

Kacang Cerdik: A Conceptual Design of an Idea Management System

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Abstract

An idea management system is where ideas are stored and then can be evaluated and analyzed. It provides the structure and the platform for users to contribute ideas for innovation and creativity. Designing and developing an idea management system is a complex task because it involves many users and lot of ideas. Some of the critical features for an idea management system are supports for the ideas generation process, stimulate users to actively participate, facilitates reuse of ideas and encourages open collaboration among the users. This paper discusses a conceptual architecture design of an idea management system called *Kacang Cerdik* based on three novel concepts; actor, object and workflow. In the system, an idea is an object or an entity that can be manipulated by the users. An idea as an object can be used to generate other ideas. It can also derive its features from other ideas. In this system, an idea is linked with other ideas in the system. The idea will flows from one state to another state in a single workflow. A single workflow is a process or a pipeline that consists of many states. At each of the states, an idea (an object) can manipulated by a user (an actor) based on his current role. The single workflow consists of five different states which are editing, collaborating, reviewing, publishing and evaluating. In the system, a user is an actor who has multiple roles such as a submitter, a reviewer or an evaluator. Based on this concept, a user can submit a new idea or can review an existing idea or can vote on an idea. The system also uses the concept of crowd wisdom to evaluate the ideas. Finally, the potentially viable ideas at the end of the workflow or the pipeline can be further evaluated in a new product development cycle. This conceptual design encourages open collaborations among the users, reuse of previous ideas and use of crowd wisdom in ideas evaluation. A working prototype called *Kacang Cerdik* has been developed using these concepts as a proof-of-concept.

Keywords: idea management system, design, object, actor, workflow

1. Introduction

An idea is an important component in the process of creativity and innovation in the field of entrepreneurship (Baron & Shane, 2006; Hisrich et al., 2010). Ideas are a core part of an innovation process (Glassman, 2009). Based upon these contributed ideas, an entrepreneur can do an innovation of the existing product, process or service to create a new product, a new process or a new service that has market value. Innovations are products or services that have market values, offer new solutions to existing problems or show a new radical design from existing dominant design (Dorf et al, 2009). An idea can also be a catalyst in triggering many new ideas (van Bundy, 2007).

There are two major activities in the innovation process; the idea generation activity and the idea management activity. In the idea generation activity, various methods and techniques such as TRIZ (Altshuller, 1999), brainstorming and mind-map can be used to generate as many ideas as possible. This activity may involve open innovation approach where anyone can contribute any idea on any subject. Normally ideas from open-innovation are submitted into an idea bank. This activity may also use event-based innovation where anyone can only contribute specific ideas to specific events or problems. The ideas generated using this approach is more focused and specific. In the idea management activity, the main focus is how to manage, archive, filter and, evaluate the ideas generated from the idea generation activity. The ideas that have market potential will be further developed in the new product development activity.

Managing ideas in the idea management activity is a difficult task because there are many steps to consider. First,

there are many ideas from diverse sources such as customers, clients, employees, managements, students and, users. Each of the ideas is a potential new product or service has a market value if further developed. Also, each idea needs to be refined and improved to be usable. Thus, each idea needs to be evaluated in term of originality, technicality, usability and market potential. Contributed ideas need to be archived for future use. Further, each idea needs can be tagged to categorize them into appropriate categories.

We put forward the opinion that an idea management system has four important issues to be solved to be useful. Firstly, the system needs a method to control and to manage a large number of ideas. Generally, a large numbers of ideas will be generated by the users. Managing the ideas is an important issue. Secondly, the system needs a method to evaluate the quality of the ideas. Each of the ideas needs to be evaluated and screened for potential novelty and potential commercialization. Thirdly, the system needs a method to categorize and to search the ideas. This method will allow easy navigation for the users to browse and to search for existing ideas. Lastly, the system needs a method to reuse archived ideas. Each idea that has been submitted has the potential to be reused in different scenarios.

In this paper, we are concerns with on how to design an idea management system from a software design perspective. We are also concern with on how to adopt existing concepts from others domain into the design of an idea management system.

To solve these issues in the design of an idea management system, this paper proposes a conceptual design of an idea management system based on concepts from object oriented programming (Cox, 1985) and manufacturing production process. The idea management system will be based on the concepts of object, actor and workflow. In this system, the idea is an object, the user is an actor and the process is a workflow. The system will use tags to categorize the ideas into different categories (Carbone et al., 2012). The tags will allow the users to search archived ideas and subsequently reuse existing ideas. There are three main contributions of this paper. Firstly, this paper provides new conceptual design of an idea management system based on the concepts of actor, object and workflow from object-oriented programming and business process workflow. Each of these concepts from outside the idea management domain is a novel contribution to the design of an idea management system. The use of idea as an object will allow the system to manage, manipulate and store the ideas. The use of workflow and actors will solve the quantity and the quality of the ideas.

2. Literature Review

There are many definitions of an idea. An idea can be defined as any conception existing in the mind as a result of mental understanding, awareness, or activity (Merriam-Webster, 2009). An idea can also be defined as a concept or mental impression (Michanek, 2009). An idea also means a concept in mind, the result of mental activity to produce recommendations or an action (Oxford Dictionary, 2000). Foster (1996) defined an idea as nothing more or less than a new combination of old elements. Using these definitions, we can conclude that ideas come from mental activities and a recombination of previous ideas. Hence, we can define an idea as mental activities where previous knowledge, facts or ideas were recombined to form a new idea with relation to a particular set of events.

A system is defined as a collection of components that combine to achieve a given purpose. Thus, an idea management system is a software-based system or a web-based system to manage and to support activities in generating and manipulating ideas. A comprehensive review of idea management activities and idea generation activities was given by Glassman (2009). Thus, the main purpose of an idea management system is to manage and to control the innovation process in a company so that new ideas can be generated and used for new products development.

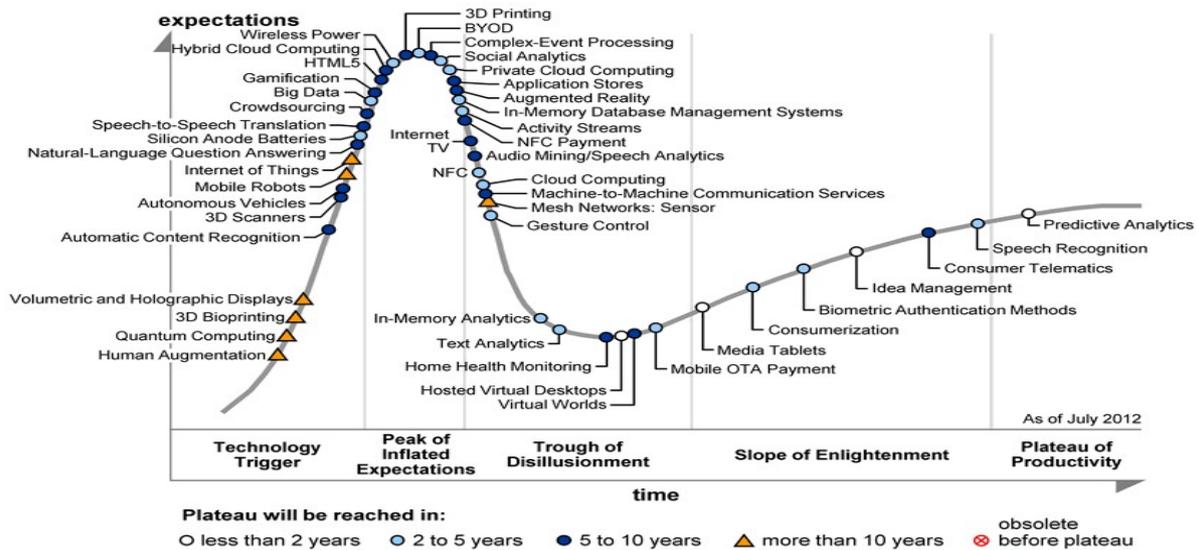


Figure 1. Gartner Hype Cycle shows that an idea management system will become main stream in 2-3 years. This indicates that an idea management system will becomes an important system in an organization in the next two to three years

Historically, an idea management system began as a system for a worker to contribute ideas, comments and suggestion with respect to employment to the management. This system normally used suggestion boxes to gather ideas and comments. The first such system is reported to have started since 1872 in a steel manufacturing company in German and in 1880 in a shipping company in Scotland (Robinson & Stern, 1998).

The basic concepts of idea management for business activities were first introduced in 1980s (Clark, 1980). During this period, no formal idea management system was developed. Many of the approaches are ad hoc and temporary. When computer network was introduced in 1980an, e-mails were used as a method to gather ideas and suggestions from users. The use of information technology in the management idea began around the early 1990s when idea management systems were developed and used.

In the 2000s, web-based innovation management systems were introduced to companies using Internet. Companies realized the importance of innovation as one of the competitive strategies. Idea management systems were developed as part of the innovation management systems (van Bundy, 2007). The basic function of an idea management system in a company was to get contributed ideas from employees with respect to internal company activities, processes and new products development. The system normally used internal company structure such as e-mails, blog, wiki or web portals for idea solicitation (Van Dijk & Van den Ende, 2002).

Currently, there are many idea management systems on the market. Some of the system are offered as *Software as A Service* (SaaS) or as a cloud-based applications. Using SaaS approach, a company will use an idea management system developed and maintained by another company on the cloud. The current idea management systems are very complex and can manage thousands of ideas (Duin et al., 2008). A few example of the idea management systems currently in used are *ThinkPlace* by IBM, *Innovation Grapevine* by Accenture, *Innovation E-space* by Whirlpool, *IdeaStorm* by Dell, *YourIdea* by 3M and *IdeaBoxes* by Ericsson. Based on a study, only about 5% of generating ideas have value to be highlighted. According to Gartner (2012), an idea management system will become main stream in the next 2-3 years.

From a software architecture perspective, an idea management system is a unique system. It is unlike a typical web-based system or a software system. For instance, in designing and developing web-based system, we can normally use MVC model (Morales-Chaparro etc., 2007). In the MVC (Model-View-Controller) model, the model is the database design, the view is how the user will interact with the system and the controller is the logic that links the model and the view. The MVC model is widely used in web development. In developing software system, object-oriented paradigm has been widely used. In the object-oriented paradigm, a system has many objects. Each object has features and methods. The system will interact with the object through the methods. Each object can interact with other objects. An object can inherit features and methods from another object, and it can extend these features and methods (Wegner, 1990).

A business process workflow is a sequence of connected stages where a task is applied to an object or an item

(van der Aalst, 2003). For example, we might have an idea for a new product. We can collaborate on the idea with several persons. Then, we might need to write the idea on a form, submit the idea to a proper person. The person will evaluate the idea. Based on certain criteria, if the idea has a value, the idea will be discussed for further actions.

Currently, there are no widely use models or designs for an idea management system. In this paper, we propose a conceptual design for an idea management system based on concepts from an object-oriented paradigm and a business process workflow.

3. Method

We propose an idea management system based on the concept of an object and an actor from object-oriented paradigm and a single workflow process from a business process perspective. In the system, an idea is basically an object. It can be manipulated, inherited and moved from one state to another state. An idea (object) can derive its features from one root idea or combinations of features from multiple root ideas. In this way, the ideas in the system are reusable objects that can be manipulated.

The user in the system is an actor. As an actor, a user can has multiple roles in the system. A user can be a submitter, a collaborator, a reviewer and an evaluator. As a submitter, a user can submit new ideas and invites other users to collaborate on his ideas. As a collaborator, a user can improve or edit others' ideas. As a reviewer, a user can decide whether an idea is worth publishing or not. And, as an evaluator, a user can give a review to ideas that have been published. Based these multiple roles, a user are heavily involves during the idea generation and idea management process.

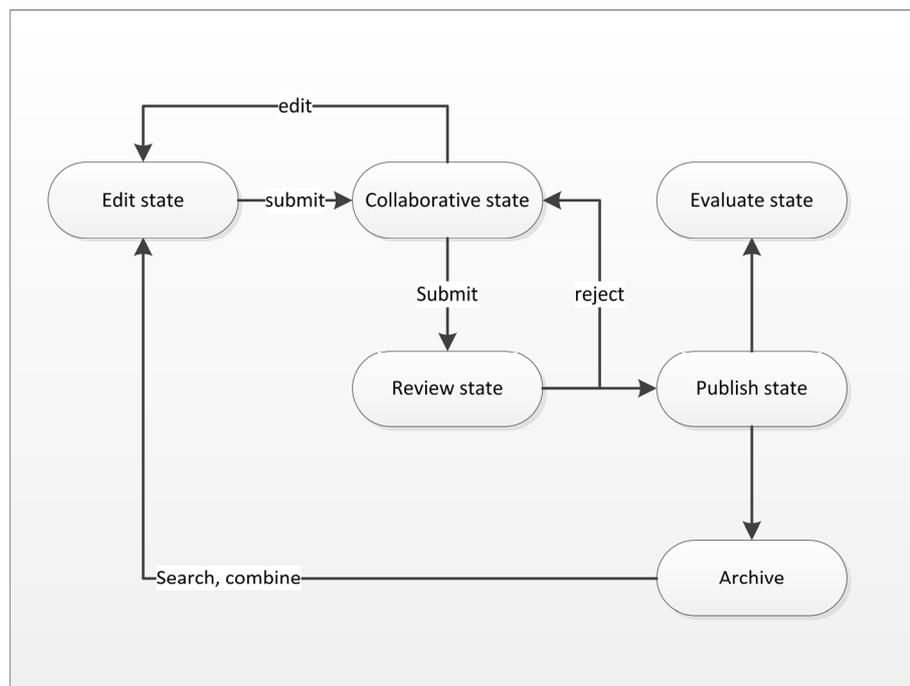


Figure 2. The system consists of multiple states in a single workflow. In the initial edit state, a user (as a submitter) can edit or submit an idea. In the collaborative state, a user can collaborate with other users to create new ideas or edit existing ideas. In the review stage, a user (as a reviewer) will support or reject an idea that has been submitted. If the idea has good review from many users, it will be published, archived and evaluated further. If the idea is rejected, it will return to the collaborative state for changes and improvement

The ideas (as an object) will flow through multiple states in a single workflow process (Figure 2). At each state, the idea will be processed by many users. This single workflow process consists of five states: editing state, collaboration state, reviewing state, publishing state, evaluation state and implementation state. During each state, there is an open collaborative process between the users to manage and to improve the ideas. In the editing stage, a user can submit a new idea or a modified idea based on previously ideas. The system encourages idea reuse where an idea can be based on existing ideas. This concept of reuse is an important concept from object-oriented

paradigm. Ideas that have been rejected before can provide a new perspective to existing problems. During the collaborative stage, a user can collaborate with other users to refine and to improve the idea. Then, the idea is submits to the review state, where the idea will be reviewed by other users. The basic idea in the collaborative state is to employ the wisdom of the crowd to improve the idea.

In the review state, the idea will be reviewed by many reviewers who will determine the suitability of the idea. Each user will provide a positive or a negative review of the idea. If the idea has more positive review compare to negative review, the idea will be published and be considered for further evaluations. If the idea has more negative review it will is submitted back to the collaborative state or be archived. The reviewers in this state have the authority to accept or reject the ideas based on various factors such as originality, suitability for the market, commercial value and others. The basic idea in this state is the use of the wisdom of the crowd to determine the quality of the idea. If many users consider the idea is good, then the idea has a potential value. All ideas from the workflow process will be archived. The idea with the most positive review will becomes the top idea for consideration. If an idea is accepted, it will be further review in the new product development state. The overall conceptual system architecture is given in Figure 3.

4. Results

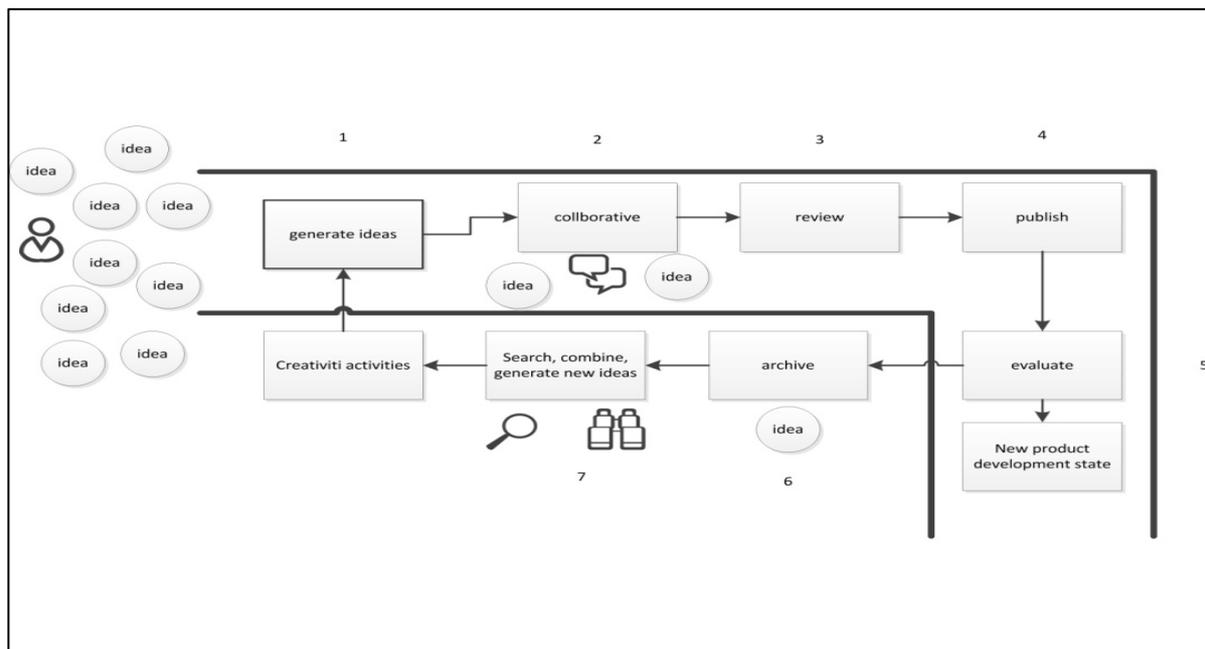


Figure 3. A conceptual system architecture of an idea management system based on the concepts of object, actor and workflow. A user is an actor that has many roles. A user can be a submitter, a reviewer and a collaborator. An idea is an object that flow from one state to another state in a single workflow process. At each state, the idea (object) is manipulated by the user (actor)

A working prototype called *Kacang Cerdik* based on the proposed concepts of object, actor and workflow has been developed. It has been implemented using Python programming language using Plone framework (Aspeli, 2007). The use of Plone framework has significantly reduced the development time of an idea management system based on our proposed concepts.

The proposed system has solves many issues related to an idea management system. In a typical idea management system, a large number of ideas are generated by the users. This makes it difficult to identify good ideas. In our proposed system, we use a single workflow process where every idea will flow through a single workflow. By using a single workflow, we can control the flow of ideas from the users. A user can submit many ideas, and each idea will be reviewed by many users. Only ideas that have good value will be published or evaluated further. The proposed system encourages collaboration among the users where a user is encourages to reuse old ideas. The concept of open collaboration is emphasized in generating ideas.

The system uses the concept wisdom of the crowd to choose good ideas. The basic concept is that, more people

give positive reviews on a particular idea, the better is that idea from the other ideas. The system do not depends on one particular person or an individual to make the decision.

The system encourages reuse of ideas or using previous ideas as a template to generate new ideas. This avoids the user the difficulty of starting from nothing to generate new ideas. The system allows the user to modify, to combine, to add, to expand and to edit previous ideas. During the workflow process, an idea can be tagged. A tag is a category for the idea or key words about the idea. Using tags, a user can search the archives for ideas based on categories or key words.

Finally, the system encourages user participation. In a typical idea management system, a user submits an idea and the idea will be reviewed by another person. There is a separation of task between the two events. In the proposed system, a user has many roles. A user can be a submitter, a reviewer, a collaborator or an evaluator. With each role, a user has a responsibility. For example, as a reviewer, a user is responsible to evaluate an idea. With these responsibilities, a user is heavily involves during all states in the workflow process. By giving a set of responsibilities to the users, the system encourages users' participation in the system.

5. Limitations

The current prototype system has many limitations. One important limitation is how to measure the differences between two ideas. For example, if a user submits an idea which is later modified by another user, how can we measure the differences between the two ideas? What is the right similarity percentage to use to measure similarity? The system encourages collaboration, but we also need to know which ideas are original and which are derived from other ideas.

Another important limitation is acknowledgement of a contributor to an idea. For example, a user submits an original idea. This original idea is rejected. However, the original idea is modified and improved by another user. How much credit should the original user get from the modified idea?

There are various other limitations. However, in this paper, we have shown that it is possible to design and to develop a working idea management prototype based on concepts from other domains.

6. Discussion and Conclusion

In this paper, we have proposed a conceptual design of an idea management system based on the concepts of object, actor and workflow. These concepts are derived from object-oriented paradigm and a business workflow process. A working prototype called *Kacang Cerdik* based on the proposed concepts has been developed using Python programming language and a Plone framework. The working prototype has been shown to solve some of the issues in an idea management system. The proposed conceptual architecture provides a general framework to design and to develop an idea management system.

Usually in an idea management system, an idea is considered as a single item. It is isolated from other ideas. The idea stands alone and is uses to solve a particular issue. However, in our proposed system, an idea is an object. It can have links with other ideas. As an object, an idea can be reused. A user can edit, modify and extend existing ideas to create new ideas. Ideas reuse is encourage among the users. The idea (object) will flows through a single workflow with multi states. This ensures that all ideas will be processed at the various states of the workflow. At each of the states, each idea will be processed.

In a normal idea management system, a user has a single role. A user can be a submitter or a reviewer. In our proposed system, a user can take multiple roles. A user can submit a new idea or review an existing idea. Thus, the system encourages active participation from the users. The users are also encouraged to collaborate with other users during the idea generation process.

Also, normally an idea is evaluated by a group of person of a single person. In our proposed system, all users are responsible to evaluate and to vote on the ideas in the system. Each user has an important vote that can be used to evaluate whether an idea is a positive or a negative. Using this concept of crowd wisdom, ideas with high positive votes will emerge from the large number of ideas in the system.

In conclusion, this paper presents a new perspective in the conceptual design of an idea management system using the concepts of an object and an actor from an object-oriented paradigm and a multi-states single workflow from a business workflow process.

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