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Titanic TRIZ: A Universal Case Study

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EXECUTIVE SUMMARY

When teaching TRIZ to groups of people from a wide variety of technical and cultural backgrounds, it is important to use a case study that they can all understand. Because of the world-wide popularity of the movie ***Titanic, the*** problem of rescuing all the people on board can be used easily with such audiences. (Ref. 1)

THE SITUATION

There are frequent opportunities to introduce people to TRIZ in a 3-4 hour workshop, generally a pre-conference tutorial at a convention. (Ref. 2) The participants want to learn actual skills, not just learn about TRIZ. The instructor has to teach a sub-set of the TRIZ concepts, and stimulate the participants to get serious TRIZ training at a later time. In a convention setting, however, the participants come from a wide variety of companies, universities, and government agencies, and have very different technical backgrounds. A case study using a technical electrical engineering example would not be meaningful to the people with chemical or mechanical engineering or software development specialties, for instance.

The situation of rescuing the passengers and crew of the ship Titanic was chosen because of the world-wide popularity of the movie. (Ref. 3) The technical situation is well-known to the conference participants, and very little time is spent defining the basic parameters, as follows:

- The ship has just hit the iceberg
- The engines are still running, but will stop after an unknown period of time
- The ship will sink in 2 hours, and the ship's officers know this
- The nearest rescue ship is 4 hours away
- There are enough seats in the lifeboats for 1178 people, and there are 2224 on board.
- In the North Atlantic, a person in the water can live approximately 4 minutes.

THE TUTORIAL CURRICULUM

For a 3-hour conference presentation, this situation can be used to teach the following:

1. The Ideal Final Result
2. The use of available resources
3. Technical contradictions and the 40 principles

For a 4-hour workshop, the instructor can add more detail to each of these, or add the physical contradiction to the list of TRIZ tools that the participants sample. The 40 principles and the technical contradiction were chosen because it is an easy concept to teach in a short period of time, references are readily available, and the contradiction matrix is a tangible tool that the participants can show others in their organization, to help stimulate the desire to learn "serious" TRIZ.

FIGURE 1. The initial conditions of the problem.

The Ideal Final Result is taught conventionally, (Ref. 4,5) with the instructor briefly introducing the concept, then leading discussion. If there are more than 30 people (the process has been used with 10 to 140 people), small group discussions are organized, then each group reports on its conclusions.

The use of resources is taught experientially, for any size group. The TRIZ concept of resources is introduced briefly, by presenting a list with a few examples.

- Substance resources
  ⇒ Cabins (First class, 2nd class, 3d class)
  ⇒ Kitchen and pantry
  ⇒ Engine room, machine shop, cargo hold
  ⇒ External environment
- Field resources
  ⇒ Energy, momentum
- Functional resources
  ⇒ Buoyancy
  ⇒ Insulation
- Space resources
  ⇒ Surface, volume
- Time resources
  ⇒ Parallel operations

Teams are created to "search" each of the areas for all the categories of resources, and to develop ideas for the use of the resources within the time constraints of the problem. Every group has found unique, interesting, and plausible solutions, ranging from the slightly ridiculous (take the lard from the kitchen and smear it on your body as insulation and flotation, then use the empty lard container as more flotation) to the true breakthrough (use the kinetic energy of the ship to get back as close as possible to the iceberg, then use the lifeboats to shuttle people from the Titanic to the iceberg. They only have to sit there for 2 hours until rescue comes, and they will be out of the water. The group usually amplifies this idea with lots of other resources such as fur coats, mattresses, ropes to climb with, etc.)

In the course of looking for resources, the participants usually develop several technical contradictions, which can then be used to demonstrate the use of the contradiction matrix and the 40 principles (Ref. 6) If they do not, the instructor should be prepared with a few, such as the problem of the lifeboat:

- We want to increase the number of people in the lifeboat. This increases the weight in the boat.
- But, the boat has less freeboard (rides lower in the water) and could swamp, killing all on board. This is a reduction in length of a moving object, in terms of the contradiction matrix.

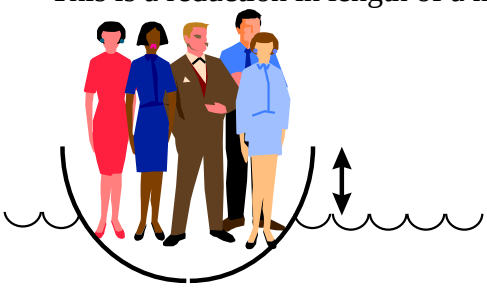

FIGURE 2. The technical contradiction in the lifeboat. As you add more people (weight) you get less freeboard (the distance from the gunwale of the boat to the water, shown by the arrow)

This contradiction leads us to principles 15, 8, 29, and 34, all of which can be used to develop very plausible solutions using the available resources in the short time that the Titanic's crew and passengers had available.

CONCLUSIONS

Teaching TRIZ in a short time at a pre-conference tutorial is different from teaching TRIZ in a multi-day class. The objective is to teach the participants enough TRIZ that they will be able to use it on simple situation, and will be motivated to learn more. The Titanic case study is very useful because it requires very little time to explain the situation, it is very memorable since it builds on common culture, and it impresses the participants since they themselves create the solutions that save all the people, in a very short time.

REFERENCES

1. Ellen MacGran developed the Titanic case study as a classroom exercise in Ellen Domb's Advanced TRIZ class, because her company problems were proprietary, and could not be discussed with others in the class. That led directly to the development of the conference presentation version of this case.
2. E. Domb, Tutorial Proceedings of the 11th QFD Symposium, 1999. This tutorial has also been presented at the Council for Continuous Improvement, Detroit, October, 1999, the International Association for Management of Technology, Miami, February, 2000, and the California Council for Quality and Service, San Diego, March, 2000. (Note for the TRIZ Journal, March, 2003—This tutorial has been successful in Japan, Singapore, the UK, and the Netherlands, showing the cultural robustness of the Titanic story. It was most recently presented at the American Society for Quality Six Sigma Conference, Palm Springs, CA January, 2003, and was very successful in getting Six Sigma Black Belts and Master Black Belts, who frequently are required to solve problems quickly, using existing resources, to appreciate how TRIZ can help them.)
3. The movie "Titanic"—both the 1997 version and the 1930's version.
4. E. Domb. "Using the Ideal Final Result to Define the Problem to Be Solved" June, 1998, The TRIZ Journal, http://www.triz-journal.com
5. E. Domb. "The Ideal Final Result Tutorial" February, 1997, The TRIZ Journal, ***HTTP***://www.triz-journal.com

6. E. Domb and J. Kowalick. "Contradictions: The Air Bag Case Study." July, 1997, and D. Mann and E. Domb, "The 40 Principles—Business Examples." September, 1999, The TRIZ Journal, ***http***://www.triz-journal.com

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