

The Ideation Cube – A game concept to support cooperative ideation

anonymous version

Abstract

The following concept approaches the field of ideation in the working context from a computer-supported cooperative work (CSCW) perspective and with a focus on gameful design. Drawing from research of CSCW especially in the area of computer-supported brainstorming and brainstorming in general, the concept of *The Ideation Cube (TIC)* is introduced in this paper which tries to face challenges of brainstorming in groups and supports the ideation process in a gameful way. In the following, the design process of *TIC* will be explained as well as the details of the concept described with a special focus on the game elements of the concept.

1 Introduction

In contemporary businesses, the importance of ideation and idea management is increasing and the demand for creative solutions is growing (Arthur D. Little, 2015). As Wölbling et al. state, “[i]nnovation is considered key to unlocking the answers to the economic and social problems of the twenty-first century. It is only through constant innovation that an organization can survive in the long run, regardless of its size” (Wölbling et al., 2012, p. 122). To achieve this, creative processes need to be facilitated and emphasized to generate ideas for the development of potential innovations. As research shows, problems and challenges which limit the creative potential of the participants can occur during this phase (Paulus and Yang, 2000; Stroebe and Nijstad, 2004).

In order to improve the ideation process and to overcome problems encountered during this phase, the concept of *The Ideation Cube (TIC)* which aims to support the ideation process in a gameful way is introduced. The tool allows the players to handle creative blockades by enabling inspirational power and opening their mindsets to come up with creative ideas. Furthermore, it attempts to face challenges that come up during the ideation phase in a similar way other computer-supported cooperative work (CSCW) based tools did before (Forster et al., 2010). The main goal of ideation is to generate as many ideas on a topic as possible without the need to sort, prioritize or evaluate them (Plattner, 2010). Sorting out ideas may come towards the end or amid a different session which is why *TIC* will allow the user to focus on

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generating ideas, increase creativity and inspirational sources in a gameful way that supports cooperation as a central element in a distributed interdisciplinary team.

To explain the concept of *TIC*, some fundamental concepts in the fields of ideation, CSCW, as well as game studies and game design will be discussed. Afterwards, the methodology applied to develop the concept of *TIC* is explained and the concept itself is described in more detail referring to the usage scenario, feature specifications and game design. In the end, the notion of *TIC* will be discussed with regard to the literature in the field of game studies, gamification and the challenges of brainstorming raised before.

2 Related Work

To approach the field of ideation, it is indispensable to define the main characteristics of this notion. The design thinking approach describes the ideation phase as follows: “Ideate is the mode of the design process in which you concentrate on idea generation. Mentally it represents a process of ‘going wide’ in terms of concepts and outcomes. Ideation provides both the fuel and also the source material for building prototypes and getting innovative solutions into the hands of your users.” (Plattner, 2010, p.6). Consequently, the focus in this process lies in the generation of a large number of ideas without judging their quality instantly (Dam and Siang, 2017). Another approach to idea generation was developed by Osborn (1963) coined the term brainstorming. According to him, “‘brainstorm’ means using the *brain* to *storm* a creative problem and to do so in commando fashion, each stormer audaciously attacking the same objective” (Osborn, 1963, p. 151). The difference between the terms ideation and brainstorming is that brainstorming is used as a detailed ideation technique and usually takes place in face-to-face sessions with certain rules whereas ideation is referred to in a more general manner concerning the generation and development of ideas (Plattner, 2010). For this reason, the concept of *TIC* focuses on the broader notion of ideation but, as well, takes central elements of Osborn’s brainstorm paradigm into account: The aim is to generate ideas in a high quantity without instantly criticizing or evaluating the generated ideas and to further develop the ideas of others (Paulus and Yang, 2000).

Forster et al. state that “brainstorming groups yield better results than groups conducting traditional meetings” (Forster et al., 2010, p. 2). However, it has been argued that the brainstorming approach may not be as productive as expected. For instance, Stroebe and Nijstad (2004) argue that the quantity and quality of ideas in group brainstorming sessions is lower than in single person sessions. They describe different effects that may negatively affect the productiveness of brainstorming groups. For instance, “participants may be unwilling to state some of their ideas because they are afraid of being negatively evaluated” (Paulus and Yang, 2000, p. 77) which is a phenomenon called *evaluation apprehension* (Paulus and Yang, 2000). Another negative effect is called *social loafing* (Forster et al., 2010) and describes the effect that a group member performs under her or his potential due to a feeling of social isolation from the group. Additionally, *production blocking* (Paulus and Yang, 2000) may also have a negative impact on the performance of a brainstorming group. The term describes that in team brainstorming, only one participant is able to talk at a time which can prevent other team members to express their

own ideas (Paulus and Yang, 2000; Stroebe and Nijstad, 2004). Hymes and Olson (1992) argue that *production blocking* has a major impact on the performance of brainstorming groups.

To face these problems, Paulus and Yang (2000) suggest the ideation method brainwriting, which reduces the verbal interaction between group members in an ideation session, as a possible solution to encounter such problems: “Writing ideas instead of speaking them in groups eliminates the problem of production blocking” (Paulus and Yang, 2000, p. 78), because the task can be conducted simultaneously by all group members. Furthermore, they argue that brainwriting may also reduce evaluation apprehension, due to the increased anonymity written text offers (Paulus and Yang, 2000). Moreover, brainstorming sessions require people to be locally connected (Osborn, 1963). Therefore, it might not be a proper ideation method in situations where team members are distributed over several locations.

Approaching the field of brainstorming and ideation from a CSCW perspective it can be argued that “[c]omputer support for idea generation can help to mitigate the negative effects of interacting groups” (Forster et al., 2010, p. 2). Similar to brainwriting methods, computer aided brainstorming tools allow simultaneous input of ideas as well as increase the author’s anonymity which tackles the issues of production blocking and evaluation apprehension (Hymes and Olson, 1992). By increasing the participation awareness of certain members, social loafing is another problem which can be approached by computer support (Forster et al., 2010). For instance, a currently available tool to facilitate brainstorming or idea generation with computation is *Mindmeister* (MeisterLabs GmbH, 2017). It is a web based mind mapping tool that allows the user to visualize, develop and share ideas with team members. The previous examples show that computer-supported brainstorming may have positive effects on the issues of group session brainstorming. *TIC* tries to tackle these issues as other tools did before but will focus on a more gameful approach.

To further explain and characterise *TIC* as a game or gameful artifact, it is necessary to discuss the notion of *gameful design*. Deterding et al. define gameful design as “the use of design elements characteristic for games in non-game contexts” (Deterding et al., 2011, p. 5). Furthermore, they differentiate between playful and gameful design regarding Caillois’ (1961) continuum of *paidia* and *ludus* which differentiates between free, spontaneous forms of playing (*paidia*) and more rule-based forms of gaming (*ludus*). We argue that *TIC* can be classified as gameful mainly characterized by elements of *ludus*. Whether *TIC* can be better described as a fully-fledged serious game or rather as a gameful IT artifact will be discussed with regard to the classification of Deterding et al. (2011) later in this paper, as well.

3 Methodology

To develop the idea of *TIC* the *design thinking* approach was applied. The design thinking process is structured in the following phases: *Empathize*, *Define*, *Ideate*, *Prototype* and *Testing* (Gibbons, 2016).

In the first phase *Empathize*, internal group brainstorming sessions were initiated with the purpose to explore different game mechanics, work contexts and technologies that are fitting the

scope of the CSCW Challenge. After this initial step, research on the fields of brainstorming, ideation techniques and computer-supported brainstorming was conducted. Besides accumulating theoretical knowledge, interviews with ideation experts were conducted to empathize with the target group. In total, seven participants who are involved in ideation processes on a regular and professional basis in international companies were asked about techniques, experiences, problems and preferences concerning a successful ideation phase. The seven participants are between 23 and 50 years old with an average age of 32 and consisted of 6 male and one female person from different nationalities. An interview guideline was prepared as a loose frame to obtain semi-structured interviews and thus make them comparable with each other. Afterwards, the results were analysed and the main insights of each interview were gathered and summarized. This evaluation not only helped to empathize but also to *Define* the important needs of these experts. Due to the unnatural selection of participants and the small size of the group, it needs to be noted that the results of the interviews are not representative enough to be generalized.

Based on the research and insights, the notion of an interactable, cubic IT artifact emerged and different concepts of cubes were thought up and compared to each other in the *Ideation* phase. Possible conflicts, synergies and other interesting points of the different concepts were discussed in the team. Out of these findings, divergent paper-prototypes were built, discussed in the *Prototype* phase and a high-fidelity video prototype was produced later in the project. Already at an early stage of the project, the creation of paper-prototypes proved useful. Paper prototyping offers a fast and simple way of implementing different variations of a concept (Snyder, 2003). In creating paper prototypes individually and during team meetings, it was easier to communicate ideas and especially possible interactions with the cube to team members in a clear and understandable way. Consequently, the method contributed to an iterative refinement process of the concept because improvements, drawbacks, changes and alternatives were discussed directly at the prototyped model rather than in a more abstract way. In a later phase of the project, the central aim was to communicate the finalized concept idea including the context of usage, main functionalities, the interaction model and the central cooperative and game elements to outsiders in a quick and understandable way. For this purpose, we produced a high-fidelity video prototype¹.

4 The Ideation Cube

The main goal of *TIC* is to inspire and support ideation phases and as a result to come up with more ideas as a team in early phases of ideation processes. To achieve this, we designed the IT artifact *TIC* which supports the generation of ideas with existing techniques and tools and enables the user to share inspiration as well as generate new ideas in cooperation with others and in a gameful way (figure 1).

TIC is shaped like a cube and offers the user different possibilities to share and get inspired by making use of the six sides which are defined as follows (figure 2):

¹Link to the video prototype: <https://vimeo.com/lagset/TIC>

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Figure 1: TIC - The Ideation Cube

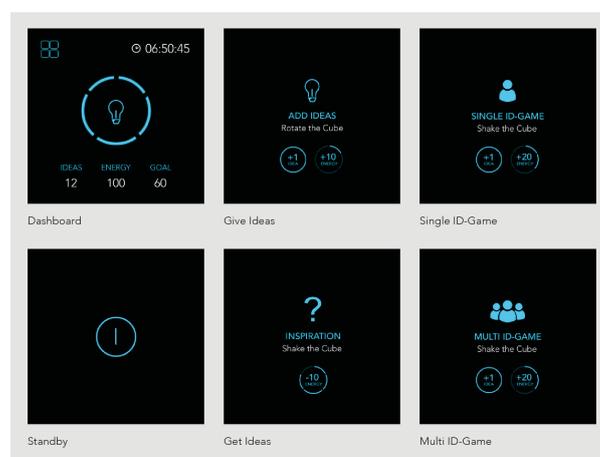


Figure 2: Overview of the six modes of TIC

- *Dashboard*: Overview of all the important information of a TIC's game session.
- *Standby*: Set TIC to an inactive mode.
- *Give Idea*: Input of own ideas via audio/video recording or photos without any rules and make them accessible to all team members to inspire them.
- *Get Idea*: Take a look at random ideas from other team members to overcome creative blockades by inspiration.
- *Single-ID-Game*: Random mini games with the aim to change the view and approach the problem from a different direction through creative techniques.
- *Multi-ID-Game*: Comparable to Single ID-Games. Team members can cooperatively and simultaneously play small mini games to inspire each other.

4.1 Scenario and target group

The concept of *TIC* is about supporting the whole ideation phase in any given context where people have to design or ideate on a regular basis. This context could be an ad agency where people have to create new logos or names for customers or a company that is developing a new product or even students that have to come up with innovative ideas. Whereas *TIC* is applicable to any mentioned context as well as to other contexts which make use of ideation processes, this paper will focus mainly on the following context to illustrate the concept more detailed: Ideation for new products in an almost fully virtual distributed company, where working from home can take up approximately 80 percent of the working time. Thus, face-to-face meetings are rare and main communication takes place over the internet or telephone (Radigan, 2017). The target group of this concept primarily consists of designers, engineers and other people who are involved directly in the conception phase of a new product. But even selected customers or other colleagues may get involved and be able to contribute to the product development within the ideation phase through the usage of *TIC*. With *TIC*, ideation for a new product does not stop after a virtual or local meeting because each member with a *TIC* at his or her home is able to connect to the team in the time between meetings and to interact with the ideas of others in a gameful way.

4.2 Interaction model and feature specifications

TIC is an interactive electronic device shaped in a form of a 6cm x 6cm x 6cm cube. The dimensions are chosen because a cube of this size is handy and portable. It fits the main purpose of the use on a desk at home or in office and offers a sufficient display size for screens which are located on each side of the cube, but is still usable with only one hand and enables comfortable transportation of *TIC*.

The conventional touch gestures, like *tap*, *swipe* or *pinch* were avoided in the interaction concept to facilitate a more direct interaction with the cube and therefore encourage a more natural feeling when using *TIC* which does not disrupt or enclose creative processes. For this purpose, a special interaction model was developed to emphasize this in the everyday use of *TIC* (figure 3). There are only four main interactions that the user can perform with *TIC*: One mode of the six modes can be chosen through turning *TIC* to the desired side. The side that is on top is the currently activated one. *TIC* can be rotated to select further actions on this side if there are any. By lifting up *TIC* the user confirms her/his desired action. In some occasions, the user has to trigger a random action, which is done by shaking *TIC*.

To input ideas and inspirations, *TIC* supports voice recording and allows the user to listen to the recordings from others. By adjusting the volume of the played audio and video recordings through rotation of the cube, it is possible to use *TIC* appropriately in a lot of situations. In more quiet environments it is also possible to hear the ideas via headphones. If the player uses *TIC* for the first time, a little clip is shown that explains how to adjust the volume correctly. An aux output jack is located inside the actual cube. It is accessible by pull open *TIC* like shown in figure 4. Besides, there is also a lock button to deactivate all the input possibilities for convenient transportation. Furthermore, a camera is located in the middle of it to enable video recordings and take pictures. The users are not supposed to make perfect pictures or

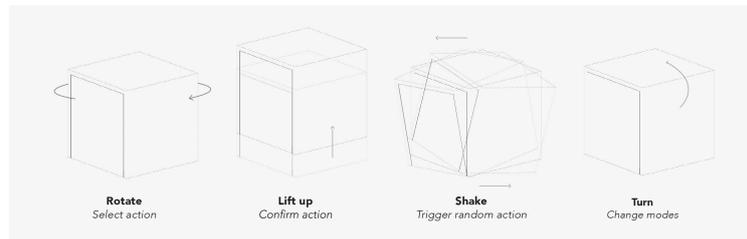


Figure 3: Interaction model of TIC: Rotate, lift up, shake and turn

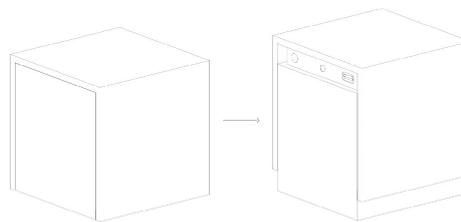


Figure 4: Aux output jack, camera, lock button and micro-USB functionalities are accessible inside TIC

create polished ideas, rather they should focus on sharing a lot of inspirational material with the whole team. For this reason, there is no option to review the own capture on her/his own cube - only a check mark is displayed after a picture has been taken. Furthermore, the cubes are permanently connected with one another over the internet.

4.3 Game Design

A game session with *TIC* starts at a meeting where some ideation or brainstorming was already done or at least the ideation topic has been clearly communicated to the whole team in an appropriate way as it was mentioned in the conducted interviews: “*Ein Problem kann sein, wenn du nicht so ein klares Bild schaffst, um was es eigentlich geht. Dann ist es zu frei [...]*” (male, 36 years, visual designer).² A *TIC* Game Master, who is a team member with additional responsibilities regarding *TIC*, sets up the cubes and hands them out to the team members and other people who should be involved in the ideation process, e.g. customers or other colleagues. The team has to reach a certain amount of ideas within a given time frame to win the game session as a team.

To improve cooperation between team members the principle of *individual accountability* is used within *TIC* by differentiating team progress from individual progress (D. W. Johnson and R. T. Johnson, 2002). This separation of progress is achieved by a narrative which is introduced to all players at the start of each game session: A narrative is a prominent game design technique used in games to create an immersive experience for the player (Nicholson, 2015). In the

²The statements made by the interview participants were not translated by the authors to not misrepresent their meaning.

context of *TIC*, each player has the goal to supply her/his own cube with enough *Inspiration Energy* to keep her/his *TIC* alive: Each player has to actively input ideas to recharge *Inspiration Energy*. This can be done by using the input side of *TIC* to input an idea or by playing *Single-* and *Multi-ID-Games* with other team members to reach the goal together and share his or her idea instantly with the team. After a successful sharing of an idea, the player regains *Inspiration Energy*. Furthermore, the notion of *Inspiration Energy* is strongly connected with the winning condition of the overall game session: The game is won if the previously set total idea count is reached before the countdown has finished and a bonus is calculated dependent on how many players have *Inspiration Energy* left.

Players can spend *Inspiration Energy* to inspire themselves by listening to or watching the ideas which were previously generated by other players. By shaking the cube while the *Get Idea* side is on top, players are able to output randomly chosen ideas. This matches with the approach an interview participant describes who does not distinguish between “good” or “bad” inspiration: “Ansonsten versucht man sich einfach anzureichern mit allem möglichen Zeug [zur *Inspiration*].” (male, 36 years, visual designer). Usually, the player obtains a full-length recording or a picture that way, but on rare occasions, *TIC* presents a collection of ideas to the player - this is called a *Crazy Minute*: In 60 seconds there are 12 ideas presented with every idea just lasting 5 seconds. A high amount of *Inspiration Energy* increases significantly the chance to trigger a *Crazy Minute*.

To prevent users from using only the *Get Idea* side, passively consuming ideas and thus not actively contributing to the ideation process, every request for an idea diminishes the *Inspiration Energy* by a small amount. However, this should not be interpreted as a penalty for players, instead they get reminded gently and motivated to insert own ideas, too. *Inspiration Energy* will diminish mainly if a player has not used the cube for a longer period of time. One consequence of this is that the cube will change its voice output from a normal voice to a powerless and sad one.

One way to raise *Inspiration Energy* is to play mini games that usually do not last longer than 15 minutes. There are two different types of mini games: The *Single-ID-Game* and the *Multi-ID-Game*. The latter is only available if there are at least two team members active, *Single-ID-Games* are always playable and support asynchronous interaction, whereas *Multi-ID-Games* allow synchronous interaction between team members. Besides recharging *Inspiration Energy*, the mini games are aimed to increase the creative potential of its players through various tasks by helping them to change their perspective as, for instance, mentioned by an interview participant: “[...] sich halt bewusst für sowas (*Ideenfindung*) in eine absurde oder in eine andere Situation rein zu bringen [...] fände ich auf jeden Fall geil auszuprobieren” (male, 36 years, visual designer). Also, it comprises of instructions which could be categorized as creative techniques. For instance, the *ABC-list technique* (van Aerssen, n.d.) requires the user to find associations that are matching with different starting letters of the alphabet which is implemented as a *Single-ID-Game*. An example for a *Multi-ID-Game* is the mini game *Story Time* that is based on the *6-3-5 brainwriting* (Rohrbach, 1969): Players have to verbally continue a story of someone else before the next player also adds more to the end of the story.

New instructions can be added or old ones can be customized by a *TIC Game Master* through an app or a web interface of *TIC*. With this, it is also possible to invite new team members

to the group, adjust the ideation time frame and the ideation topic of a game session and also pre-select or deselect appropriate mini games for the given ideation topic. Only selected mini games will be available within a game session of *TIC*.

In total, the three sides which are used to input ideas (*Give Idea*, *Single-ID-Games* and *Multi-ID-Games*) and the one side to output all those ideas and inspirations were already described within this chapter, remaining sides include the *Dashboard* side and the standby side. The *Dashboard* side is primarily used to provide important information such as the number of ideas already collected, the remaining time, the overall goal and the *Inspiration Energy* of each *TIC* to the player. Lastly, there is a standby side which will set *TIC* in an idle mode and immediately shuts down all the displays. It serves as a “focus mode” (Harris, 2016). By turning the cube to this side, the player may be able to better concentrate on other important tasks not related to ideation. “[...] *Das hat in der Vergangenheit immer sehr gut funktioniert [Brainstormen ohne Rechner]. Man ist weniger abgelenkt, konzentriert sich auf einer höheren Metaebene [...] man ist freier [...].*” (female, 24 years, Junior User Experience Design Consultant). Since distraction of the cube is minimized, therefore, users can stay focused while working if they wish so.

5 Discussion

As mentioned previously, *TIC* combines various elements that are characteristic for games, like time constraints, limited resources, clear goals and a variety of game styles (Deterding et al., 2011). For instance, time constraints are used to, firstly, set a time limit for the overall idea generation phase and, secondly, for the idea generation in *Single-ID-Games* and *Multi-ID-Games*. Additionally, the notion of *Inspiration Energy* can be interpreted as the central and limited resource which allows the user to access ideas from others, will decrease over time and can be earned by sharing own ideas or playing mini games. Furthermore, clear goals are set by displaying the number of ideas which need to be generated until the countdown indicating the end of the game has finished. This element is also implemented in the cube, giving detailed instructions to the player, what to do in a specific game. By offering the player the opportunity to just input or access ideas as well as playing *Single-ID-Games* or *Multi-ID-Games*, *TIC* supports different game styles in a broader sense.

With regard to the classification based on the two dimensions *playing/gaming* and *parts/whole* by Deterding et al. (2011), it is arguable, whether *TIC* is rather a fully-fledged serious game or a gamefully designed artifact. As they argue, “the boundary between ‘game’ and ‘artifact with game elements’ can often be blurry” (Deterding et al., 2011, p. 3) and this distinction is not possible “without taking recourse to either the designers’ intentions or the user experiences and enactments” (Deterding et al., 2011, p. 6). Since we designed *TIC* as an option to support and expand the ideation process in a gameful way, we argue, that *TIC* can be viewed as a fully-fledged game which is applicable to non-game contexts due to the point that game elements are central to the system and it combines them in a consistent way. Furthermore, *TIC* does not support any other use which is independent of these elements. However, from our perspective and as previously mentioned, this classification is highly dependent on the user’s experiences

with the system and can not be generalized only by the designers. Nevertheless, we argue, that *TIC* goes beyond gamification as, for example, Huotari and Hamari define it: “A process of enhancing a service with affordances for gameful experiences in order to support user’s overall value creation” (Huotari and Hamari, 2012, p. 20). From this perspective, describing *TIC* as a gamified system would not fully encompass its characteristics because this “definition excludes all systems where the provision of game mechanics (tailored to a specific context) is the core service itself, or at least an essential part of it” (Deterding et al., 2011, p. 5). We count *TIC* towards this kind of systems because it was designed with game mechanics as its central element.

By the use of the mentioned game elements, the concept of *TIC* supports the cooperation between team members within the ideation phase and may reduce social loafing (Forster et al., 2010) by encouraging the player to play out their best in a group with the concept of *Inspiration Energy* that acts as a tradeoff for new inspirations to prevent players from just inactively consuming ideas of others and not adding to the group’s ideas. Furthermore, evaluation apprehension (Paulus and Yang, 2000) may be reduced by letting each player record as many ideas as they want without getting assessed by others. Of course, this anonymity is limited when users share voice messages because authors may be identified by the input. Lastly, production blocking (Stroebe and Nijstad, 2004) is tackled similarly to other computer-supported brainstorming tools by enabling the players to express their own ideas separately or in a group simultaneously without the requirement of waiting for others. As a result, *TIC* fosters *divergent thinking* as described by Guilford (1956) which is crucial for a successful ideation phase (Uebornickel et al., 2015).

6 Conclusion

The Ideation Cube is a tool to enhance creativity and get inspiring ideas from various participants supporting cooperation of work among the disseminated group. It endeavours to determine the underlying problems experienced during a conventional conceptualizing process in a way that each individual has an opportunity to get involved in an ideation process by recording her/his ideas and cooperate with other members by sharing them. *TIC* is applicable to any mentioned context for ideation, however, we concentrate essentially on designers, engineers or other individuals who are involved in the planning phase of a new product. *TIC* tackles different challenges in the area of ideation and is capable of adding a gameful experience to this field.

To examine if the concept is applicable as intended and to figure out possible flaws, user tests need to be conducted and evaluated. For this purpose, the next step would be a user evaluation of the video prototype. In future works, we mean to include diverse functionalities that are centred more around the equipment specifications and the application which can be utilized for configuration of *TIC*, for example, defining objectives and assignments, setting timelines and instructions. Since in this stage, we constrained our focus to ideation, *TIC* is currently not capable of identifying valid and invalid ideas. Hence, in future, we might want to work on the steps after the ideation procedure which incorporates the idea analysis and prioritization.

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