Why Triz is a whizz

Tom Shelley reports on recent developments in Triz, and why every company that designs new products needs to be aware of them

Along with the 39 features and 40 inventive principles that Triz has identified as underlying all patented developments, there are two other powerful tools that now form an essential part of the armoury. In all, eight technical trends have been identified, as well as a nine-box technique to enable looking outside – and inside – the original problem to find lateral solutions.

These techniques help pinpoint optimum solutions to design problems. They are also becoming essential to apply, if UK companies are not to be outsmarted by applicants for patents by competing companies (and countries) that already use these techniques.

In particular, failure to embrace Triz techniques could mean somebody else taking your patented ideas and either finding ways to patent these themselves – or patenting variants and applications so that the original patent becomes useless without licensing these additional patents.

The original notion of Triz is Russian. So just as Russia produces chess masters, it also produces Triz masters. And while Russian naval patent officer Genrich Altshuller invented it in 1946, many of the modern Triz masters now come from elsewhere. And while BAE Systems engineer Andrew Martin, whom we recently encountered instructing a class of engineers on behalf of Oxford Creativity, does not bear such a title officially, he certainly showed himself to be an expert.

Oxford Creativity director Karen Gadd says Triz is very simple and, true enough, after a few days' instruction, it is possible to make use of it. However, it is no panacea, says Martin, referring to the features and principles.

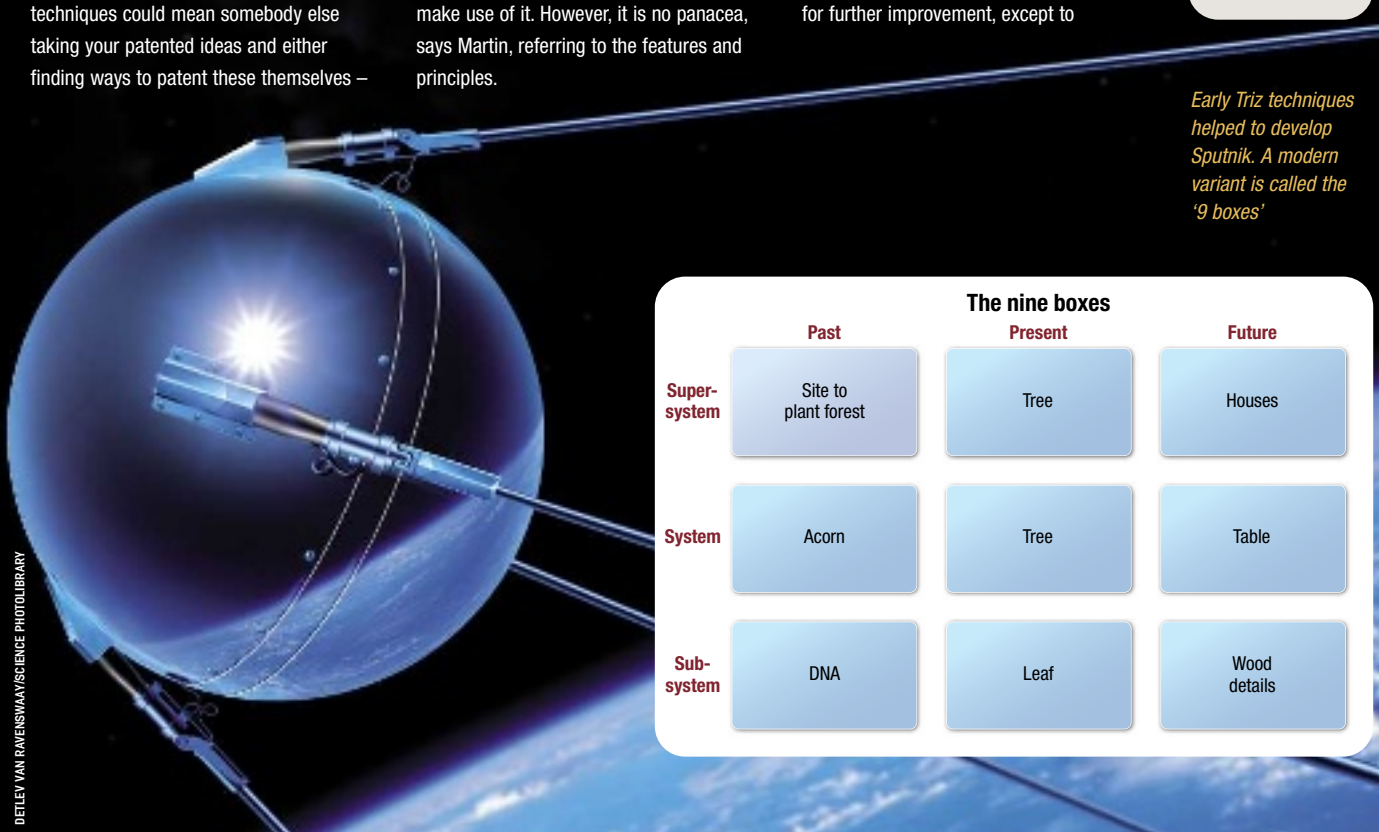
"They do not work for every problem," he states, "but they do suggest good places to look."

One of the most powerful of the modern developments is to follow the '8 Trends' and apply them to whatever it is one is making. Just as computing technology seems to be governed by Moore's Law, which states that the number of transistors that can be placed on an integrated circuit doubles every two years, so products increase in 'Ideality'.

In formal Triz terms, this means an increase in the ratio of 'Benefits' to costs, plus 'Harms', a Harm being any unwanted output, such as waste heat, vibration or noise. Improvements in Ideality follow 'S' curves. So beware, if yours is a mature product at the top of the S, with little room for further improvement, except to

Pointers

- Modern Triz has reduced innovation to 39 'features', 40 'inventive principles', eight 'trends' and nine 'boxes'
- These methods allow possible solutions to any technical problem to be investigated in a systematic manner
- If applied to patents, it makes them more watertight and offers less opportunity for competitors to get round them



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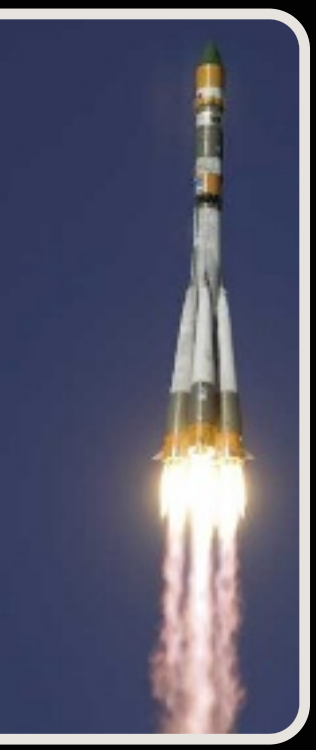
Early Triz techniques helped to develop Sputnik. A modern variant is called the '9 boxes'

The nine boxes

	Past	Present	Future
Super-system	Site to plant forest	Tree	Houses
System	Acorn	Tree	Table
Sub-system	DNA	Leaf	Wood details



The Luna 16 lander was another part of the space race to benefit from Triz

cut costs. A third trend is that products require less human involvement; that is, they become more and more autonomous and automatic.

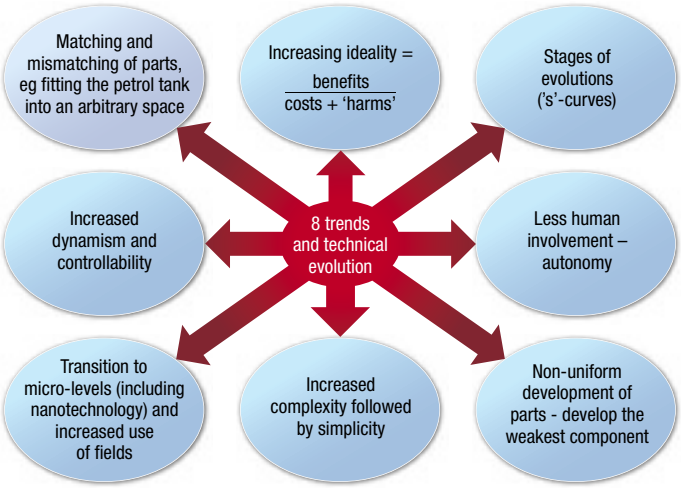
A fourth trend is the 'Non uniform development of parts', which means that, even when the overall system is fairly mature and should be reliable, one of its parts may be letting it down, which is why floppy disks have been replaced by memory sticks.

More interesting is the way many products become increasingly complicated and are then reduced to simplicity. Martin said this applied to jet engines, but a more revealing progression is the development of medical injection systems, with the final stage being represented by a one-piece needle syringe.

The 'Nine boxes' is another powerful technique whereby a situation, usually a problem to be solved, is placed in a box, with another box to the left representing what happened before and a box regarding what is expected to happen afterwards to the right. Above are three corresponding boxes relating to the wider system or environment in which the problem box lives and, below, relevant components relating to the problem box.

The classic example of a successful application was in the design of the Luna 16 lunar lander, where engineers toiled for months trying to develop a lamp to illuminate the scene for a camera, that would survive take-off and landing. They then applied Triz, thus establishing that the vacuum environment did not require there to be a lamp bulb at all.

The 8 trends of classical Triz



Another example from the Russian space programme is the realisation that, because re-entry heat shields do not have to come into existence until re-entry has begun, they can be made from cork and tar to resist vibration damage during take-off, but turn into a porous and highly insulating carbon heat shield when re-entry commences.

While Nine Box or other types of Triz analysis may not appeal to everyone, it's worth remembering that competitors may well be using these to steal an advantage. A classic example, according to Martin, was the patenting of brush seals in jet engines by Rolls-Royce. GE then applied Triz concepts to both the wider engine environment around the seals and the detailed construction of the brush seal elements, and came up with a set of patents that made the original patent worthless, without access to some of the subsequent patented ideas. It is believed the two companies then agreed to mutual use. However, had the people who drew up the patent for Rolls-Royce been that bit sharper, GE might well have been paying them licence fees.

As reported in our September 2007 edition, the Taiwanese are starting to show an interest in Triz, at a time when they are beginning the transition from lifting intellectual property to protecting it. The mainland Chinese are unlikely to be far behind. ■

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