TRIZ in 7 Simple Steps – Copyright Next Step Associates

"Just as you cannot do very much carpentry with your bare hands, there is not much thinking you can do with your bare brain" - Bo Dahlbom and Lars-Erik Janlert, Computer Future (found in "Kinds of Minds" by Daniel Dennett)

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TRIZ can seem very complicated with lots of new words and ideas and when you try to build ideas together it can be confusing. When building TRIZ, the Soviet TRIZ scientists had technology very much in mind, so the examples had lots of machines in them. Sometimes it is not easy to see the process ideas embedded in the solutions for the devices being re-invented.

We have been asked again and again to simplify TRIZ and to make it applicable to non-technological areas such as services, marketing, software programming, and systems design rather than hardware design.

So we have reframed TRIZ in a simple way, taking out the technical and, we hope, leaving the core process intact! You may use this simple matrix approach as a start to learning and using TRIZ and then move onto the more traditional TRIZ approach. You may use it for technical as well as non-technical issues/problems, needs/wishes.

Our reframing should also help you integrate other creativity processes into a systematic approach. So whether you like Synectics, or Soft Systems Methodology or a de Bono lateral thinking then our 7 Steps Tao Matrix should help you manage your innovation sessions efficiently and effectively, whatever set of creativity tools you use.

To start you off, we provide a simple list of steps. You may solve your design issues just using this list or you may need to go on for a fuller "Innovation Process Analysis". Jumping around in the Steps is OK. The more you practise using these steps the more you will jump around! But at first just try a few steps. If one is difficult then leave it for a while. Practise Steps 1 to 3 on lots of different everyday things from the design of your kettle, to planning a holiday, to using your time at work. Anything! Then as you get to use these steps easily you will find the others get easier to use, too.

Step 1 – List all the Resources in the system as you see it at present.
Start the list as the left-hand column of a matrix. The other columns will be the parameters (Step 2).

These are not just the physical items of the device (say, motor, wires, case) but also all other things that can carry out some "Function" (that is may change one or more parameters) on other things in the system. So the air may be a resource, or someone's shoes, or their hair which may fall out, or the dust, or the sunshine coming in from the window.

For non-technical, or even for the more open kind of technical inventing where anything is an option, you might like to make separate lists of **Resources:** those which are **Current** in the system you have in mind, those which are **Optional**, you can think of bringing them into the system, and those that are **Fantasy**, you can imagine them in the system but that seems a bit crazy!

Analytical thinking should give you the Current Resources, but you may need some out-of-the-box thinking for the others. So you may want to use creativity excursions to generate the **Optional** and **Fantasy** lists.

For example, for a table you may think of all these as resources that are **currently** available:
Legs, feet, top surface, inner structure, edges, coffee stains, the floor, the walls, people's hands and any other "things" or "parts of things" that are around. You may add ropes, chains, electricity cables, mouse pads, ash trays and lots more as **optional** Resources. And then you may add ghosts, socks, garden

gnomes and butterflies in the **fantasy** collection of Resources. The fantasy resources may not be immediately useful as they are but they may stimulate an idea which you can work on and make practical. They trigger ideas by analogy and metaphor.

A non-technical example may be for a marketing campaign for Beetroot!
Current resources might be money, Supermarket chains, Corner Shops, TV, Schools, Newspapers, Posters, and a Telesales team. **Optional** Resources might be Virgin Airlines, Ships, Car Parking Attendants.

The difference between these two lists is that you may consider **current** Resources as those you use or have used whereas the **optional** Resources are other things that seem to be available but have not yet been used.

Then there are the **fantasy** resources, from the technically/economically questionable (every street light beams down your campaign slogan) to the wild idea stream, e.g. how to use Queen Victoria, or rats or DNA to market your beetroots.

Step 2 – **List all the parameters** that are being changed or that you might like to consider changing for each of the resources. So you might like to change shape, temperature, texture, speed, rigidity, whatever. Note which are helpful/useful and which are harmful or which reduce a harmful effect.

Try to include as many as you can but if the list gets too long you may choose just those that, after a bit of careful thought, seem to be the essential ones.

For marketing, your parameters might be package size, number, texture, colour, shape, or soft features such as sexiness, vitality, trust, relevance - just about any descriptor that seems appropriate and then add a few that are not just fur fun and to extend you thinking!

As you did for **Step 1**, you might like to use some Creative excursions to help you get your thinking out of the box on what parameters/features/attributes you could consider changing if you dared!

Step 3 – **Evaluate the benefit** of changing each of these parameters. How does it improve or make worse the functioning of the device? If changing a parameter in one direction makes it worse would changing it in the other direction make it better? If you have a lot of parameters and resources the list can get very long. So think about the **Primary Benefit** you are seeking and go through the parameters of the available resources you have and ask how these might improve or not the Primary Benefits you are seeking (also see Ideality below).

A **primary technical benefit** might be durability or longevity, strength or speed. A **primary non-technical benefit** might be customer loyalty, brand image, or simply profit or market share.

Your evaluation can take many forms, from simple dialogue to an open "voting" system. Synectics uses a NAF rating, so get people, and particularly the problem owner (the customer/user or the project manager or both), to give a score from 1 to 10 for Novelty, and also Appeal and also Feasibility. So a change might get a 7 for Novelty, 8 for Appeal and 3 for Feasibility.

For real innovation you clearly want a high Novelty rating, and hope that these are also Appealing. If not, why are you trying to invent? If people only give Feasible things high Appeal scores, then go back and ask why?

We have also used VICE. Vote for "Value added", "Impossibility", "Can-do-ability" and "Energy for".

It is interesting to note that when in a group, lots of people vote for something as impossible and others for the same thing for Can-do-ability. Then you explore why!

For different situations you may like to invent different voting systems. But remember, feasibility is a challenge to address, not a reason for rejection.

Step 4 – **Consider** how far from the **Ideal device/wish** you are. Are there some changes you can make which then lead to increasing benefit and reducing harm/cost? If you are a long way away from an

Ideal device or solution, consider changing it drastically, so that it would function Ideally. Consider Trimming secondary functions to do this.

A major goal in using Ideality is to simplify a system so that future innovations can be introduced with fewer elements to consider. In a technical device the fewer parts there are the easier it is to add something later without so many variables to consider (everything has some kind of effect on everything else, especially in manufacturing).

In a non-technical system, reducing the number of elements gives you a faster potential change in the future. How close can you get to a virtual marketing campaign - one which delivers the function of the marketing without any actions needed by the marketing team?

Ideality frees up options and people and money!

Step 5 – - **Examine your product or system in terms of the Trends of Evolution**. Any parameter which is simple or uniform along any physical dimension can be made to be more complex. Consider the time dimension also. Consider making it more complex in successively more complex ways. Straight can be changed to angled, to curved, to wave formed, to complex wave formed, to matching wave formed to mismatching wave formed.

The same concepts can be applied to service or systems ideas. For example, a "curved" service delivery may be one which starts slow and then increases gradually in intensity (or vice-versa).

Consider making it more complex in more than one dimension. If necessary, play with ideas for all four dimensions! The Trend for Trends is to slowly, step by step, make each parameter one stage more complex, from uniform to linear change to curvilinear change to complex change.

The Trend is also to change one parameter, then a second, and then a third and so on. And the final Trend for Trends is to change your parameter in just one dimension, then two, then three and finally in all four dimensions, including time!

When you have most, if not all, parameters in very complex form, the Trend is to simplify the whole system back to a few most useful parts!

An example of a technical trend is chocolate bars, which were simple solid sheets when first sold, then segmented, then were made to have voids (holes in it) and now have other tasty substances in the holes.

A non-technical trend might be the shift from role-based teams ("solid" single functional units) to complex teams, segmented, nested, flexible, or asymmetrical teams. Software design has followed some of these trends, with the change from sequential to parallel processing.

Step 6 – **Consider the Contradictions** in the system. As you improve one function does another get worse. If you are not sure, then imagine magnifying the "improvement" many times. E.g. don't make the Product or Service 10 times faster; make it 10,000 times faster! You will soon "see" the contradiction.

Now try to solve that Contradiction by imagining you really have to make it go that fast! Use the 40 Principles and the Trends of evolution to guide you and give you ideas for solving this Contradiction. Don't accept Compromise!

You can use the 40 Principles simply as a creativity list or you can look at the TRIZ matrix.

The most powerful use of Contradictions, though, is to create them in your imagination. We can look at our devices and services and then consider how they might change if we altered something by maybe 5% or 10%. It is difficult to imagine what would happen. So now imagine changing a parameter by 1000%. Your brain should tell you, "Hey, if you do that then this will be really difficult!" Challenge the current conditions in which your device or service operates in order to challenge how you might really improve it a lot! So help your brain by thinking big!

For non-technical Contradictions you might think of Profit versus customer loyalty, speed of response versus versatility and individuality.

Step 7 – **Now consider all your resources** again. Zoom in for a closer look, and Zoom out for a broader perspective. Do this again and again to see how you can move your design towards Ideality and solve all the Problems.

These steps may help you solve the design issues. If not, they will at least have helped you prepare the ground well for using the full **Tao Design Process!**

Don't rush it. To go fast you need to go slow.

7 Step TAO Design Process
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Example – A Table

Resources	Parameter	Parameter	Parameter	Parameter
Leg	Rigidity	Temperature	Curvature	Length
Table Top Surface	**Texture**	Porosity	Colour	Flexibility
Feet	Surface area	Rigidity	Asymmetry	
Corners	Curvature	Rigidity	Asymmetry	
Edges	Curvature	Texture	Colour	Heat transfer
Top surface main body	**Rigidity**	Heat Transfer	Weight	Porosity
Table Under Surface	Texture	Asymmetry	Rigidity	

Explanation

We have listed the main features of an ordinary table. We consider the separate parts of the surface, the edges, the corners, even the under surface as these perform different functions (positive and negative).

For example, children playing under a table may bang their heads and hurt themselves if the under surface is very rigid or has sharp points (very asymmetric). Clothes may rub against this under surface if its texture leads to high friction. People tend to hurt themselves on the corners of the table, people rest their arms on the edges of the table (if they have good manners?).

We have only listed a few parameters of the table parts. For some parts we could list many other parameters.

In our first run through building the Matrix it is sufficient to list the ones that you think are most important, but do this with a little care, checking, as above, that some parts may be more important than it seems at first glance.

We then check through the Parameters and highlight those which are of Primary Benefit. We have used **Bold** to do this.

For example, I might think that the **Primary Function** of a table top is that it holds the weight of objects on it (this is provided by the rigidity of the main body) and that objects do not slide too easily or with too much difficulty (I want to put things on the table and not worry that they will slide away but also that as I put them down they slip a bit so placing them is not too hard).

7 Step TAO Design Process

Example – An after sales service

Resources	Parameter	Parameter	Parameter	Parameter
Expert	Knowledge	Personality	Communication skills	Availability
Contact person	Knowledge	Personality	Communication skills	Availability
Telephone	Clarity	Weight	Position	
Web pages	Complexity	Speed	Attractiveness	Fun rating
Instruction manual	Simplicity	Visual clarity	Colour	Size
Neighbours	Availability	Confidentiality	Knowledge	Communication Skills
Children	Availability	Perseverance	Knowledge	Communication Skills
Store managers	Availability	Willingness	Knowledge	Communication Skills
TV ads	Clarity	Fun rating		
Software instructions	Clarity	Availability	Universality	Complexity
Gifts	Cost	Flexibility	Diversity match	Timing
Customer	Knowledge	**Happiness**	Available time	Period of day

In the first run through I have extra cells as I may want to add more resources later. This is most likely when dealing with a non-technical issue. There can be a very long list of potential resources.

We have included some non-standard resources, simply to suggest that the list can be quite open. Children do, for example, explain to their parents how to make things work. Yet they are not usually the ones an after sales service talks to when things go wrong!

For some people, a neighbour, a local priest or a "meter reading" person may be called on to explain how something works, or not.

The Primary Function is quite clear. A Happy customer!