Envisioning a Multilevel, Open-Content Social Network for a Worldwide Community of I-TRIZ Practitioners

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ABSTRACT

We envision a worldwide community of I-TRIZ users connected via an Internet-based, user-generated, multilevel social network. The community will be centered on a collaborative social environment maintained on the Internet containing I-TRIZ and TRIZ knowledge base, tools, software, training, and general information. The community will also be an active collaboration portal allowing practitioners to work together on projects and share information and experiences. Practitioners will be able to augment the core information store with their own materials, the distribution of which will be under their control. Through user-generated content, the community's knowledge store will grow and exceed sizes impossible for a single person or company to produce. Future versions of I-TRIZ software will automatically connect to this online community and allow private, local, and public contributions by users. In this way, users will be able to protect intellectual property while also benefitting from community collaboration.

1. INTRODUCTION

The last decade has seen the rise of new kinds of collaborative environments yielding unprecedented growth and value creation. Some of these are household names: Wikipedia, e-Bay, MySpace, and Facebook. The Internet (or rather the precursor to the Internet) was created in the late 1960s as a survivable communications infrastructure for military command, control, and communication. By the 1980's, the Internet had been opened to commercial and academic interests, however, interaction was largely textual and based on computer-to-computer or person-to-person communications. The World Wide Web (WWW), invented in the early 1990s, made it possible to connect graphical/textual pages of content to each other via hyperlinks and also made it easy for individuals to create their own content. Release of Internet and WWW infrastructure to the public spurred an explosive growth in the mid to late 1990s known as the "dot com boom." By 2000, hundreds of millions of people were using the Internet for email, shopping, entertainment, and general information. However, the Web consisted of monolithic information sources (Web sites) created by individuals, companies, or organizations with any edits to these sites were made by the owners of the site.

In the last few years a new paradigm has emerged. User-generated content (UGC) represents a shift away from the monolithic owner-edited Web site [1]. Instead, Web site owners create the facility permitting ordinary users to generate the content and open the editing of the site to all users. Such sites are called *open-content* sites belying the user-created nature of the material [2]. Some notable examples include:

Wikipedia
Wikipedia is an open-content encyclopedia currently containing over 10 million articles in 253 languages and receiving almost 700 million visits per day. Any user can add or edit an article on Wikipedia making the knowledge stored there an emergent property of the community of users [3].

MySpace
MySpace is a social networking site featuring user-submitted personal profiles, photos, music, etc. for the purpose of interacting with other people. Anyone can create a MySpace page and link to or view other MySpace pages. Text-based communication facilities allow the users to communicate with each other. There are currently over 200 million MySpace users and receives hundreds of millions of visits per day [4].

YouTube
YouTube allows any user to upload, view, and share video clips. Currently, nearly 100 million visitors

watch 3 billion video clips each month via YouTube [5].

These wildly successful sites share some common features. First, they are types of *social networking* sites in that they allow people to communicate directly to other people [6]. This is the least true about Wikipedia and the truest about MySpace. However, all three allow individual users to express personal opinions and personality. Second, these sites rely on *user-generated content*. The user community itself provides the content that is shared by the community [1].

The combination of these two forces makes these and dozens of similar sites attractive to users and is the basis for their success. In this paper, we argue that the growing TRIZ and I-TRIZ community of users should be served by a dynamic, social networking, online community allowing user-submitted content to continually grow the body of knowledge and experience. We feel the existing TRIZ/I-TRIZ knowledge base should serve as the core around which the community is constructed. This paper discusses specific features such a community should have.

2. OPEN I-TRIZ KNOWLEDGE BASE

TRIZ (the Russian acronym for "the theory of inventive problem solving," pronounced "trees") is a methodology, knowledge base, and tool set designed to assist practitioners in generating innovative solutions to problems [7]. Began in 1946 by Russian engineer and researcher Genrich Altshuller and colleagues, TRIZ went unknown to the Western world until some of his writings were translated into English in the 1980s. Some of the contributions from this, the so-called "classical" era of TRIZ, include [8]:

- 40 principles of innovation
- Lines of Evolution
- 72 standard solutions
- Substance/field analysis
- ARIZ (algorithm to solve an inventive problem)

The "contemporary" era of TRIZ began in the late 1980s and early 1990's. This era began in Russia but moved to the USA with the start of a new company, Ideation International which moved most of the principle TRIZ scientists to the USA. The result of development by this group of scientists is called "I-TRIZ" and features:

- Over 400 operators (superseding the 40 principles)
- Methodology for use by the masses
- Family of software applications
- Problem Formulator diagramming tool
- Documentation of case studies
- Compilation of knowledge base

The I-TRIZ knowledge base consists of over 400 operators, 1300 illustrations, 4000 individual screens, and 14,500 links [8]. The I-TRIZ knowledge base represents an astounding distillation of human innovative thought. The only access a practitioner has to this knowledge base is through one of the Ideation software applications. We feel that the knowledge base should form the core of the online community.

To date, content for the knowledge base has been created by TRIZ and I-TRIZ specialists. We feel that to support the envisioned dynamic user-generated online community, the knowledge base should be extensible so that ordinary users are able to contribute content. Furthermore, we feel that the knowledge base should be expanded to include several other types of material including, but not limited to:

- Annotations
- Contexts
- User-created illustrations
- User-created descriptions
- Discussions
- Solutions

All of these types of material would be created and submitted by ordinary practitioners all over the world. This user-submitted content would be added to the core knowledge base to form a continually expanding knowledge store similar to Wikipedia and YouTube. We call this concept, the *open I-TRIZ knowledge base*.

3. MULTILEVEL CONTENT

We recognize that security and privacy are important features for world-wide adoption of an open community. An open I-TRIZ community is different than other open content sites. Sites like Wikipedia and YouTube are designed for wide public exposure. Any

user can access content placed by any other user. The intent of doing so is to have your submitted content viewed by as many people as possible. However, users employing I-TRIZ will many times be working on proprietary problems involving confidential information they wish to keep private. For this reason, we envision multiple secure "zones," or "levels," in which private information can be placed and the user having control over who is able to access the information. We also envision distributed storage architecture for the knowledge store allowing selected content to be stored locally on corporate computers while being seamlessly fused with information attained from Internet-based sources.

Figure 1 shows the multilevel architecture of the open I-TRIZ knowledge base. Located on Internet-based Web servers, the core of the open knowledge base consists of the default I-TRIZ materials (operators, illustrations, etc.) combined with user-submitted materials. These are all *public* materials and can be accessed by any user. However, also stored on the Web servers is a *semi-private* area in which users can place shared information. As an example, consider users from two different companies collaborating on a project. Likely, the collaborators do not want to share project information with the entire world. However, in order to collaborate, they must share information with each other. The semi-private level gives users the ability to place information but also grant access only to others authorized to view the information. Also possible is locally-stored *private* materials. Consider a company who uses I-TRIZ internally. Users within the company can place information in this private level thereby making it available to any other company employee but not available to the I-TRIZ community at large. Security is insured because private materials are never stored outside of the corporate computing environment.

An important step in realizing the concept of an open knowledge base is to formulate a data representation and storage format suitable for open-content. In a separate paper, we have argued for the use of the extensible markup language (XML) in such a role. An XML-formatted knowledge base is ideal for a Web-based community, supports any style of information display, and is easily extensible.

4. THE MASHUP USER INTERFACE

A *mashup* is the integration of information from different sources into a single application [9]. An example of a mashup is user-submitted annotations superimposed on an online map such as Google Mashups [10]. We envision the user interface of any future I-TRIZ software to be a fusion of information obtained from the public level, the semi-private level, and the private level.

Figure 2 shows an example of a mashup-style user interface screen. Shown is a particular operator—*Use inflatable construction.* The title and default description of the operator are shown. The icons at bottom left allow the user to select the context (default is selected). Clicking one of the other contexts (mechanical, chemical, physical, information technology, medical, or all) causes the display to change accordingly. For example, choosing the medical context causes the medical-specific description of this operator to display instead of the default.

The tokens at bottom right indicate annotations associated with this operator. An annotation is a textual note that can be added by any user and associated with an operator. The green tokens represent public annotations obtained from the I-TRIZ knowledge base located on the Internet. The yellow tokens represent private annotations obtained from the local store. Shown is a message from one company employee placed there specifically for other employees to view. Note that any other I-TRIZ users across the world would not see these private annotations. They would see the green annotations since they are public and may see their own private annotations, but the annotations shown in Figure 2 are viewable only to people within the one corporate computing environment with access to that local private store. In this way, the user interface is customized seamlessly for use by different users while also preserving security. Clicking on the token displays the annotation. Figure 2 shows multiple annotations being displayed.

The tabs at left give users access to the illustrations and sample solutions associated with this operator. Hovering over the tab causes the list to display. Figure 2 shows the list of illustrations. The illustrations listed in black are the public illustrations obtained from the I-TRIZ knowledge base on the Internet. The illustrations in color are private or semi-private illustrations obtained from the local store or the semi-private store on the Internet. Clicking an

illustration causes that illustration to display (not shown). The solutions tab functions in similar fashion.

Since annotations, contexts, descriptions, illustrations, and solutions can be added to the open I-TRIZ knowledge base by any user, all users have seamless access to this ever-growing store of knowledge via the "mashup" interface. Since material can alternatively be flagged as private, and stored locally within a company, the "mashup" interface allows one to customize the knowledge store. Because different users will see different private information, each user will view a different user interface although one totally consistent with other users.

5. CONCLUSION

For I-TRIZ to become a global phenomenon, millions of people must have access to it, it must provide a benefit to those accessing it, and it must look and feel like modern Internet-based services. I-TRIZ practitioners must become an active community rather than a collection of individual users as it is today. To facilitate this, we argue that an online social-networking service, based largely on user-submitted content be developed to serve the I-TRIZ community. In other documents, we describe some necessary components to bring this into reality. In [11] we discuss adding the notion of context to the I-TRIZ knowledge base. This will allow users to create customized descriptions for operators. In [12] we discuss incorporating an I-TRIZ user interface directly into the Microsoft Office suite of applications. This HyperTRIZ Ribbon would give users access to the online community's resources without having to leave their current Office application. In [13], we discuss how the future will bring us to a place where innovative thought and problem solving is as commonplace as information processing is today. In one generation, most employees in the corporate world have turned into *information workers*. We envision the next generation to become *innovation workers*. To achieve this, the process of innovation must be supported by basic tools in similar fashion to the way information processing is supported by computer, softw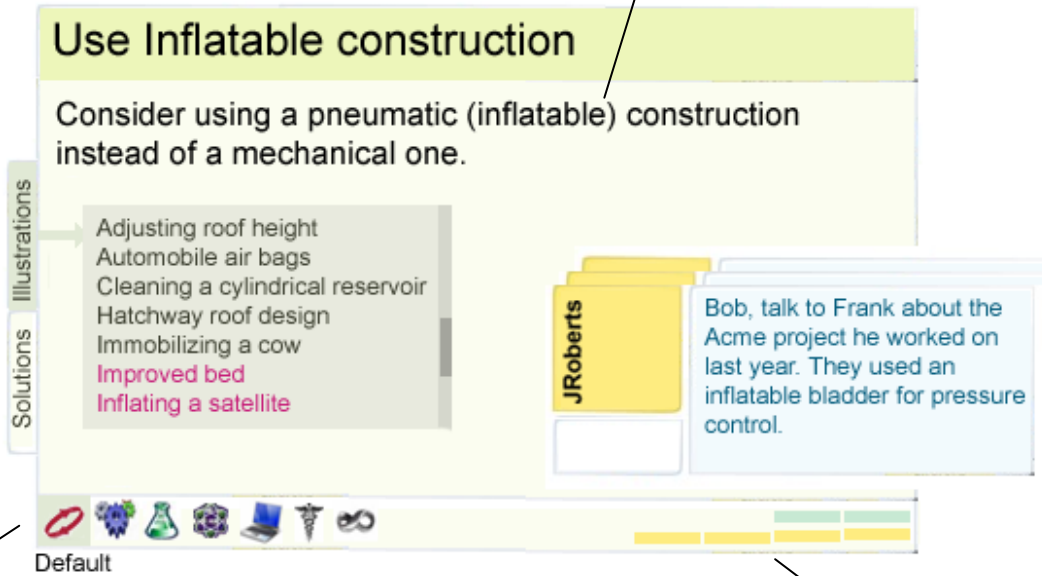are, and networking. We see the open I-TRIZ knowledge base serving the worldwide community as a critical component of this future.

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Clicking the Illustrations tab displays a list of examples demonstrating the application of this operator. The list is composed of public (default) illustrations and any private illustrations (colored) this user is authorized to view. The Solutions tab functions in similar fashion.

The description of this operator changes depending on which context is chosen (lower left). Users can add their own contexts and contextual descriptions so the descriptions shown here are a combination of the public descriptions and the private descriptions.

Use Inflatable construction

Consider using a pneumatic (inflatable) construction instead of a mechanical one.

Illustrations

Solutions

Adjusting roof height
Automobile air bags
Cleaning a cylindrical reservoir
Hatchway roof design
Immobilizing a cow
Improved bed
Inflating a satellite

JRoberts

Bob, talk to Frank about the Acme project he worked on last year. They used an inflatable bladder for pressure control.

Default

Clicking an icon displays information about how to apply this operator in the chosen context (default, mechanical, chemical, physical, information technology, medical, and all are shown). The illustrations, solutions, annotation, and the description may change for different contexts.

An annotation is a textual comment associated with this operator by other users. Public annotations (green) are indicated along with private annotations (yellow). All users see the public annotations, but only authorized users see the private annotations.

Figure 2 – Multilevel "Mashup" Display

This sample displays information associated with the I-TRIZ operator "Use inflatable construction." The information shown is a combination of public material from the default knowledge base and private material added by users and optionally shared with others. All users see the same public information but each user may see different private material. This allows users to customize and extend the I-TRIZ knowledge base and also enables intellectual property protection since the private material can be stored locally and never compromised to the outside world.
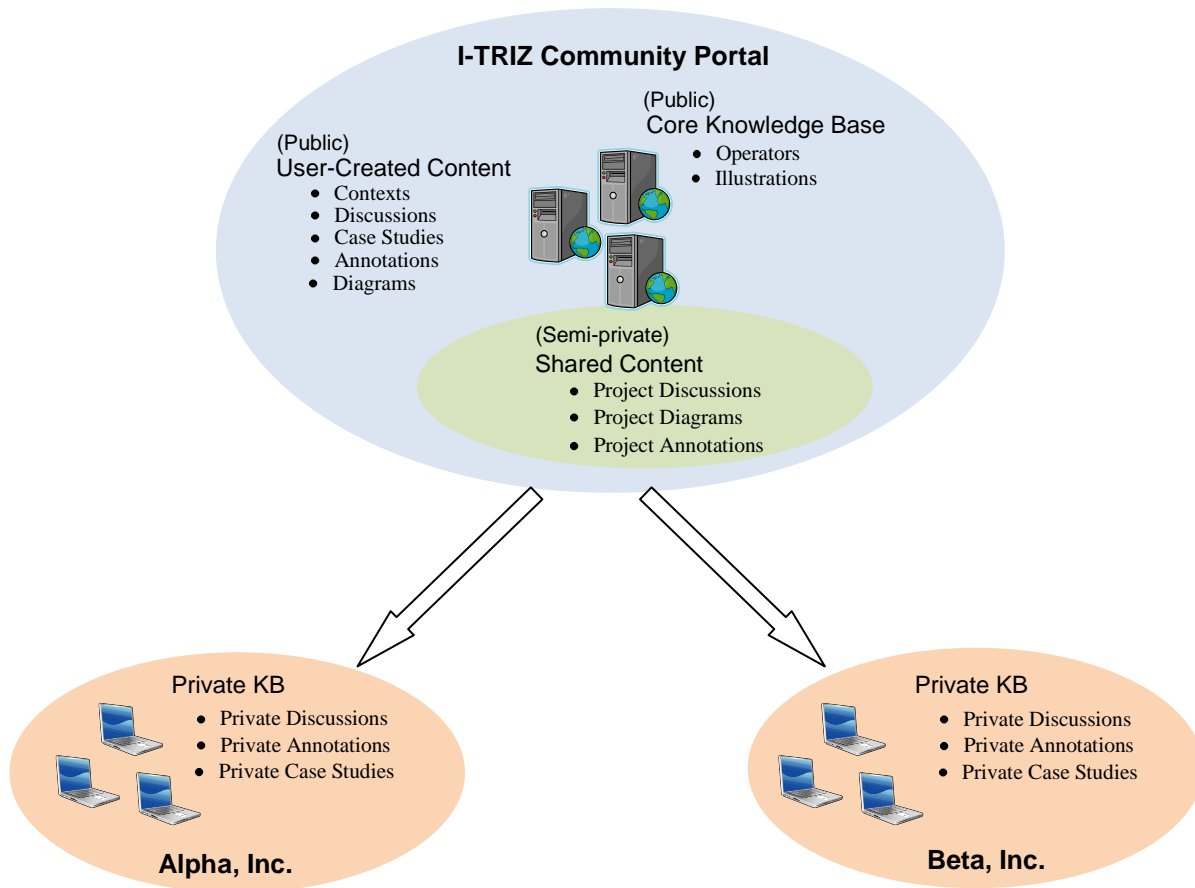
Figure 1 – Multilevel Open-Content Knowledge Base

The world-wide I-TRIZ community will be served by an Internet-based, open-content knowledge base consisting of the core knowledge base and additional materials submitted by users. Some user-submitted content is public and available to all users whereas other material is semi-private permitting it to be shared among a group of collaborators. Individual users, depicted here as company employees, maintain locally-stored private materials accessible only to authorized users within their own local area network. Users will be able to see materials from all levels seamlessly integrated onto a display screen as shown in Figure 2.