

# Using MINDMAPS™ \* with TRIZ

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## Abstract

MindMaps™ are a concise way of displaying notes and information and their associations. Tony Buzan developed Mind Maps as an efficient way of using the brain's ability for association. Association plays a dominant role in nearly every mental function, and words themselves are no exception. Every single word and idea has numerous links attaching it to other ideas and concepts.

To make a MindMap, one starts in the centre of the page and works outwards in all directions in a tree root like manner to produce an organised list. The MindMap can be enhanced through the use of images, colour, outlining / emphasis, shapes, icons, codes, patterns, and links. This large amount of information together with their associations can stimulate us to generate new ideas and associations that have not previously been thought of. They can also be used to organise and show structure to your notes.

These attributes make MindMaps an ideal partner when using TRIZ for problem solving and inventing. MindMaps can be usefully applied at a number of stages in the problem definition, problem solving and solution evaluation phases of a problem. We typically use them to help define a problem, analyse resources and constraints, and then provide a structure during the brainstorming of problem solutions. A typical application sees MindMaps being used to record the ideas generated in the brainstorming sessions associated with exploring a contradiction. Using the main branches to display the idea concept and the lower branch to show the idea and twigs to show implementation, one can easily move between the different hierarchical layers of a problem and its solution possibilities. At the end of a typical session, the MindMap is already sorted by area or concept, making it easier to produce a list for ranking, as well as providing a common basis upon which all participants can see how the big picture is formed from the individual details.

In defining a problem, a MindMap can be used in a similar fashion by starting at the centre with the super-system and working outwards and down through to the sub-system level. MindMaps thus help to focus on each part of the system in turn and allow a problem to be broken down to the root cause.

There are several software packages <<http://www.mindjet.com/>> that can be used to produce MindMaps, but they are not discussed here as the best MindMaps are produced using large sheets of paper and pens in the hands of all the participants. Allowing everyone to contribute to the idea MindMap ensures that nobody feels that their ideas have been lost or discarded and it encourages a structured organisation of the ideas. Because each item on the MindMap can become the centre of a new MindMap, you do not run out of paper, but just start a fresh MindMap.

## Introduction

Although TRIZ offers good methods for solving problems and developing products and ideas, it does not suggest ways of displaying and enhancing the search for solutions and new ideas. This does not mean that we shouldn't use the method. It does mean that use of TRIZ can be greatly enhanced through integration with thinking frameworks which are aligned with the ways in which the human brain functions.

Tony Buzan developed MindMaps™ as a concise way of displaying notes, information and their association(s). MindMaps have been used to help organise lists, agendas and 'brainstorming' sessions since the 1980's. Not only can we use a MindMap to help us when using TRIZ principles, but we can also use a MindMap to represent how we might use TRIZ. Figure 1 shows a MindMap created from the way TRIZ is depicted in the Step-by-Step TRIZ book (Reference 3). A MindMap tends to be personal to the person or group who developed it, so the MindMap that another individual might develop is likely to be similar but not identical.

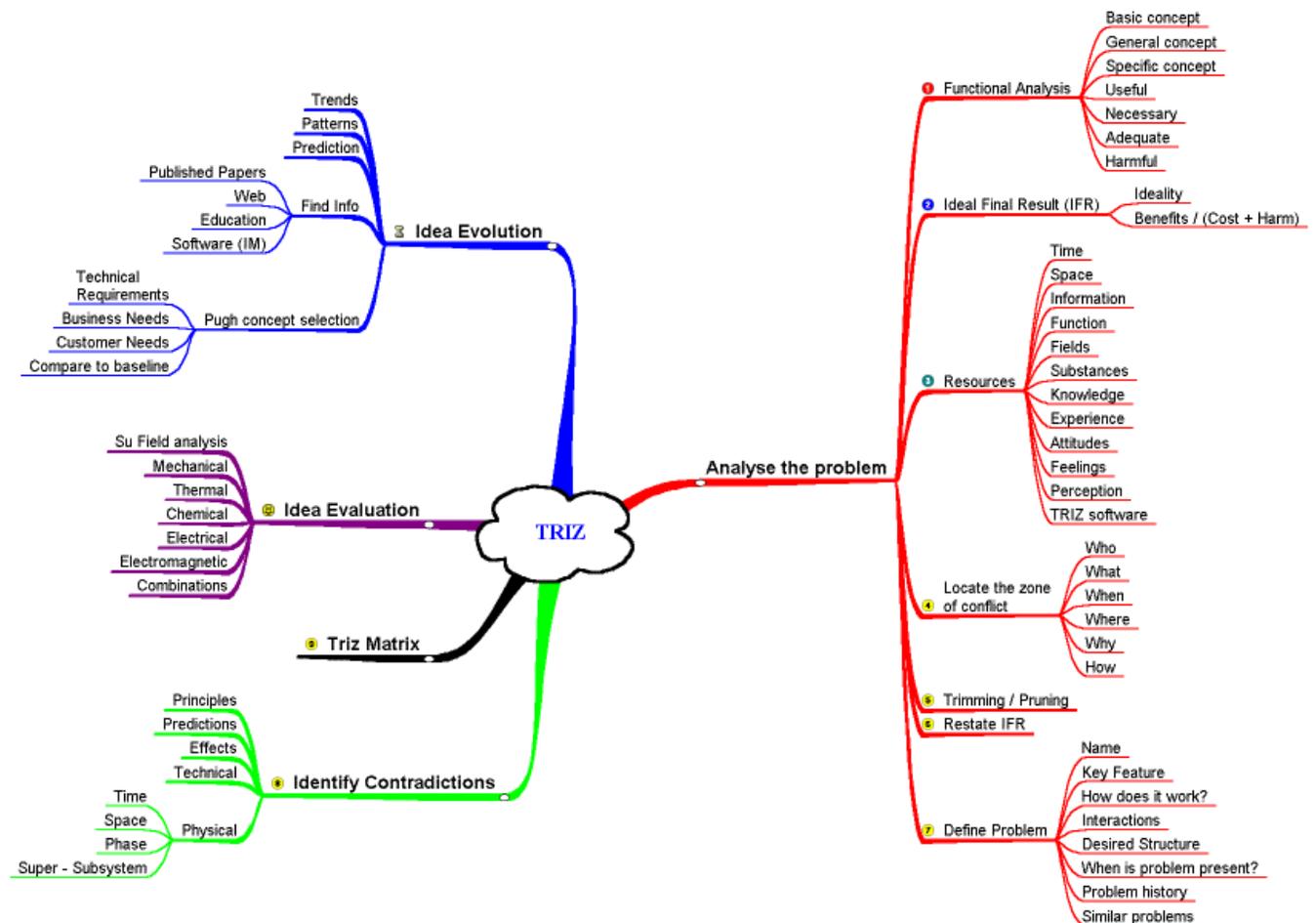


Figure 1: Summary of TRIZ - "Step by Step TRIZ"

To make a MindMap, one starts in the centre of the page by stating the overall (or supersystem) concept or idea or stated task. Working outwards in all directions in a tree like manner first the concepts or principles are added as branches. Then continuing outwards to the ideas are added to form the 'leaves' of the tree giving an organised list. Arrows can be added to show association together with shapes and patterns to help with memorising and association. The MindMap can be enhanced through the use of images, colour,

outlining / emphasis, shapes, icons, codes, patterns, and links. This large amount of information together with their associations can stimulate us to generate new ideas and associations that have not previously been thought of. They can also be used to organise and show structure to your notes. It is possible to add an idea as a 'leaf' without having a concept to hang it onto - you can go back later when the ideas have dried up to work that out.

Because association plays a dominant role in nearly every mental function, and words themselves are no exception, the MindMap arrangement helps our brain make those links.

Each item on the MindMap can become the centre of a new MindMap, just take a fresh piece of paper and place the concept or idea you want to expand in the centre.

For clarity in this document I have used electronic versions of the MindMaps that were generated, though normally in a face-to-face session these would be drawn on large pieces of paper, with each person having a pen to add their input. Some software permits virtual MindMaps to be generated by remote groups of people. The software used to generate these MindMaps was MindManager 3.5 from M-Urge (in the UK) or Mindjet (in the USA) <<http://www.mindjet.com>>.

### **TRIZ and MindMaps**

By way of an example, we will use a typical problem that exists at work - and indeed at many other places I have visited - that of where to park your car. The UK Government is in the process of passing a variety of laws to encourage us to use alternative means to get to and from work in order to reduce the congestion on our roads. One of these, is to place a tax (or charge) on workplace car parking. You will see that as we progress through the TRIZ view on the problem and couple this with the reactions of the people this exercise was done with, it becomes apparent that the Government did not think through its ideas nor to work out how people would react - perhaps they should be using TRIZ and MindMaps!

The target was to see whether we could use a small group of people to come up with viable solutions all within the space of their lunch break.

The first step (see Figure 1) is to analyse the problem, by asking the group to record their perception of the problem onto a MindMap. The group were allowed 5 minutes. At this stage, it is best to try not to suggest any solutions, though inevitable some will emerge - make sure there is somewhere to record them.

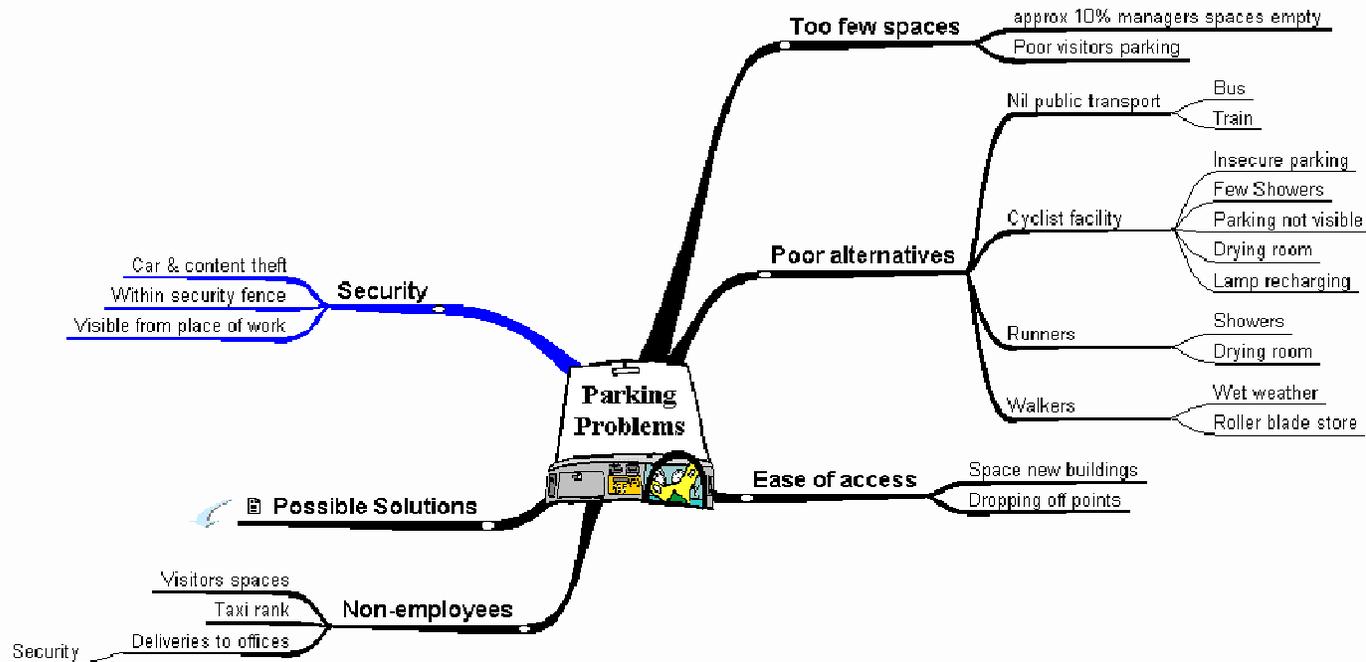


Figure 2: MindMap of perceived parking problem

The results show that, fairly naturally, the group concentrated on the problems they encounter and not on the wider problem of too many cars for the road structure. Since several suggested solutions emerged from the problem perception, it seemed worthwhile to spend another couple of minutes to see if a 'good' solution to these emerged without using TRIZ.

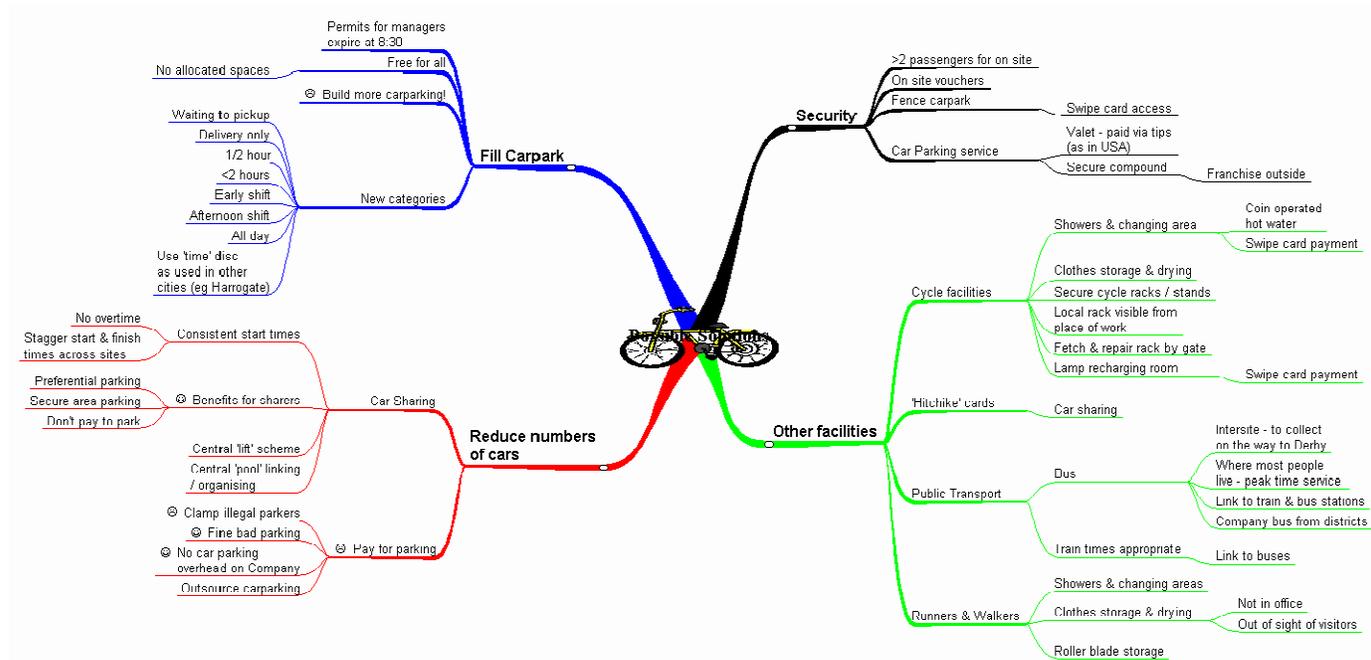


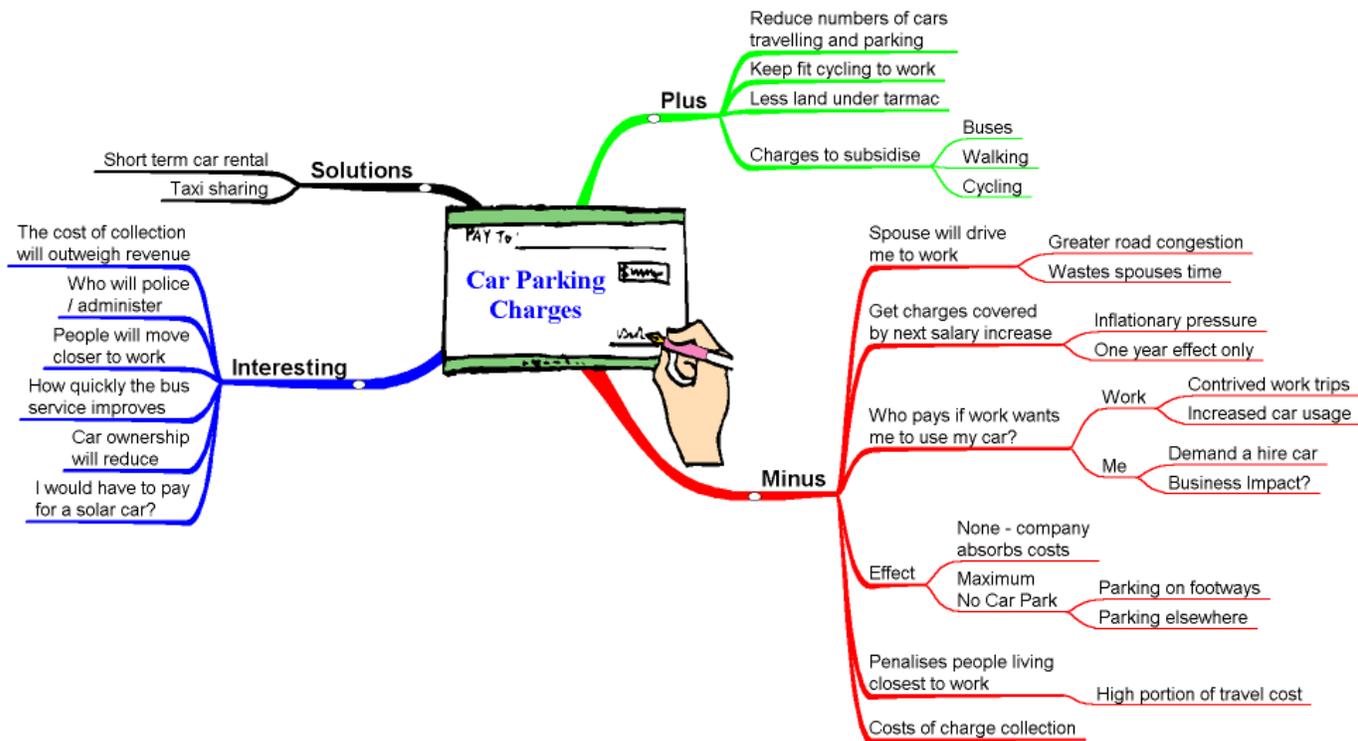
Figure 3: MindMap of solutions to the parking problem

This started to flush out some of the issues, and lead us to an Ideal Final Result statement.

The **Ideal Final Result (IFR)** would leave no vehicles in the car park, the journey to work would be from home to work (door-to-door), with your vehicle being the only one on the road, costing nothing, causing no pollution, at a time of your choosing, with perfect security, travelling time negligible, and still leave the car available for your spouse to use during the day.

The feeling was that people would be very happy for everyone else to go to work by public transport, leaving the roads free for them to go to work when they wanted with no traffic congestion and for there always to be a parking space waiting for them. No one wanted to be amongst those 'inconvenienced' by having to use another form of transport.

This seemed an appropriate time to evaluate the Government's idea that car parking spaces at work should be taxed, and the employee to pay for the privilege of parking (car or motorbike or pedal cycle). The evaluation was done using de Bono's PMI (Plus-Minus-Interesting) tool, but using a MindMap to display the results. Everyone was given a green pen and asked to think of positive statements relating to the Government's idea. When this was exhausted they were given a red pen to think of negative things about the idea. Finally they were given a blue pen to record interesting thoughts along the lines: "I wonder if.....". The PMI was repeated. Solutions (ways of overcoming the negative points) were recorded that emerged in black on a fourth branch of the MindMap. The result is shown in Figure 4. This shows that the idea is likely to generate some income for the Government, plenty of resentment, and little change in the long term, with very little benefit to the nation or the environment and only marginal reduction in congestion.



**Figure 4: PMI on introduction of Government Car Parking space charges**

We have defined the problem as we perceive it, stated an IFR, and recorded our initial solutions and ideas. The problem is clearly not just the physical problem of a space to park a car, but mainly the social problem of persuading people to change their ways, and a management problem of controlling the situation.

We have physical contradictions of: wanting a car to get to work and not wanting a car when we get there (i.e. nothing to park); wanting a car each, and wanting people to share; wanting no cars on the road when we are driving, and don't mind when we're not driving.

TRIZ suggests using:

- **Separation in time**  
Dynamics, Partial Action, Preliminary Action, Mechanical Vibration, Periodic Action, Beforehand Cushioning, Skipping, Preliminary Anti-action, Pneumatics & Hydraulics, Discarding & Recovering
- **Transition to subsystem**  
Segmentation, Cheap Short Living
- **Transition to supersystem**  
Merging, Blessing in disguise
- **Transition to an Alternative System**  
Self-Service, Universality
- **Transition to Inverse system**  
Other way around (inversion)

Splitting the group into two with each selecting two principles they thought might produce workable solutions, further ideas were recorded on self-sticky paper. In the final few minutes these were added to the solutions MindMap generated earlier. The final MindMap is given in Figure 5.

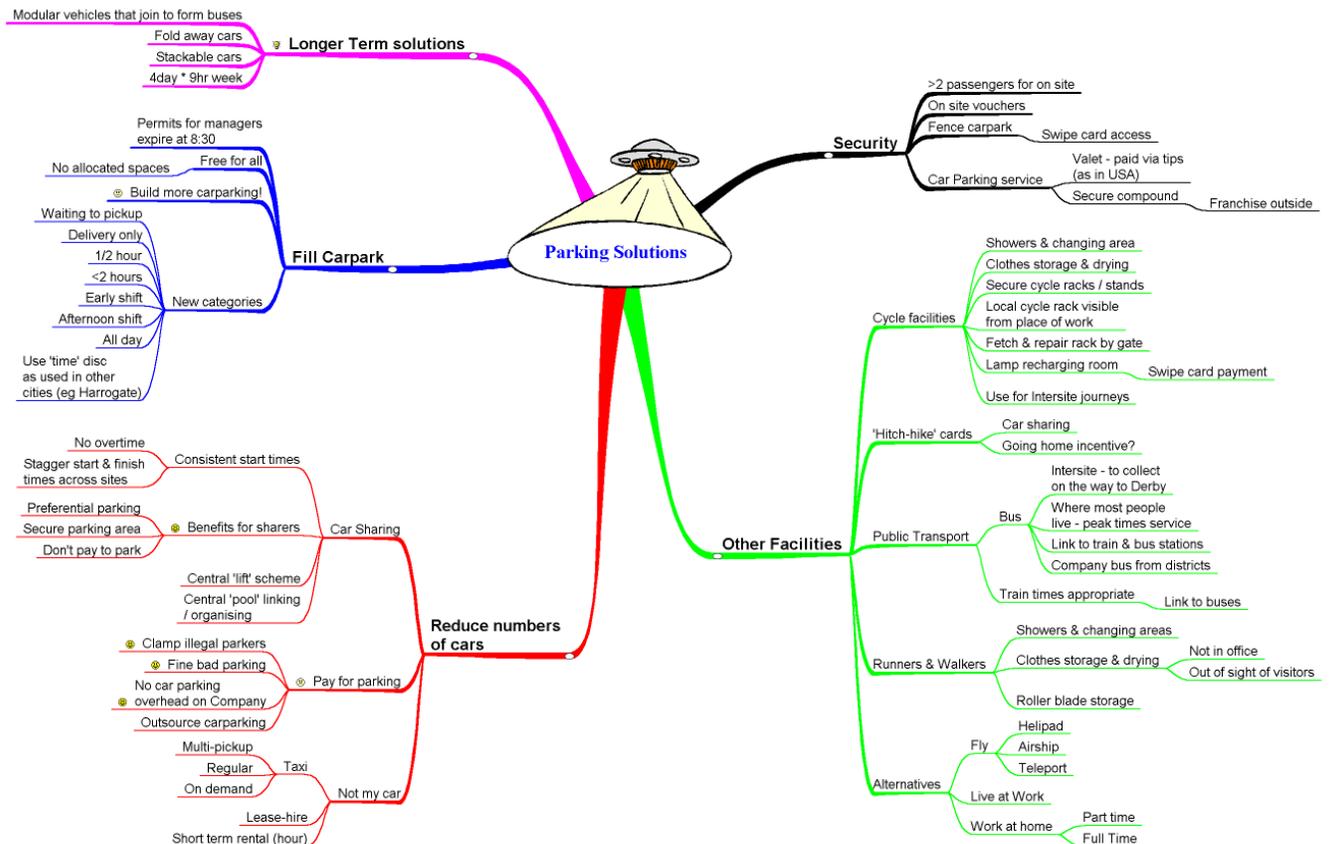


Figure 5: Final MindMap of Parking Solutions

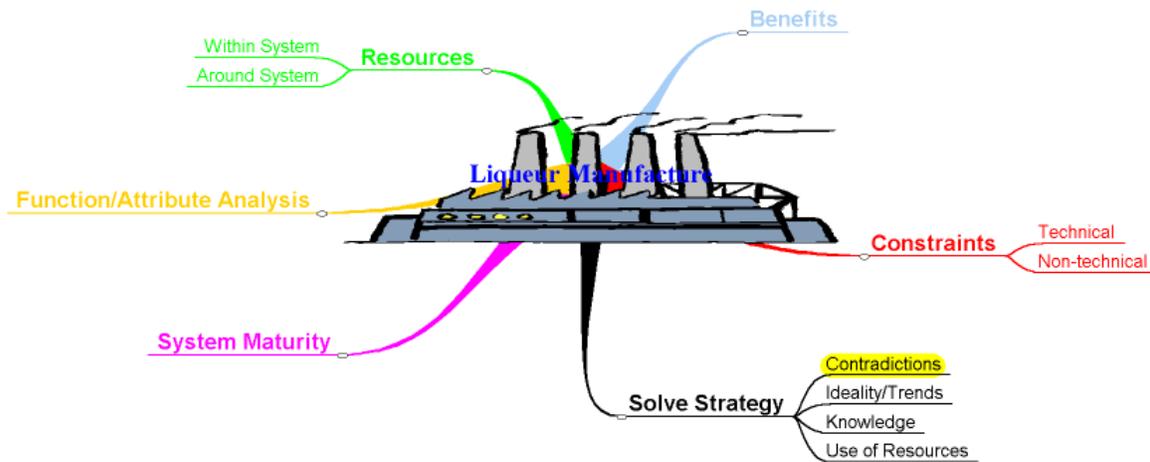
This exercise above serves to show how MindMaps can be used to help in recording TRIZ sessions.

The car parking problem was run as an exercise and was not exposed to a rigorous TRIZ study. It does serve to show how the use of MindMaps can help to record and assist the problem solving process.

We can use MindMaps to present very large quantities of information in a way which is both compact - as was shown in the 'one-page' view of TRIZ illustrated in Figure 1 - and closely allied to the way in which our brains operate. We can also use MindMaps at a more detailed level to focus in on a part of the problem - as shown in say Figure 4 - or, as suggested earlier to provide a structure when using the Contradictions and Inventive Principles parts of TRIZ. The following MindMaps (Figures 6 to 8), for example, illustrate the construction of a hierarchy of mind-maps concerning the classic TRIZ 'liqueur chocolates' case study.

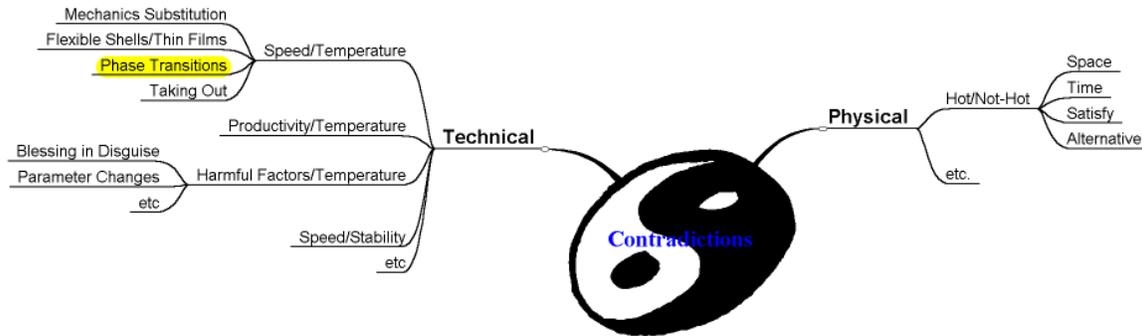
The liqueur chocolates scenario, for those unfamiliar with it, involves a limiting contradiction associated with the manufacture of chocolate 'bottles' filled with a liqueur. The contradiction involves our desire to improve production rate ('SPEED' in terms of the Contradiction Matrix). To date we have improved speed by increasing the temperature of the liqueur filling in order to reduce its viscosity and thus improve the rate at which we can pump it into the chocolate bottles. Now we have increased the temperature to a point where we are beginning to melt the chocolate.

The first MindMap (Figure 6) illustrates our overall approach to the problem. Being a limiting contradiction, we have identified Contradictions, Trends and Knowledge as the three TRIZ tools most likely to help solve the problem. Used as a foundation, this MindMap serves to prompt us to ensure that we evaluate all identified solution routes rather than, as is common, simply applying one technique.



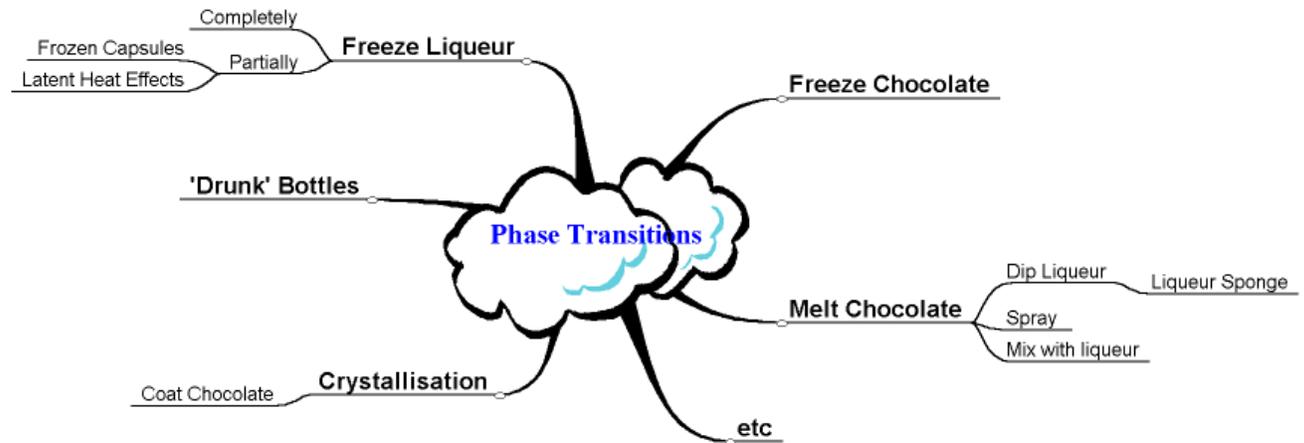
**Figure 6: Liqueur Chocolates - Overall Mind Map**

From this MindMap we proceed to another (Figure 7), which we have drawn to help us to think about just the Contradictions part of the problem. In the figure, we have identified a number of contradictions and obtained several Inventive Principle solution triggers. Again the Map serves as a prompt to ensure we consider all possibilities.



**Figure 7: Liqueur Chocolates - Contradictions Mind Map**

The final MindMap (Figure 8) represents one of the Maps drawn for each of the identified Inventive Principles. In this Map, the Principle is used as the focus for a systematic brainstorm to connect the Principle to the problem.



**Figure 8: Liqueur Chocolates - Inventive Principle MindMap**

As with the preceding car park example, we would usually take the Figure 8 output alongside other similar pictures obtained for other Principles and cascade it upwards to the Figure 7 Map until we have explored all of the previously identified branches. Similarly we would cascade the completed Figure 7 Map back up to the Figure 6 Map along with the other Maps constructed for Trends and Knowledge, until we are able to complete all of the Figure 6 branches.

### Conclusions

MindMaps can be used with TRIZ and other tools help generate further solutions that you would not otherwise have thought about. In do so it provides a suitable means to record and provide a framework for the ideas and solutions generated during the working sessions. Using the MindMap to group concepts and ideas can help to trigger further ideas and solutions.

The car park exercise given above only took a short time to do (a half hour lunch break), but the layout and number of ideas show what can be done in a short time compared with other methods. These MindMaps together with minimal explanation were submitted to our site services department, and resulted in provision of:

- Intersite bus, that also includes the local cycle repair shop on its route;
- A shower and changing facilities (no charge for their use);
- Lockers for storage (big enough to fit roller blades!);
- Clothes drying area, out of sight from visitors;
- A bus link to the bus and train station;
- A bus link to the local supermarket;
- Bus timetables available at reception;
- Car sharing / car pooling match up service (via the computer);
- Cycle parking visible from the security lodge.

Our brains love solutions and are highly prone to diversion when someone in a brainstorming session derives a 'good idea'. This is an inevitable part of the problem solving process. The framework offered by MindMaps gives us a structured road-map of all the solution routes for a given problem, and thus allows us to maintain a systematic problem solving approach when we wish to return from the euphoria of one good solution in order to continue the search for other - possibly stronger - solutions.

## References

- Reference 1: **Yuri Salamatov, "TRIZ: The Right Solution at the Right Time - a guide to inventive problem solving", Insytec B.V., 1999 ISBN 90-804680-1-0**
- Reference 2: **Tony Buzan, "The MindMap Book", BBC Books, 1993-1999 ISBN 0-563-37101-3**
- Reference 3: **John Terninko, Alla Zusman, Boris Zlotin, "Step-by-Step TRIZ: Creating Innovative Solution Concepts", Responsible Management <<http://www.mv.com/ipusers/rm>> Inc., 1996 ISBN 1-882382-12-9**