Inventions on Menu Interfacing for GUI Applications, A TRIZ based Analysis, Part-3

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A TRIZ based Analysis, Part-3*

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Background

We analyzed ten inventions on menu interfacing in the previous two parts of the article. We analyzed the problems faced in the prior art, the Ideal Final Result to be achieved, the contradictions faced to achieve those IFRs and the Inventive Principles used to solve those contradictions.

We will analyze five more inventions in this concluding part. After analysis of all 15 patents we will try to draw the summary and finding of the study.

The inventions discussed in this section are as follows.

1. Pie menu
2. Menu configuration using heuristic factors
3. Radial Menu
4. Dragging menu items to toolbar
5. Barrier around the menu item

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Invention- 11: Pie Menu

Conventionally the menus are displayed in a linear fashion. This method is ok for small number of items. When there is a long list of items, the linear display is not suitable. Only the first few are remembered and the last items remain beyond the display area. Besides it takes long time to scroll through a long list to find an item at the bottom.

Ideal Final Result:
- All menu items should be displayed within the limited screen space.
- The user should not face any difficulty in searching the menu items.

Contradiction:
- You cannot display all menu items within the limited screen size. Screen size cannot be increased because of other constraints.
- There should be minimum number of menu items so the user does not face difficulties in searching a menu. But there should be maximum number of menu items to optimize the benefit of menu system.

Inventive Principle:
- Use a non-linear display of menu items (Principle – Curve).
- Organize the items in a hierarchical structure of importance (Principle- Parameter Change).

Example Invention:
Patent 6549219 (Invented by Selker, assigned to IBM, April 03) disclosed a method of concentrically arranged multiple pie menus. The center most location contains menus of greater importance or higher probability. The menu items are organized from center to the outer border in the order of decreasing importance.
Invention- 12: Menu configuration using heuristic factors

The prevailing menu management mechanisms maintain relatively rigid system of menu arrangement. Fixed content menus are never rearranged. Variable content menus change only in strict sequences based on user’s recent selections. The parameters like recency and frequency are not sufficient to display the visibility of the menu.

Ideal Final Result:
- The arrangement of the menu should change automatically to suite the user’s need.

Problem:
- If the menu is programmed to adjust itself for user, it will not suit another user on the same computer.
- A person may work on different utilities at different times, If the menu is adjusted to one utility, it will not suit to the other.

Inventive Principle:
- Adjust the menu for different heuristic factors (Principle- Dynamise).
- Combine all the heuristic factors for menu management (Principle- Composite).

Example Patent:
Patent 6583793 (Invented by Roth, Assigned to IBM, June 03) discloses a method of arranging the menu through automatic heuristic control. The features include time of the day as a heuristic factor to affect the automatic arrangement of menu. Besides the user can configure the menu to change according to change in time.
**Invention- 13: Radial menu**

Sometimes selecting the appropriate menu is a time consuming process. The user has to navigate through menus and sub menus to find the appropriate item to select. There are alternative options like using a hot key to access a function or using a toolbar button etc. But how to achieve this functionality by using menus?

**Ideal Final Result:**
- The desired item should be displayed automatically by the system.
- The menu should occupy minimum screen space.

**Contradiction:**
- The conventional linear menus show less number of items as they require more screen space.

**Inventive Principle:**
- Display the menu items in circle (Principle- Curve) in contrast to the conventional linear display. But a radial or pie menu also has limitations.
- Use a combination of a radial marking menu (Principle- Curve) and a linear menu in the same display (Principle- Another dimension).

**Example Invention:**

Patent 6618063 (Invented by Gorden Kurtenbach, assigned to Silicon Graphics, Sept 2003) invents to combine radial marking menu with linear menu in the same display. Item selection in the linear portion is performed by location selection using a pointing device. Item selection in the marker position is determined by the pattern of a stroke made by the pointing device.
Invention- 14: Dragging menu items to toolbar

Accessing an option through navigating a menu tree is time taking. This is worse in case of a sub-menu item which needs to activate and go through several level of menu by controlling the mouse pointer. Selecting an item on a toolbar is faster as it does not require activation of any menu. On the other hand a toolbar permanently occupies some real estate on the GUI.

Ideal Final Result:

- The items in the menu should be accessible in a single click.

Contradiction:

- If menu items are displayed permanently like toolbar items, they will occupy more screen space. If menu boxes are collapsed then the user has to click several times to navigate the menu.

Inventive Principle:

- Drag more frequently used option from a sub-menu to the toolbar (Principle-Taking out). The accessibility of the item is changed (Principle- Parameter Change) to be accessed by a single click.

Example Invention:

US Patent 6621532 (invented by Mandt, assigned to IBM, Sep 03) discloses a method of dragging pull down menu items onto a toolbar. According to the invention when the user drags a menu item and drops on the toolbar, the menu is automatically converted to a toolbar button. This facilitates the user to easily access the option during later use.
Invention- 15: Barrier around the menu item

A menu is operated by using a pointing device like mouse. Sometimes there are chances of the pointer moving slightly longer or shorter to click an undesired item. The case is worse when the user clicks some risky items like, close, print etc. How to reduce the chances of error? One option is to use a confirmation dialog box. But that adds extra effort to the user.

Ideal Final Result:
- The menu should not allow the user to make any mistake.

Contradiction:
- If the menu asks for a confirmation (or any obstacle) for every click, the system will be slow and irritating. If there is no obstacle then there is possibility of clicking a wrong item.

Inventive Principles:
- Protect the risky menu items through some mechanism (Principle- Prior Counteraction).
- Isolate risky items from other items (Principle- Taking out).

Example Patent:
Patent 6628315 (Invented by Smith Dawkins et al. Assigned to IBM, Sep 03) discloses a method of providing a barrier around the menu choice which reduces the chance of selection errors. As per the invention, the problem items in the menu will have a barrier. But the barrier will not impede the movement of the pointer. Although the mouse can flow freely on the menu, the option in the menu becomes unselectable unless the pointer comes through a desired path. The pointer has to go through an opening in the barrier to make the option selectable.
Summary and Findings:

Each invention tries make the menu system better, more adaptive and more powerful. If we make a list of the features of an ideal menu system, we can find that each invention attempts to achieve some or other feature of the ideal menu system. Each successive invention proposes a better idea than the previous. In other words, each successive invention takes the menu system towards its ideality little by little.

As we can observe, there are some predominant issues in a menu system, such as, conserving screen space, quick finding of the menu items, auto adjustability, user configurability etc. which are addressed repeatedly by different inventions in the past. Interestingly, the same issues will be addressed in the future inventions too.

Although the same issues are addressed again and again by different inventions, each invention addresses the issue differently and tries to eliminate the contradiction in a different way. We can observe that each solution use different Inventive principles, or different combination of Inventive Principles.

Sometimes a better solution may use many Inventive Principles as in case of Invention-6 above (Patent 6121968). But no such correlation is established from the study.

Sometimes a single invention/ patent addresses to multiple problems. Although a single Inventive Principle can address to multiple problems, (from this study and other similar studies), it is apparent that patents addressing multiple problems use more Inventive Principles.

The methods of TRIZ, such as Ideality, contradiction and inventive principles are suitable for analyzing software inventions. A systematic application of TRIZ principles and techniques can further address the current limitations and invent an even better menu system for future generation applications.
About the author

After working for more than 18 years in various fields of Information Technology Umakant is currently doing independent research on TRIZ and IT since 2004. He last worked as Director and Chief Technology Officer (2000-2004) in CREAX Information Technologies (Bangalore). Before that he worked as IS/IT manager (1996-2000) for ActionAid India (Bangalore).

Umakant is a Master in Philosophy (MA), Master in Business Administration (MBA), Bachelor in Law and Logic (LLB), Microsoft Certified Systems Engineer (MCSE-I), Certified Novel Engineer (CNE), Master Certified Novell Engineer (MCNE), Certified Intranet Manager (CIM), Certified Internet Professional (CIP), Certified Software Test Manager (CSTM) and holds many other global IT certifications.