Embedding I-TRIZ Using The HyperTRIZ Ribbon

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ABSTRACT

I-TRIZ comprises the I-TRIZ knowledge base and a suite of desktop applications. To use any of the tools, users must acquire and install the I-TRIZ application of choice. Multiple purchases and multiple installs are required to use the full suite. Once installed, users must run the application(s) individually and possibly copy material back and forth from the I-TRIZ application to any other electronic document. Requiring users to work with I-TRIZ applications individually is cumbersome. Using Microsoft Visual Studio, one can create custom toolbar menus that can be added to any existing Microsoft Office application. In Office 2007, this is made even easier facilitating a way to embed I-TRIZ functionality into desktop applications. This paper describes a custom Office 2007 toolbar ribbon, called the HyperTRIZ Ribbon, that can be added to all Office 2007 applications. This makes it possible for users to access I-TRIZ tools and the knowledge base without having to leave the current Office application. The result is a much more integrated environment that stimulates "everyday innovation."

1. INTRODUCTION

TRIZ (the Russian acronym for "the theory of inventive problem solving," and pronounced "trees") is a methodology, knowledge base, and tool set to assist practitioners in generating innovative solutions to problems [1]. Began in 1946 by Russian engineer and researcher Genrich Altshuller, TRIZ has been in continual development for over 60 years only becoming known to the Western world in the 1980s. The "classical" era of TRIZ ended with perestroika and the fall of the iron curtain in 1989 giving way to the "contemporary era."

With the collapse of the Soviet economy, many Russian TRIZ masters and other Altshuller colleagues relocated to other parts of the world. Many started their own consulting business or formed partnerships with entrepreneurs. Ideation International, Inc. was started in 1992 by an USA-based Israeli entrepreneur and moved a sizeable portion of the principle TRIZ scientists to the Detroit, MI area.

In the USA, this group continued to develop their own brand of TRIZ called I-TRIZ (for Ideation TRIZ). I-TRIZ was different from the rest of the TRIZ community because it was meant to be used by everyone. Up until this point, effective user of TRIZ was possible only after significant training and apprenticeship. To bring about this revolution, the Ideation team sought to develop several different methodologies, each for a different purpose, overhaul the knowledge base, and develop several standalone desktop applications. Much of the original software was developed in the early and mid 1990's. Therefore, by today's standards (2008), the software's look and feel is outdated as is its underlying technology and Ideation in collaboration with a number of others are in the process of defining the next generation of I-TRIZ software.

In this paper, we argue that future incarnations of the software include the embedding of I-TRIZ directly into the normal Office applications. We do not propose to replace the standalone I-TRIZ applications entirely, but rather make it possible for users to utilize I-TRIZ without having to leave their current work piece and bother with separate applications. We think this will not only encourage wider usage and quicker adoption of I-TRIZ, but also provide a platform for I-TRIZ distribution and dissemination to sustain a huge mass-market era for I-TRIZ.

2. The I-TRIZ Applications

The I-TRIZ suite of software, collectively known as TRIZSoft® includes the following [2]:

Innovation WorkBench® – a comprehensive professional tool for inventive problem solving.

Ideation Brainstorming – a simplified tool for solving problems of light to medium complexity in individual or team work format.

Knowledge Wizard – a professional tool for inventive problem solving in non-technical areas (business, management, marketing, logistics, etc.).

Failure Analysis – a professional tool for revealing root causes of undesired effects (accidents, failures, production defects, etc.) and their elimination (prevention).

Failure Prediction – a professional tool for predicting possible undesired effects and events (accidents, failures, production defects, etc.) and their prevention.

Intellectual Property Management – a professional tool for evaluating and enhancing patents, disclosures, and applications, "inventing around" patents, and protecting patents from inventive competitors.

Ideation Brainstorming for solving non-technical problems – a tool for solving problems in business, management, marketing, logistics, etc. in an individual or team setting.

Directed Evolution – accelerated and controlled evolution of systems and product lines.

The left-hand pane contains the outline of the "final report" the user builds and is also a roadmap for the methodology. By stepping through each item in the outline and working with information displayed in the right-hand pane, the user fleshes out the contents of the left-hand pane which can be saved to a document format at the end of the process. Icons in the toolbar at the top of the screen give the user access to specific I-TRIZ tools.
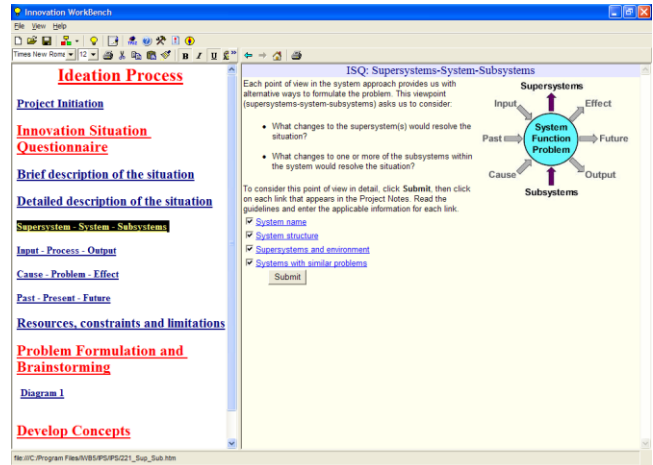

Each application requires separate installation and authentication steps on the part of the user and each has its own, but very similar, user interface style. The following images are taken from the Innovation Workbench (IWB).
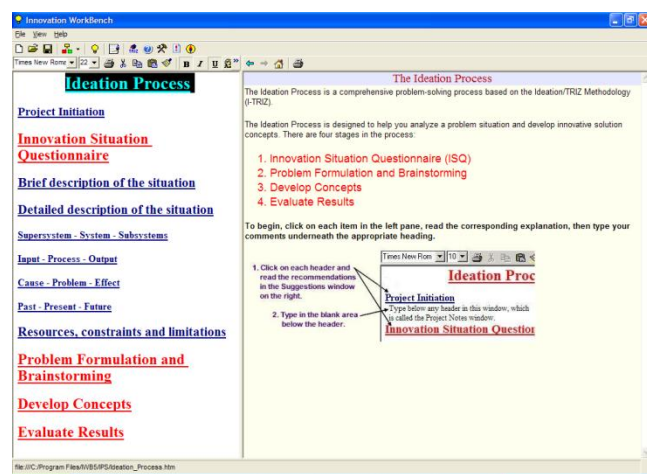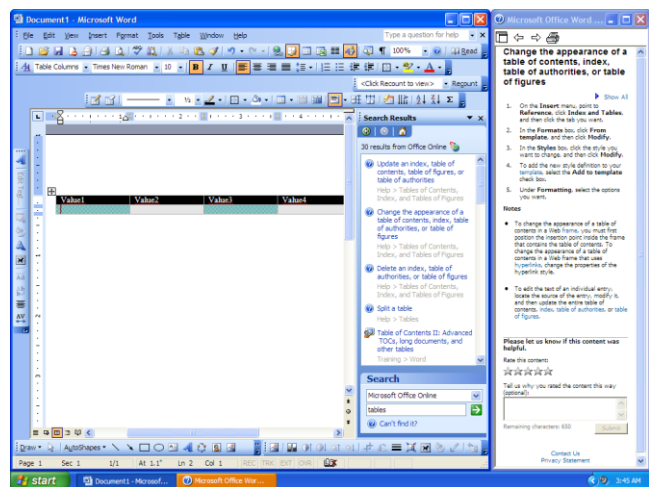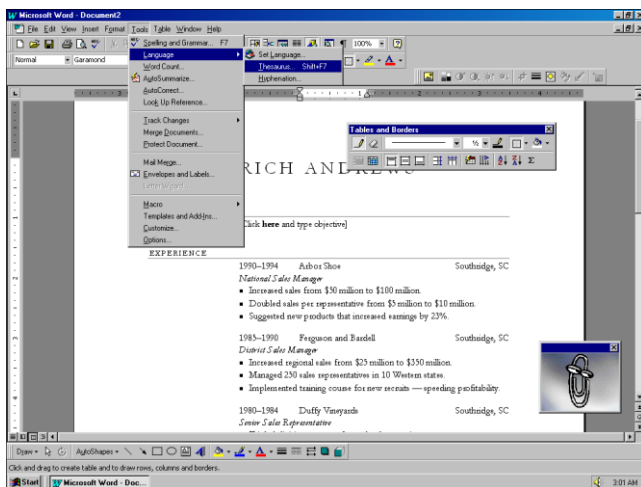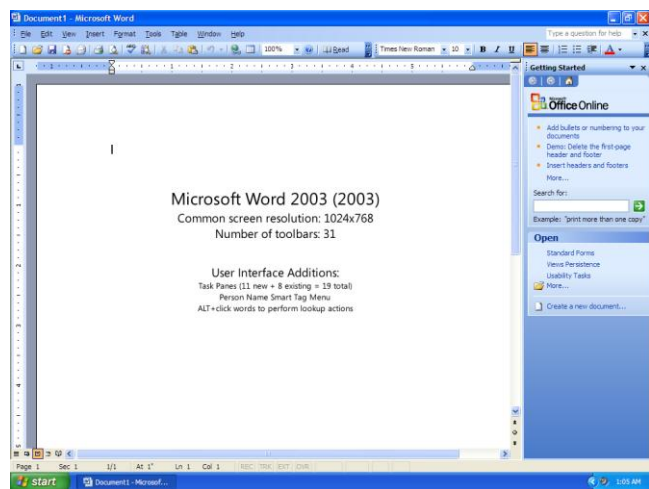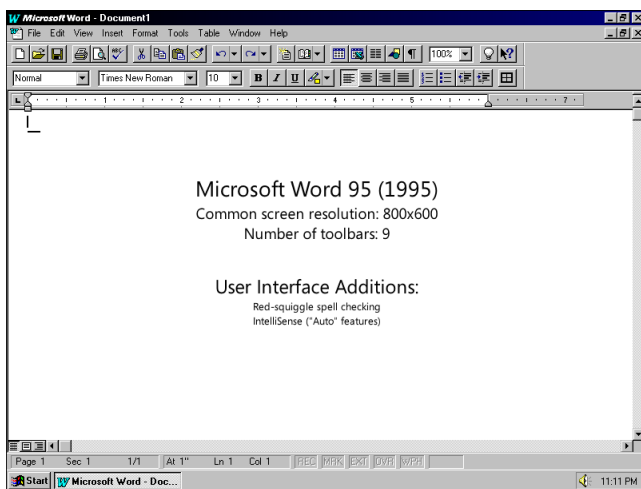

An adjustable slider bar divides the main portion of the screen into two parts whose contents are driven by hypertext markup language (HTML) files.

3. The Office 2007 Ribbon Paradigm

With the release of Office 2007, Microsoft has introduced a new user interface paradigm based on the "ribbon" [3]. The ribbon is a graphical strip across the top of the application window showing a context-sensitive selection of the application's functions.
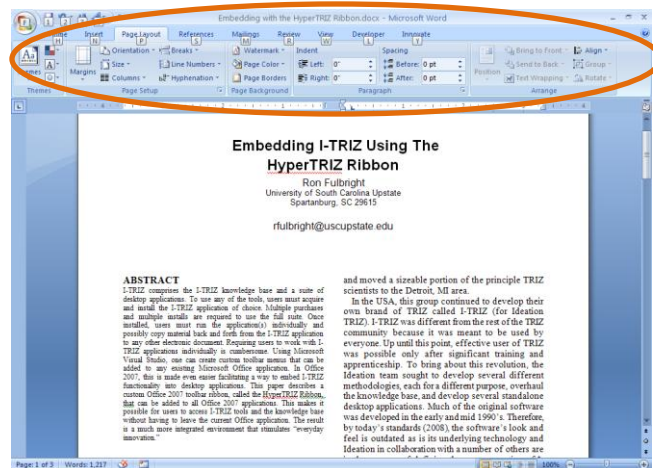
The ribbon replaces the menagerie of icons, menus, toolbars, and task panes that evolved over the years:

Word for Windows 1.0 (1989)
Common screen resolution: 640x480
Number of toolbars: 2

Microsoft Word 2002 (2001)
Common screen resolution: 1024x768
Number of toolbars: 30

User Interface Additions:
Task Panes (8)
On-Object UI: Paste Options
On-Object UI: Undo unwanted "Auto" actions
Smart Tags: Pink-squiggle recognized words
"Type a question for help" box

Microsoft Word 95 (1995)
Common screen resolution: 800x600
Number of toolbars: 9

User Interface Additions:
Red-squiggle spell checking
IntelliSense ("Auto" features)

Microsoft Word 2003 (2003)
Common screen resolution: 1024x768
Number of toolbars: 31

User Interface Additions:
Task Panes (11 new + 8 existing = 19 total)
Person Name Smart Tag Menu
ALT+click words to perform lookup actions

As is apparent in the last image, the proliferation of toolbars, menus, and panes complicated the user interface so much that it tended to overtake the work piece.

Microsoft invested years of research and development time in designing the Ribbon metaphor and it has been shown experimentally to greatly simplify the user interface and place functionality within a minimal number of clicks.

Microsoft has always made it possible for software developers to create custom toolbars and menus. In Office 2007, this is made even easier because the Ribbon's layout and content are controlled by extensible markup language (XML) files which can be user-defined. The following snippet shows an example of a custom layout (some text has been deleted for readability)

```
<customUI>
 <ribbon>
  <tabs>
    <tab id="CustomTab" label="Innovate">
      <group id="OperatorGroup" label="Operators">
       <button id="HyperTRIZ" imageMso=...
       <button id="UniversalOperators" ...
       <button id="GeneralOperators" ...
       <button id="SpecializedOperators" ...
       <button id="AuxiliaryOperators" ...
      </group>
      <group id="IdeaGroup" label="Ideas">
        <button id="NewIdea" imageMso="Pushpin" ...
        <button id="OpenIdeas" imageMso= ...
      </group>
      <group id="DiagrammingGroup" ...
       <button id="NewDiagram" ...
       <button id="OpenDiagram" ...
       <button id="SearchDiagrams" ...
      </group>
      <group id="CollaborateGroup" ...
       <button id="ChatWithOthers" ...
       <button id="BrowseSolutions" ...
       <button id="FindAnExpert" ...
      </group>
    </tab>
  </tabs>
 </ribbon>
</customUI>
```

This snippet would create a new tab labeled "Innovate" with 4 groups of buttons. Support for developing custom ribbons like this as an Add-In is provided in Visual Studio 2008. An Add-In is a compiled library of software that can be loaded by Windows applications. In this way, a custom ribbon can be developed and distributed to anyone via the Internet using a simply file download mechanism. Once installed on the user's machine, the custom toolbar will be available to be activated in any or all standard Office 2007 applications.

## 4. The HyperTRIZ Ribbon Prototype

We have developed a prototype custom ribbon demonstrating how I-TRIZ functionality can be embedded within Office 2007 applications. We call the prototype the HyperTRIZ Ribbon.
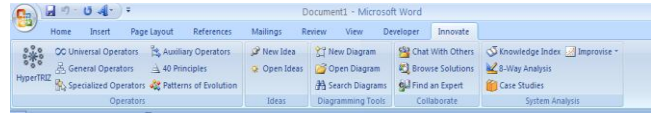
Notice that an additional tab labeled "Innovate" appears appended to the row of tabs already in the Office application (Microsoft Word in this case). The graphical representation shown here is done with actual code, but none of the functionality is implemented as of this writing. The icons and functions shown in this prototype are for proof-of-concept purposes only and are not intended to represent any final decisions on the contents of the ribbon or the functionality.

Operators Group

The left-most group in the ribbon is called "Operators" and contains links directly to operators or groups of operators from the I-TRIZ knowledge base.
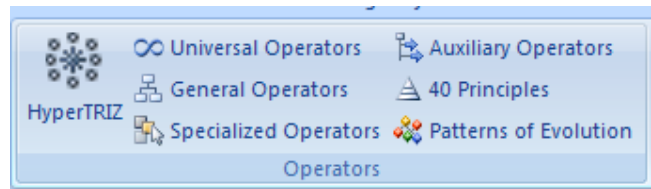

HyperTRIZ

The "HyperTRIZ" icon is intended to open an instance of the hyperbolic tree-based operator browser, shown below, and described in a separate document [4]. The other links in this group could launch the hyperbolic browser with the corresponding node centered and expanded already or it could display HTML-based pages similar to the current I-TRIZ software. In fact, the existing HTML pages themselves could be used with minimum modification. The concept behind this group of links is to give users an easy way to explore the I-TRIZ operator knowledge base.
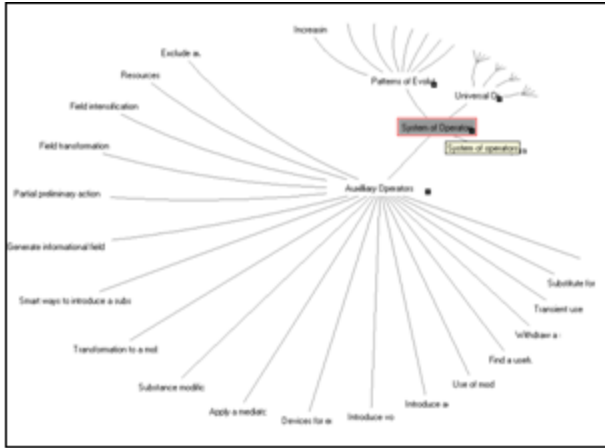
With current software, the user is insulated from the underlying knowledge base. While this is necessary to insure proper staging through the methodology, not every problem faced by users requires the time-consuming methodological approach. This kind of free and easy access directly into the knowledge base encourages learning and exploration. The fact that it is readily available in every Office application puts it at everyone's fingertips.

Ideas and Diagramming Groups

The next two groups, "Ideas" and "Diagramming Tools" give the user direct access to the Problem Formulator tool and the Idea List found in the existing I-TRIZ software.
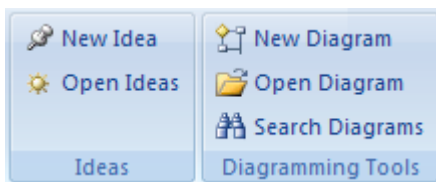

The Problem Formulator is a tool used to construct a situation diagram of the system under study. In the existing software, this step is done first and then the software directs the user to sets of applicable operators based on the diagram. The same functionality would be available through the HyperTRIZ Ribbon as well. However, because the ribbon is only one click away at all times, no matter which Office application they are currently using, ideas can be added or diagrams accessed at any time without having to leave the current application.

Search Diagrams

The "Search Diagrams" link would allow users to search by keyword for diagrams already completed. These diagrams could be stored locally (within one's company) or stored on a Web site. In this way, knowledge can be shared among I-TRIZ practitioners world-wide [5].

Collaborative Group

The "Collaborate" group is intended to suggest future communications capabilities with other members of the I-TRIZ community via the Internet [5].
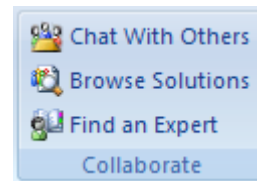
Chat With Others

This link opens an instant-message style chat session with I-TRIZ users around the world who are online at the same time. Because the HyperTRIZ Ribbon is embedded in an Office application, the chat sessions would be able to share the contents of the document being edited in addition to sharing any ideas or diagrams currently being worked with. Therefore, this link turns the Office application into a collaborative platform [5].

Browse Solutions

This link brings up a search screen allowing the user to find similar solutions from the community of online I-TRIZ users [5]. If the user has drawn a Problem Formulator diagram, the search screen could automatically search for matches with keywords in the diagram itself. This way, users could discover existing solutions (or near-solutions) to their problem.

Find an Expert

This feature allows a user to pose questions or ask for help with TRIZ, I-TRIZ, or a particular problem domain and have experts in the world-wide I-TRIZ community answer [5]. Because of the embedding, material can be copied directly from the document being edited and shared.

Systems Analysis Group

The "Systems Analysis" group demonstrates how various tools can be included in the HyperTRIZ Ribbon.
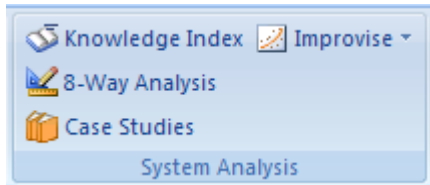
The Knowledge Index and 8-Way Analysis are materials in the existing I-TRIZ software. The Case Studies link is intended to give users direct access to the case studies as a library independent of the operators. The "Improvise" link causes a drop-down list of choices, also from the existing I-TRIZ software, that give users different entry points into the innovation process. The links shown in this paper are just a representative sample. Because the HyperTRIZ Ribbon is easily modified, it can be provisioned with any number and mixture of tools and links.

5. Uses for the HyperTRIZ Ribbon

The following are some ideas on how the HyperTRIZ Ribbon could be used to shape the future of I-TRIZ software.

Embedded Innovation

Innovative insight can happen at any time. Sometimes an innovative solution is the result of a directed, prolonged, focused, and methodical approach, but many times a thought occurs to someone while they are doing something else. We feel as though having to leave the Office application one is in, start a new application (an I-TRIZ application), open a project, select a tool or find a place in an existing project, etc. poses a barrier to users. With the HyperTRIZ Ribbon embedded in the Office application itself, the user is only a couple of mouse clicks away from accessing an I-TRIZ tool. The HyperTRIZ Ribbon also gives a user direct access to a tool or a feature without having to go through other materials. We feel that this kind of embedded access to tools supporting innovation is a very important concept.

Another reason to embed I-TRIZ into Office applications is that much of peoples' work is contained in Office documents. With the current I-TRIZ software, a user must re-create or copy and paste material from one or more applications to the I-TRIZ application itself (or vice versa). This is an unnecessary cumbersome burden that, again, throws up barriers to users. With the I-TRIZ tools embedded in the application, the substantive work contained in the Office documents are right there side-by-side with the tool. We feel that embedded innovation tools will become as important as embedded drawing or text editing tools. In fact, we envision a not too distant future in which employees have become *innovation workers* [6].

The Future I-TRIZ Software Platform

We are careful here not to suggest that the HyperTRIZ Ribbon replace *all* existing I-TRIZ software. Instead, we see the HyperTRIZ Ribbon as being a companion to the standalone software. One way this can happen is to make the HyperTRIZ Ribbon the place users go to purchase, download, and launch standalone applications. So far in this paper, we have described tools and links that would be included as part of the HyperTRIZ Ribbon itself or be available via the Internet. There is no reason why the HyperTRIZ Ribbon could not simply launch a standalone I-TRIZ application. In fact, software within the HyperTRIZ Ribbon could automatically check for updates and suggest upgrades to the user. This kind of thing is commonly done by "watchdog" applications that install with software and run in the background. These tend to accumulate on users' computers and slow the machine down or occupy Internet bandwidth when the least desired. Placing such "watachdog" software within the HyperTRIZ Ribbon means that the overhead of checking for updates will not occur until the user uses the I-TRIZ tools.

Standalone Application UI

As seen in the Microsoft Office 2007 applications, the user interface is changing to the ribbon-based metaphor across the board. Current I-TRIZ software uses the old menu and toolbar approach to the user interface. Microsoft research has shown users take less time to navigate and use the ribbon than they did using the menu/toolbar user interface. Current versions of Microsoft Visual Studio readily support the creation of custom applications employing the new ribbon-based metaphor. Therefore, we think that any and all current I-TRIZ standalone applications be converted to the ribbon-based user interface with their

next revision. This will certainly update the user interface as well as increase usability.

Open-Source Community

We feel that in order for I-TRIZ to become used by millions of people across the world, an open-source community must evolve on the Internet and we see the HyperTRIZ Ribbon being the ideal interface the average user has to this community. The search, chat, and community-based services suggested by the prototype are the basic features of modern community-based virtual societies and we certainly see I-TRIZ as heading toward this future [5].

6. Works Cited

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