this needs investigation in itself.

G. Moderation

Moderation is an active challenge for effectively all online forums and feedback platforms [31]. Based on our design and analysis of ID8, we believe future work should be conducted into implementing and identifying the impact of ensuring content quality, preventing cyberbulling or digital harassment, managing user trust, and managing the logistics of performing moderation in the first place.

1) Content Quality: One purpose for moderation on an online platform such as ID8 is to ensure that user-generated content meets a certain pre-defined quality standard. These quality standards can cover criteria like relevance, non-redundancy, descriptiveness, and other attributes that ensure content is actually useful and on-topic. Many widely used systems employ this type of moderation, such as Stack Exchange and many of Reddit's "subreddits". As such, moderating by content quality may be beneficial toward ensuring ID8 is used as intended and works optimally. However, similarly many systems—also including many others of Reddit's "subreddits"—do not moderate user-generated content according to quality standards. This is because moderating by content quality runs the risk of being insufficient, overzealous, inconsistent, or just otherwise unnecessary. As a result, it is possible that moderators may fail to remove low-quality content, wrongly remove high-quality content, or induce confusion as to what actually qualifies as "high-quality" in the first place.

2) Cyberbulling & Digital Harassment: A prominent issue with many online forums and feedback platforms utilizing anonymity functionality is that of digital harassment and cyberbulling [32], [33]. Because we designed ID8 to make use of a variety of Anonymity Levels, there is a very real possibility that the platform may be misused for cyberbullying and harassment. This being the case, protocols would need to be developed to identify and manage instances of harassment on the platform. This introduces a couple of questions: How do we identify harassment on the platform? What do we do if there is disagreement on whether or not a post is considered harassment? How do we handle users that post harassing material? Do we need an appeals process, and how should it work?

3) Managing User Trust: One of most prominent concerns with respect to moderation of any form online is that of user trust. Biases and inconsistency in moderation, unreliable moderation appeal systems, and ambiguity in explaining moderation decisions can reduce trust in the platform as a whole [34], [35]. This may result in negative sentiment toward the platform as well as decreased usage and engagement, as evidenced by recent debates about censorship on social media platforms like Reddit and Twitter [34], [36], [37]. This being the case, considerations need to be made into identifying systems and protocols for moderation which ensure trust can be built and maintained with users.

4) Moderation Logistics: The logistics of moderating any online platform is a challenge in and of itself. Performing any form of moderation requires some amount of logistical planning, as it is not a task that can be entirely managed via software. Who has control over moderation decisions, how many people are allowed to make moderation decisions, how those decisions are made, how are disagreements among moderators managed, how users are notified, what information users are given, how appeals are managed, and many other logistical concerns all need to be answered. There are a wide

variety of ways to address all of these considerations, not to mention that the act of moderation may induce unforeseen burdens on the organization operating ID8.

H. Outcome Enforcement

With ID8 being a system designed around the suggestion of problems and proposal of relevant solutions, it will be extremely important to consider the impact of external factors toward ensuring the success of the system. The value of ID8 is entirely predicated on how effectively the organization implementing it follows through on the conclusions reached using the platform. For example, consider a situation where a user posts an important problem as an Idea on the platform, and another user posts a Solution which effectively solves the problem. This interaction is entirely digital and does not inherently resolve the real world issue on its own; someone needs to actively implement the proposed solution. This being the case, systems need to be designed to enforce that outcomes are actually implemented. Automatically emailing administrators when a Solution passes some Vote threshold may be a good means of ensuring that outcomes are more easily seen by those capable of implementing them. However, this will not inherently actively enforce that outcomes are implemented. At the current stage, we are unable to identify any effective ways to manage outcome enforcement, making this an important point for future work to consider.

I. Voting

Voting is one of the core features of ID8, as well as other similar systems. However, differences in implementations of voting across different platforms introduces some questions in need of future assessment to advise the implementation of ID8:

1) Negative Votes: Platforms such as Reddit and Stack Exchange are notable for their use of negative votes. Negative votes functionally allow one user to counteract the vote of another user. This has a few potential benefits: Allowing for low-quality content to be somewhat self-moderated and marked as such via negative vote counts; enabling users to express dislike in a post rather than limiting users exclusively to agreement without commenting; and providing a means for administrators to gauge user sentiment more verbosely. That said, negative votes also have a few notable drawbacks: Effectively negating another user's positive vote harms the inherent value of votes; canceling out positive votes obfuscates engagement statistics for normal users, as a smaller vote-score would be displayed compared to the number of people that actually interacted and voted; and artificial spamming of negative votes by malicious users can result in burying high-quality content. All of these benefits and drawbacks should be considered in future research to identify the value of negative votes and whether or not they would be beneficial to implement.

2) Time-Sensitive Bias: Another concern about voting is that it will artificially promote certain Ideas and Solutions over others due to time-sensitive biases. Specifically, it is possible that using votes to artificially privilege popular posts over others may actually result in burying other good content in need of consideration. This could induce an "early bird gets the worm" type of problem, where mediocre responses posted earlier receive more engagement and positive sentiment compared to better responses posted later. As such, work should be conducted into identifying the prevalence of this issue and how to best mitigate it.

3) Feature Naming: For the length of this project we have been referring to this feature as "Voting". However, this is not how the feature would likely be referred to externally. This is because the way that this feature is named and the semantics associated with it will likely have a significant impact on its usage. While voting is a feature of every platform we referenced in designing ID8, almost all of them referred to the feature differently: Reddit refers to their votes as "upvotes" and "downvotes", suggesting arbitrary sentiment about agreement, enjoyment, or relevance; Stack Exchange's votes do not have explicit names, however their tooltips mention effort, clarity, and usefulness; LEGO Ideas has "Support" which indicates user support for an idea; Microsoft Feedback just has basic "votes" indicating approval or agreement; among a number of other implementation methods. For example, phrasing such as "I agree with this" indicates a different type of feedback compared to "This is important", which is also different from a generic "Vote". To handle this, further research should be done into identifying the impact of different naming schemes.

V. Conclusion

User feedback platforms are a valuable tool for organizations to collect information on how their products, services, and processes can be improved to better serve the needs of their users. With the complex impact that the design of a software tool can have on the usage patterns of its users, it is important that the implementing organization considers its situation and tailors the platform's design to it. The characteristics of the organization's userbase, the types of products desiring feedback, and the types of feedback that the organization wishes to receive all inform how the platform should be designed.

ID8 is intended to support complex discussion between all members of the WPI community, enabling collaboration in designing and implementing changes to improve the experience at the school. Its design uses insights from existing feedback platforms and research to best encourage this open collaboration as well as avoid systems that limit such interactions. Many open questions were also identified, where future research could evaluate how other design choices affect this collaboration.

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References

[1] J. D. Wisner and W. J. Corney, "Comparing Practices for Capturing Bank Customer Feedback," *Benchmarking: An International Journal*, vol. 8, no. 3, pp. 240–250, Aug. 2001.

[2] S. Dray and D. Siegel, "Remote Possibilities? International Usability Testing at a Distance," *Interactions Magazine*, vol. 11, pp. 10–17, Mar. 2004.

[3] W. Jabr, R. Mookerjee, Y. Tan, and V. S. Mookerjee, "Leveraging philanthropic behavior for customer support: The case of user support forums," *MIS Quarterly*, vol. 38, no. 1, pp. 187–208, 2014. [Online]. Available: https://www.jstor.org/stable/26554874

[4] C. Phang, A. Kankanhalli, and B. Tan, "What motivates contributors vs. lurkers? an investigation of online feedback forums," *Information Systems Research*, vol. 26, pp. 773–792, 12 2015.

[5] H. Chesbrough and M. Bogers, "Explicating open innovation: Clarifying an emerging paradigm for understanding innovation," *New Frontiers in Open Innovation*, pp. 3–28, 01 2014.

[6] L. Dahlander and H. Piezunka, "Open to suggestions: How organizations elicit suggestions through proactive and reactive attention," *Research Policy*, vol. 43, p. 812–827, 06 2014.

[7] L. B. Jeppesen and L. Frederiksen, "Why do users contribute to firm-hosted user communities? the case of computer-controlled music instruments," *Organization Science*, vol. 17, no. 1, pp. 45–63, 2006. [Online]. Available: http://www.jstor.org/stable/25146012

[8]

[9] J. L. Davis and T. Graham, "Emotional consequences and attention rewards: the social effects of ratings on reddit," *Information, Communication & Society*, vol. 24, no. 5, pp. 649–666, 2021. [Online]. Available: https://doi.org/10.1080/1369118X.2021.1874476

[10] "Reddiquette," Mar 2021. [Online]. Available: https://web.archive.org/web/20220313103730/https:/reddithelp.com/hc/en-us/articles/205926439

[11] "I've just been downvoted. how should i react?" *StackExchange Meta*, Feb 2020. [Online]. Available: https://web.archive.org/web/20210506152031/https://meta.stackexchange.com/questions/121350/ive-just-been-downvoted-how-should-i-react/121351#121351

[12] L. Goode, "Social news, citizen journalism and democracy," *New Media & Society*, vol. 11, no. 8, pp. 1287–1305, 2009. [Online]. Available: https://doi.org/10.1177/1461444809341393

[13] "Allow downvoting comments," *StackExchange Meta*, jul 2009. [Online]. Available: https://web.archive.org/web/20150919061943/http://meta.stackexchange.com/questions/3615/should-downvoting-be-allowed-on-comments/3620#3620

[14] B.-C. Chen, J. Guo, B. Tseng, and J. Yang, "User reputation in a comment rating environment," in *Proceedings of the 17th ACM SIGKDD International Conference on Knowledge Discovery and Data Mining*, ser. KDD '11. New York, NY, USA: Association for Computing Machinery, 2011, p. 159–167. [Online]. Available: https://doi.org/10.1145/2020408.2020439

[15] "How does comment voting and flagging work?" *StackExchange Meta*, jan 2018. [Online]. Available: https://web.archive.org/web/20210506125823/https://meta.stackexchange.com/questions/17364/how-does-comment-voting-and-flagging-work/17365#17365

[16] "The value of downvoting, or, how hacker news gets it wrong," *The Overflow*, mar 2009. [Online]. Available: https://web.archive.org/web/20210507014930/https://stackoverflow.blog/2009/03/09/the-value-of-downvoting-or-how-hacker-news-gets-it-wrong/

[17] D. Sharma, R. Shukla, A. K. Giri, and S. Kumar, "A Brief Review on Search Engine Optimization," in *2019 9th International Conference on Cloud Computing, Data Science Engineering (Confluence)*, Jan. 2019, pp. 687–692.

[18] V. N. Gudivada, D. Rao, and J. Paris, "Understanding Search-Engine Optimization," *Computer*, vol. 48, no. 10, pp. 43–52, Oct. 2015.

[19] M. Cushman, "Search engine optimization: What is it and why should we care?" *Research and Practice in Thrombosis and Haemostasis*, vol. 2, no. 2, pp. 180–181, Apr. 2018.

[20] A. Schlesinger, E. Chandrasekharan, C. A. Masden, A. S. Bruckman, W. K. Edwards, and R. E. Grinter, "Situated Anonymity: Impacts of Anonymity, Ephemerality, and Hyper-Locality on Social Media," in *Proceedings of the 2017 CHI Conference on Human Factors in Computing Systems*, ser. CHI '17. New York, NY, USA: Association for Computing Machinery, May 2017, pp. 6912–6924.

[21] C. Guo and K. Caine, "Anonymity, User Engagement, Quality, and Trolling on Q&A Sites," *Proceedings of the ACM on Human-Computer Interaction*, vol. 5, no. CSCW1, pp. 141:1–141:27, Apr. 2021.

[22] D. K. Kilgo, Y. M. M. Ng, M. J. Riedl, and I. Lacasa-Mas, "Reddit's Veil of Anonymity: Predictors of engagement and participation in media environments with hostile reputations," *Social Media + Society*, vol. 4, no. 4, p. 2056305118810216, Oct. 2018.

[23] L. Rainie, S. Kiesler, R. Kang, and M. Madden, "Anonymity, Privacy, and Security Online," Sep. 2013.

[24] J. T. Gourville and D. Soman, "Overchoice and Assortment Type: When and Why Variety Backfires," *Marketing Science*, vol. 24, no. 3, pp. 382–395, Aug. 2005.

[25] R. Kurien, A. R. Paila, and A. Nagendra, "Application of Paralysis Analysis Syndrome in Customer Decision Making," *Procedia Economics and Finance*, vol. 11, pp. 323–334, Jan. 2014.

[26] B. Talbert, "Overthinking and Other Minds: The Analysis Paralysis," *Social Epistemology*, vol. 31, no. 6, pp. 545–556, Nov. 2017.

[27] S. Bellman, E. J. Johnson, and G. L. Lohse, "On site: To opt-in or opt-out?: It depends on the question," *Communications of the ACM*, vol. 44, no. 2, pp. 25–27, Feb. 2001.

[28] V. Kumar, X. A. Zhang, and A. Luo, "Modeling Customer Opt-In and Opt-Out in a Permission-Based Marketing Context," *Journal of Marketing Research*, vol. 51, no. 4, pp. 403–419, Aug. 2014.

[29] Y.-L. Lai and K.-L. Hui, "Internet opt-in and opt-out: Investigating the roles of frames, defaults and privacy concerns," in *Proceedings of the 2006 ACM SIGMIS CPR Conference on Computer Personnel Research: Forty Four Years of Computer Personnel Research: Achievements, Challenges & the Future*, ser. SIGMIS CPR '06. New York, NY, USA: Association for Computing Machinery, Apr. 2006, pp. 253–263.

[30] G. R. Milne and A. J. Rohm, "Consumer Privacy and Name Removal across Direct Marketing Channels: Exploring Opt-In and Opt-Out Alternatives," *Journal of Public Policy & Marketing*, vol. 19, no. 2, pp. 238–249, Sep. 2000.

[31] K. Wise, B. Hamman, and K. Thorson, "Moderation, Response Rate, and Message Interactivity: Features of Online Communities and Their Effects on Intent to Participate," *Journal of Computer-Mediated Communication*, vol. 12, no. 1, pp. 24–41, 10 2006. [Online]. Available: https://doi.org/10.1111/j.1083-6101.2006.00313.x

[32] C. P. Barlett, C. C. DeWitt, B. Maronna, and K. Johnson, "Social Media Use as a Tool to Facilitate or Reduce Cyberbullying Perpetration: A Review Focusing on Anonymous and Nonanonymous Social Media Platforms," *Violence and Gender*, vol. 5, no. 3, pp. 147–152, Sep. 2018.

[33] C. P. Barlett, "Anonymously hurting others online: The effect of anonymity on cyberbullying frequency," *Psychology of Popular Media Culture*, vol. 4, no. 2, pp. 70–79, 2015.

[34] J. Brunk, J. Mattern, and D. M. Riehle, "Effect of Transparency and Trust on Acceptance of Automatic Online Comment Moderation Systems," in *2019 IEEE 21st Conference on Business Informatics (CBI)*, vol. 01, Jul. 2019, pp. 429–435.

[35] S. Myers West, "Censored, suspended, shadowbanned: User interpretations of content moderation on social media platforms," *New Media & Society*, vol. 20, no. 11, pp. 4366–4383, Nov. 2018.

[36] M. Potter, "Bad actors never sleep: Content manipulation on Reddit," *Continuum*, vol. 35, no. 5, pp. 706–718, Sep. 2021.

[37] E. N. Wickham and E. Öhman, "Hate speech, Censorship, and Freedom of Speech: The Changing Policies of Reddit," *arXiv:2203.09673 [cs]*, Mar. 2022.

APPENDIX A
INDUSTRY FEEDBACK PLATFORMS

TABLE I: A Comparison of Existing Industry Feedback Platforms

	LEGO Ideas	Microsoft Feedback	UserVoice	Reddit	StackExchange	GitHub Issues
Official Participants	Comments from LEGO Officials are entirely separated from community comments.	Official comments are highlighted and flaired with the role of the official. Post's resolution status can be changed by the official.	Official comments are highlighted and flaired. Post's resolution status can be changed by the official.	Moderators and website administrators can choose to post as an official, or can post normally.	Official status is not displayed on posts.	Official status is not displayed on posts.
Timelines	Posts are given a fixed amount of time to gain traction. Time can be extended by meeting engagement criteria.	Posts may be marked as Resolved and locked, but may stay active for long periods of time.	Likely customizable for the customer company. Some do not have automatic post locking.	In some but not all communities, posts are archived, blocking interaction, after a set period of time.	Posts are rarely locked over time, but participation on old resolved posts is discouraged through other systems.	Posts can be closed and locked for inactivity, or after the problem is resolved.
Categories/Subjects	Categories for posts ("themes") are defined by the company. Users choose a single theme. Users may choose multiple tags.	Categories for posts are defined by the company. Users choose a single category. There are no tags.	Categories for posts are defined by the company. Users choose a single category. There are no tags.	Categories (communities, "subreddits") are defined by the community. Users choose a single category. There are no tags.	Categories are defined by the company as separate Stack Exchange websites. Users may choose multiple tags.	Posts may have multiple Labels applied to them. Labels are defined by the project organizer and may represent many semantic meanings.
Voting	Users indicate "Support" for the idea. The total number of supporters is displayed. Users may upvote comments and the total score is displayed.	Users may upvote posts. The total number of votes is displayed. There is no voting on comments.	Users may "Vote" on an idea to indicate support. The total number of supporters is displayed. There is no voting on comments.	Users may upvote and downvote posts and comments. The net score for each item is displayed.	Users may upvote and downvote posts. The net score is displayed. Users may upvote comments. The total score is displayed.	There is no voting on posts. Users may react to comments with Emojis—the "thumbs up" Emoji is commonly used to represent agreement.
Replies	Comments on the post may reply to other comments, nesting indefinitely.	Users may add comments on the post. There is no replying to other comments.	Users may add comments on the post. There is no replying to other comments.	Comments on the post may reply to other comments, nesting indefinitely.	Users may add comments on the post. There is no replying to other comments.	Users may add comments on the post. While there is no replying to other comments, a system to tag other users is supported and is commonly used as a pseudo-reply.

APPENDIX B
USER INTERFACE MOCKUPS

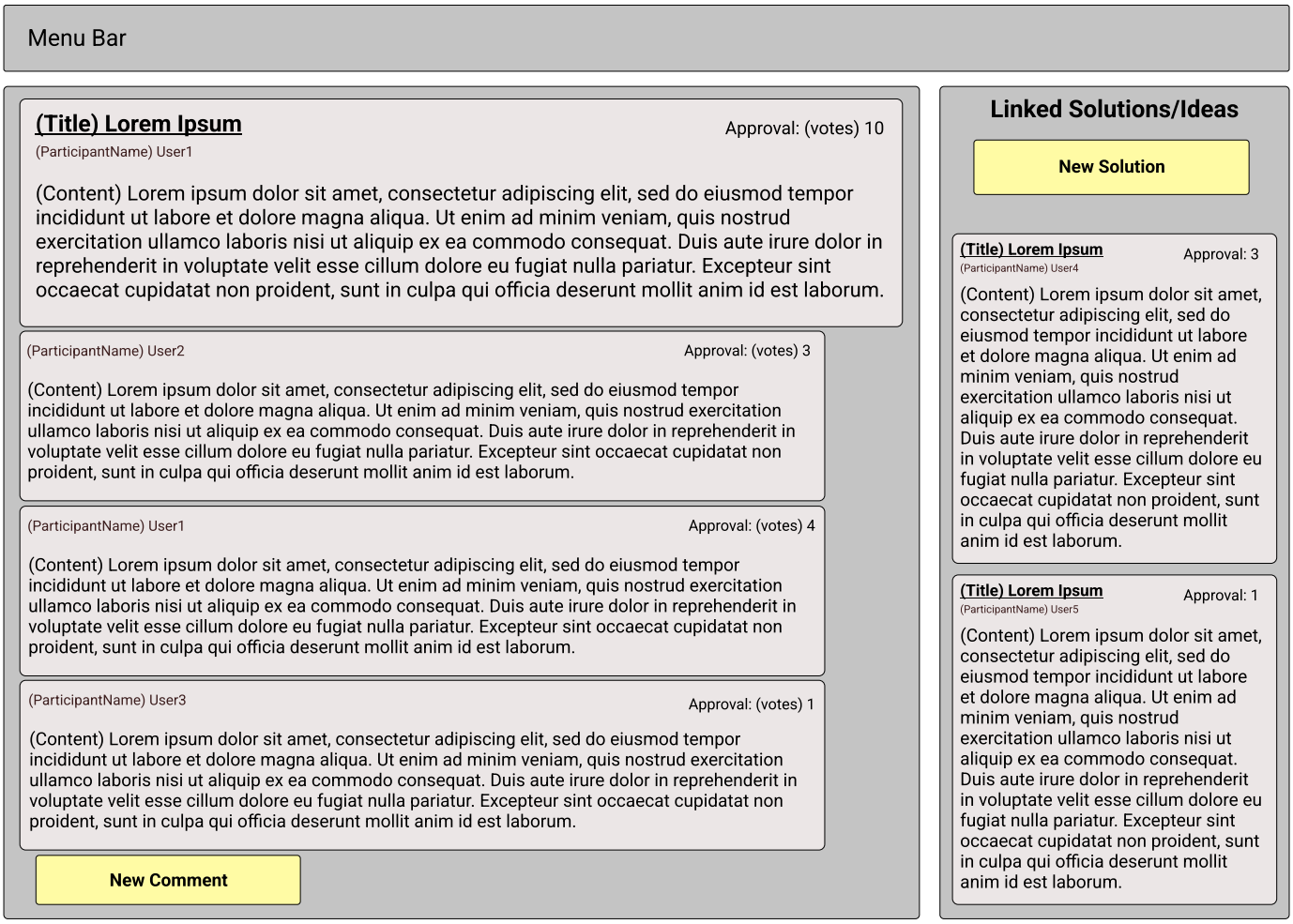

Fig. 5: Idea/Solution page mockup displaying how Ideas and Solutions may be displayed, along with their Comments and Vote counts.

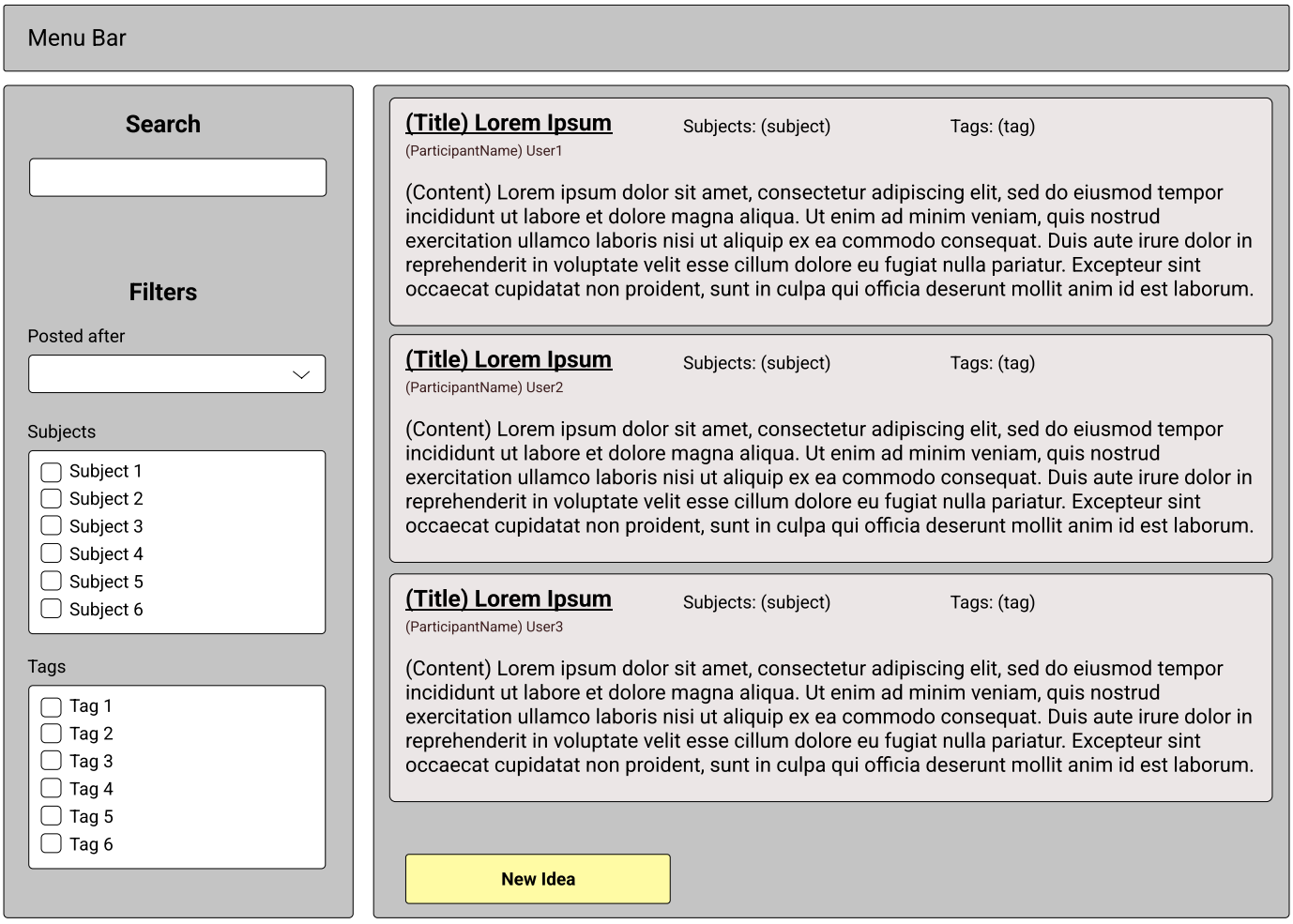

Fig. 6: Idea/Solution search mockup displaying use of Subjects and Tags.