

# **Enhancements for the 9 Windows Using Virtual Reality and Swimlane Charts**

By David Drummonds

## **Abstract**

Nine windows is one of the primary tools of TRIZ. It depicts the condition of a Supersystem / System / Subsystem in the past, present, and future. It can be expanded to as many system levels, and as many points in time, as are necessary to fully visualize an invention problem. Unfortunately however, it is a static representation.

Virtual reality is a way to see a system from various vantage points. The viewer can zoom in, zoom out, and move roundabout to get a clear understanding of the viewed object. This perspective results in a crisper invention problem definition.

Swimlane charts depict conditions from individual points of view, whether they be the supersystem, system, or subsystem or they are the different stakeholders in an invention project. They are a more holistic depiction. They also resolves deficiencies in viewing problems from a time perspective.

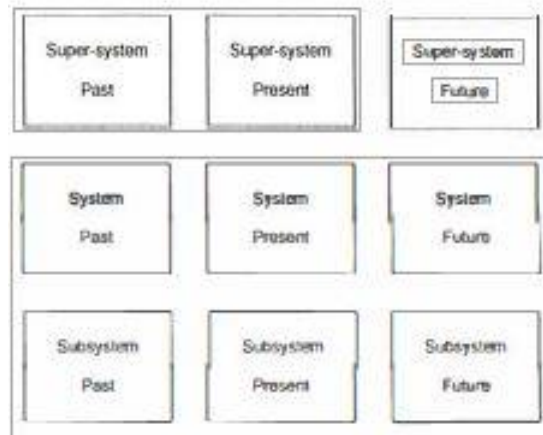
This paper discusses enhancements for the nine windows with virtual reality and swimlane charts. It should provide TRIZ practitioners with helpful tools when in the definition phase of an invention project.

## Virtual Reality

This portion of the presentation shows how the 9 Windows can be enhanced with virtual reality.

TRIZ practitioners are all familiar with 9 Windows as shown in Figure 1. It is a two dimensional static representation of a system in time and scale.

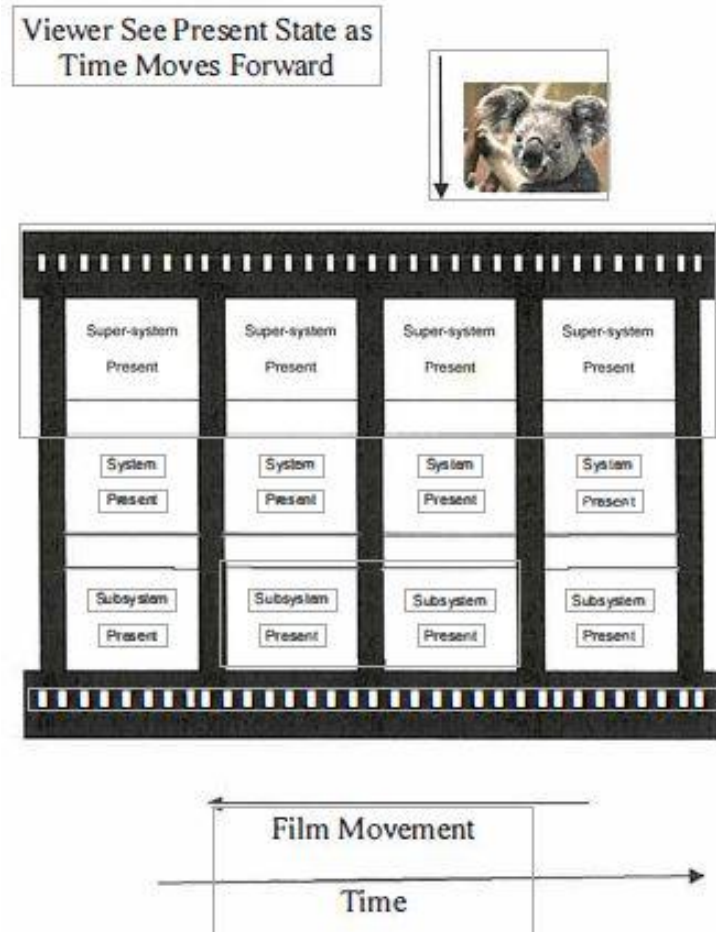
**Figure 1**  
**9 Windows**



In 1950 Disney created the feature length animation Cinderella. The animation is constructed from many hand drawn frames that when connected on film and played show movement in time. At that time movies could only be seen in a theatre. Viewers were zoomed in and out, and roundabout, which gave them more insight into the story. Terninko presented an example related to movies. <sup>[1]</sup> Why not put the 9 Windows into movie frames which when played shows how the Supersystem, System, and Subsystem change in time as shown in Figure 2. Add sound to hear what happens as the windows change with time. The viewer then has a dynamic, not static, view which gives more insight to the situation. Unfortunately, the viewers can only see and hear the movie. They cannot select what to look at.

**Figure 2**

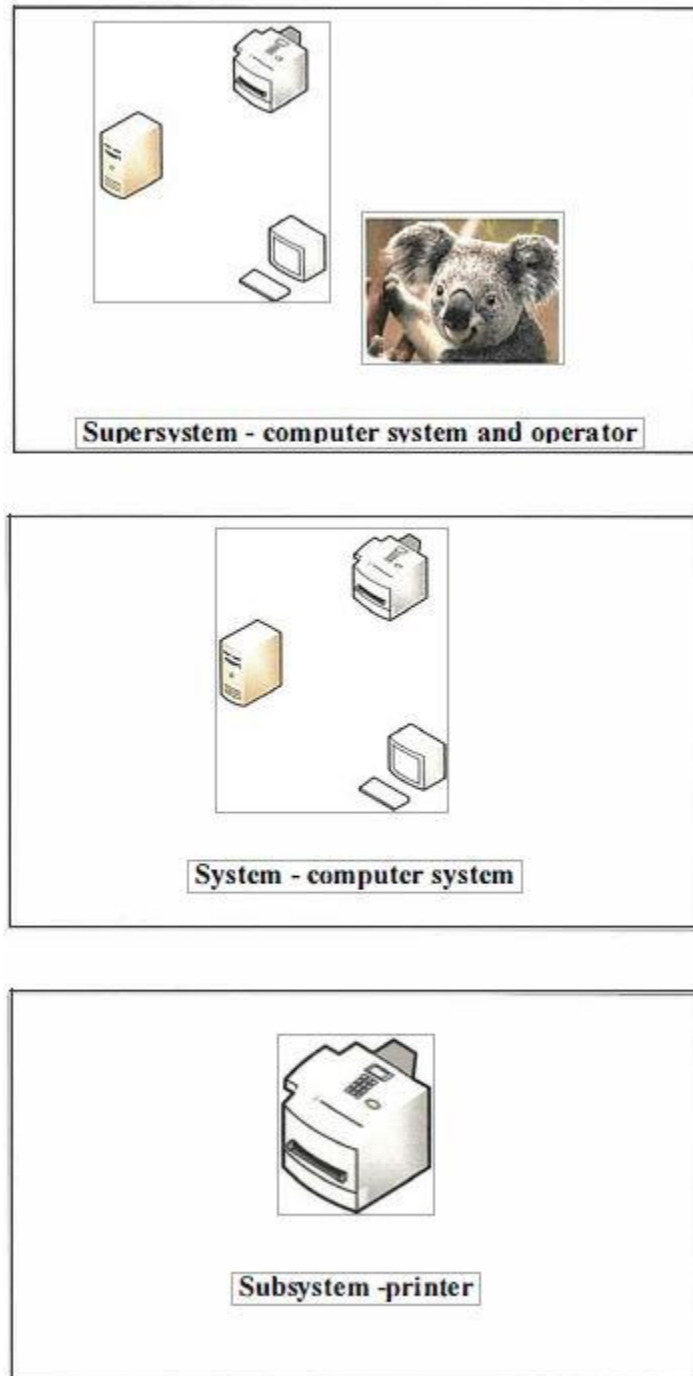
**Viewer Watching Film**



Mann states that this allows the inventor to track the problem from beginning to end. <sup>[2]</sup> The movie is effective for thinking in time and space. However, the viewer cannot select what to look at. Now we are at the beginning of virtual reality. Inventors place themselves into the three dimensional situation, choose what to look at, then zoom in and out and roundabout to see, hear, touch, and smell the situation. The inventors take their smart phone to capture what they see with photos and movies which can record the sound. Unfortunately, smart phones are not able to capture smell or touch, at least not yet.

As an example, consider a computer system where the operator cannot print a document to a printer [multifunction device] as shown in Figure 3.

**Figure 3**  
**Computer Example**



The inventor enters the supersystem, checks with the operator, and sees that the operator has correctly linked to the multifunction device. Then the inventor checks the server and sees that it is functioning properly. Then the inventor checks the multifunction device and sees that the red malfunction light is on. If the inventor could have seen the multifunction light from the computer, the server check would have been bypassed. Unlike the movie, the inventor has selected what to look at and the sequence of looking. This is the power of virtual reality.

Conclusion, the original static two dimensional 9 Window has evolved into a dynamic three dimensional experience, virtual reality.

## Swimlane Charts

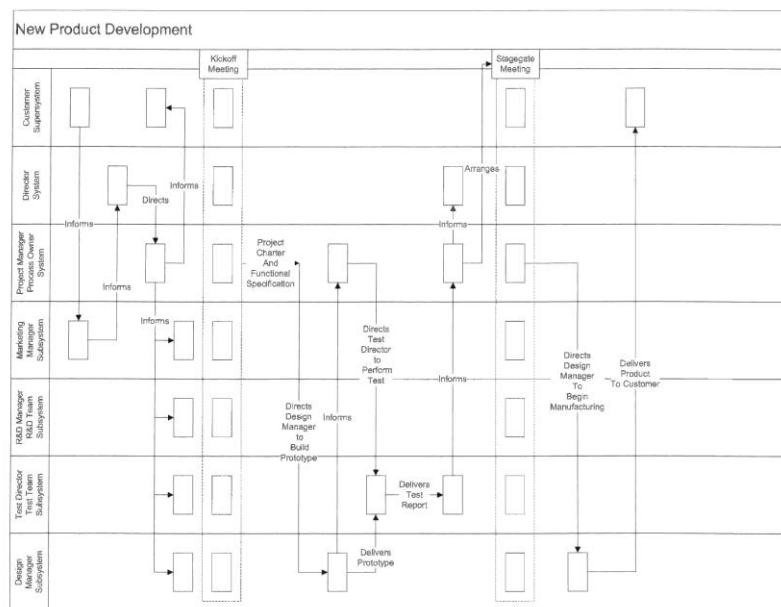
This portion of the presentation shows how the 9 Windows can be enhanced with swimlane charts.

Mann states that “time-based problems are not well served by current models”. <sup>[2]</sup> This author sees some of the depictions as a form of time lapsed photography. As such, they are confusing. Swimlane charts clarify the condition as shown by Smith. <sup>[3]</sup> It is another form of “running a movie”. And it can be annotated to point out issues of concern.

Figure 4 is a crude swimlane chart based on Mann’s example of new product development. The swimlanes are for the different people involved in the process. Of course in other cases they could be the various levels of the system.

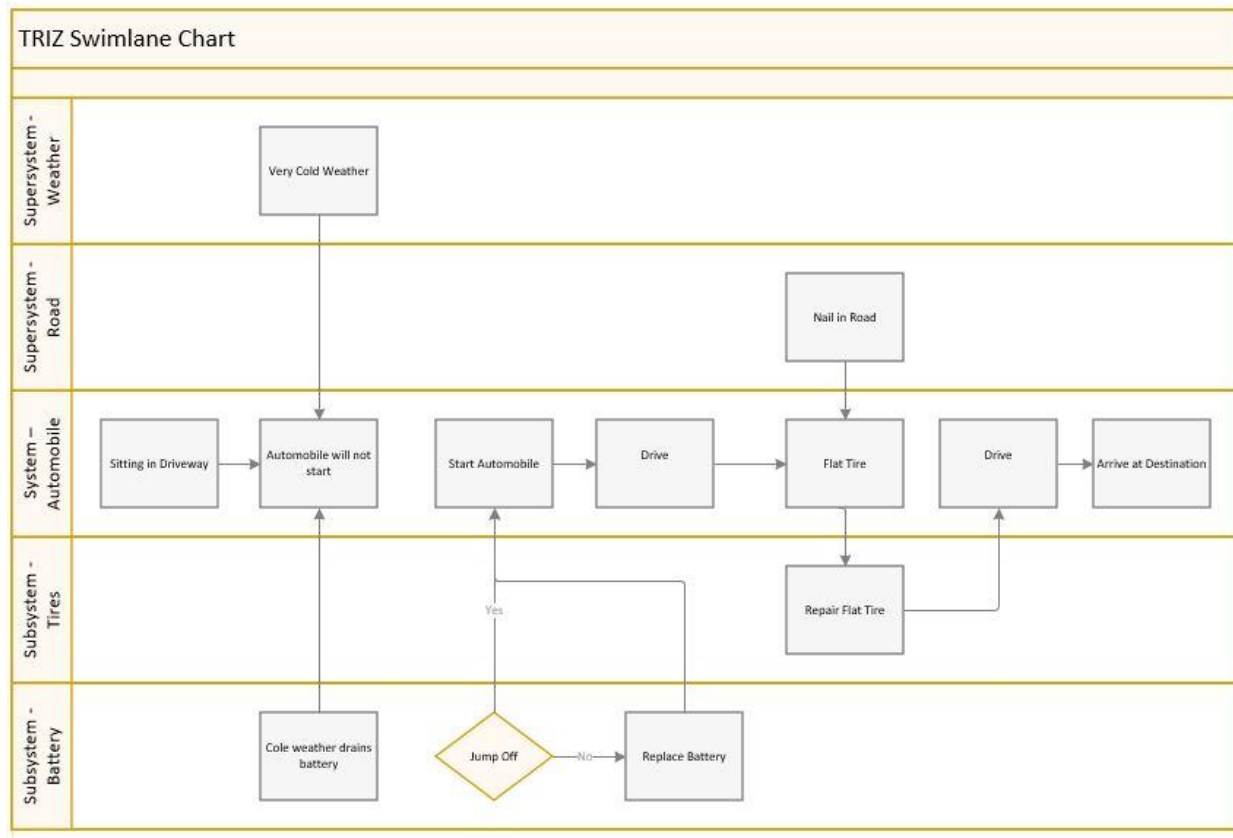
**Figure 4**

### New Product Development Swimlane Chart



If the swimlane is the parts of a system, then it becomes the film of the motion picture as shown in Figure 5.

**Figure 5**  
**TRIZ Swimlane Chart**



Conclusion, swimlane charts clarify the where and who of a condition by enhancing the 9 windows.

## References

- 1] Step-by-Step TRIZ, Creating Innovative Solution Concepts, Terninko, 1996.
- 2] Hands On, Systematic Innovation, Mann, 2007.
- 3] Smith, <https://www.bptrends.com/bpt/wp-content/publicationfiles/04-06-COL--P-TRIZ-3-Smith.pdf>.

## **Biographical Sketch**

David Drummonds is an engineer at a US power plant and has approximately 35 years of experience in the power industry. He holds both a BA and MS in Mechanical Engineering and a PhD in Engineering Management. He is a registered professional engineer and holds project management, risk management, six sigma, lean, and TRIZ certifications. His interests include process improvement and simulation.

