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Conditional Reality Tree (Cond. RT)

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Executive Summary

A conditional reality tree (Cond. RT) is developed to address problems that will arise or are expected to arise in the future if certain conditions prevail. It clarifies the expected undesired effects (UDEs) of a situation by exploring the root causes (RCs) of the key problems.

The Cond. RT is used for negative situations/conditions/cases that are expected to take place, with consequences yet to be seen. It can be used as a “do-nothing” reality tree to show what will happen if no action is taken. “Do nothing” often leads to the worsening of problems that need addressing. However, Cond. RT can also be used to analyse the likely impacts if an expected positive change were to occur. It can be used as a tool for ‘what if’ analysis.

Background

The Theory of Constraints (TOC) Thinking Processes (TP) encompass a comprehensive set of analytical tools, including the Current Reality Tree (CRT) and the Future Reality Tree (FRT). These tools provide a structured approach to understanding and addressing complex problem situations (Cox et al., 2012).

The CRT is used to clarify the undesirable effects (UDEs) of an existing situation by analysing its current state and exploring the root causes of these UDEs, while the FRT constructs a map showing the likely results of the proposed corrective actions (injections). These actions should lead to a desirable future. An FRT is built to check that this is the case before the actions are implemented (Dettmer, 2007). Any further UDEs envisaged due to implementation are averted using the Negative Branch Reservation (NBR) process.

However, there are limitations to what these trees can cover: The CRT is limited to addressing current, existing issues. The FRT/NBR focuses solely on the anticipated outcomes of the injections/solutions that we devise and introduce to produce the desired future.

There are situations of concern that these trees are not designed to handle, in particular, 2 types of problems:

1. Increasingly problematic situations whose impacts are not fully understood and are being met with an inadequate or **“Do nothing”** response. These may become very serious situations which threaten the organisation or system’s future.
2. Situations caused by **potential external changes** that are beyond our direct control, yet would significantly impact our reality.

For instance, a local supermarket chain might be facing a situation where a big international supermarket chain is considering entering the country. The ramifications when no action is taken by the local chain could be dramatic. Or it may be a seemingly positive change, such as a competitor going out of business, but which leads to such a huge spike in sales that the system is overwhelmed, having a negative impact on the business.

External changes accompanied by lack of understanding and suitable action pose serious threats in numerous other contexts besides business, including national/international, societal, organisational, or personal situations.

Thus, there is a large class of situations where external changes are about to occur and where internal actors are not taking sufficient corrective actions, and actions (if any) exacerbate rather than improve the situation.

The existing TP tools are not suited to work on such problematic situations that will arise in the future if certain conditions prevail with consequences yet to be seen. Because they lie in the future, the CRT cannot be used. And because they lead to a worsening of the situation, the FRT/NBR is not appropriate.

Therefore, there is a need for a new TP tool that can grapple with these conditional situations and their prospective consequences. It needs to deal with any significant external changes that are expected to take place, with consequences yet to be seen. It needs to deal with a 'do nothing' response to a worrying future. Such a tool should help to develop solutions and galvanise action by clearly laying out in diagrammatic form the potential dire impacts of non-action.

This paper describes a new tree called the Conditional Reality Tree (Cond. RT) that has been developed for this purpose (Youssef, 2023). The Conditional Reality Tree is designed to show clearly how an undesirable future, comprising many UDEs, is expected to arise in the future, especially where the change is caused by an external force, and where no action/change is being taken to mitigate the effects. This would then provide decision makers with a strong basis for constructing injections (interventions) and motivation to put them into action.

The Conditional Reality Tree is conditional based on a negative or positive situation that, while imminent, does not exist yet. These negative or positive situations are not caused within the system, they arise because of external factors. The ensuing outcomes are the result of these external changes and of ineffective or non-action within the system. They are not due to taking effective action, implementing injections, or solutions.

A step-by-step development of the rationale and structure of the Conditional Reality Tree is provided next, following the 'Standing on the shoulders of giants' (SOSG) process used by Dr. Eli Goldratt (Goldratt, 2009) and later spelt out (Goldratt, 2011).

SOSG Step 1 – Identify a giant, not a chupchick

Human knowledge is created by building on existing ideas and extending old theories by identifying and developing new perspectives from previous research. We naturally build on others' efforts. If we stand on the shoulders of giants, we have a head start, we can see further than if we start from our own vantage points.

The giants on whose shoulders we stand in this research are Dr. Eli Goldratt, Bill Dettmer and the TP. The two reality trees, CRT and FRT, in the TP provide the base to build on. These have been developed by Dr. Goldratt and a number of his close associates in the Theory of Constraints community, too many to name individually. However, Bill Dettmer was the first to transcribe and codify Goldratt's methods for teaching purposes in 1994, making this publicly available (e.g., Dettmer, 1997, 2007), and for that we owe a great debt.

We also draw on Goldratt's Change Matrix and the Expanded Change Matrix (Zultner, 2023) in developing a deeper understanding of the causes of inaction or inadequate action.

SOSG Step 2 – Identify the enormity of the area not addressed by the giant

As stated above, in our experience (and in that of many colleagues and client organisations), there is a large class of situations for which the existing RT's are not suitable: in which we would like to be able to demonstrate clearly through logic how current trends or events expected in the near future, are expected to lead to an undesirable future or will bring dramatic, often bad, change not because of changes we make, but because of underlying trends, new threats – e.g., a huge reduction in supply of an essential resource which will bring many undesired effects in the future. It also could be situations when we do not take action(s) needed to avert disaster or 'nip a problem in the bud'.

Why are existing Reality Trees not sufficient?

The CRT works on situations that already exist and serves to clarify the chain of cause-and-effect that leads to those UDEs. While the FRT is concerned with the future, it assumes this is a desired future, described by a tree of DEs, not UDEs, and it assumes that these are caused because of implementing injections. So, the FRT describes the future after the change has taken place.

This leaves a gap in RT's that can describe a future undesirable situation, due to outside forces or insufficient actions, or both.

So, there is a clear need for constructing a new tree that can clarify UDEs in the near future, that are not caused by implementing change/injections/solutions: A tree that is conditional based on a situation that, while imminent, does not exist yet.

SOSG Step 3 – Get on the giant's shoulders

In this step, we take a historical perspective to understand the giants' solution better than they did.

The TOC Thinking Processes (TP) contain two reality trees: the Current Reality Tree (CRT) and the Future Reality Tree (FRT) (Cox et al., 2012).

In brief:

- **CRT** - identifies the likely cause(s) of the UDEs for a **current** situation that needs improving.
- **FRT** - shows the situation once we've implemented our solution (from the EC) and eliminated all the UDEs.

In order to gain a historical perspective and understand the giants' solution, we examine the definitions in the literature, focusing on what the CRT and FRT were designed to do and how we understand and use them. This section discusses both trees and their usage. Additionally, it describes situations for which neither tree is suited.

When the CRT was introduced by Goldratt in the 1990s (Goldratt, 1990; Goldratt, 1994), before the development of the Goal Tree (GT) (Dettmer, 2022), it was the entry point into the Thinking Process, and answered the question, “What to change?”. This was originally the first question in the “change questions” sequence but is now the second question (Mabin & Davies, 2010).

Dettmer (2007) explains that the CRT clarifies the undesired effects (UDEs) of an existing situation by analysing its current state and exploring the Root Causes (RCs) of the key problem. Using the traditional ‘snowflake’ method of constructing the CRT advised by Dettmer (2007), the tree starts from the bottom with RCs and moves upward to the UDEs as shown in Figure 1.

The UDEs are negative aspects of the current reality. They are undesirable to the goal of the system (Goldratt, 2010a). The CRT uses sufficiency logic and is a “cause-and-effect” tree.

The TP protocols dictate that all entities are worded using the present tense. Every entity has to be present/has to exist. CRTs employ bottom-to-top sufficient cause thinking, which can be read “If _____, then _____” or “If _____ and _____, then _____”, or “If _____, because of _____, then _____”.

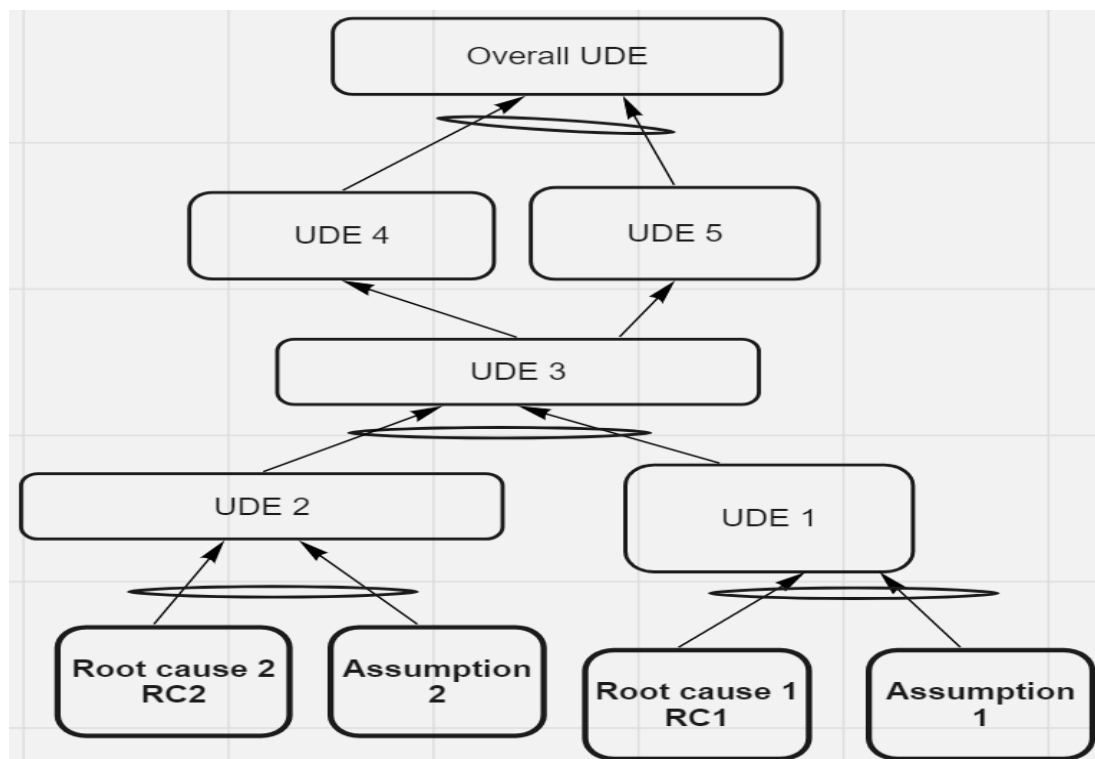


Figure 1: The CRT (Scheinkopf, 2010).

The next step in the TP is to develop solutions to address the situation and remove the UDEs. The Evaporating Cloud (EC) acts as a bridge between “What to change?” and the third question “What

to change to?”, by clarifying the conflict that is leading to the UDEs and identifying solutions (injections) to resolve the conflict (Cox & Schleier, 2010).

The FRT uses sufficiency logic to construct a map showing the likely results of the proposed actions (injections). These actions should lead to a desirable future. An FRT is built to check that this is the case before the actions are implemented (Mabin & Davies, 2010). The FRT answers the third question “What to change to?”. It focuses on the impacts of this proposed change. The FRT helps in creating solutions that, when implemented, mean that DEs take the place of the existing UDEs (Goldratt, 1994). The tree starts from the bottom with injections to RCs of different problems. These injections should turn all UDEs into DEs, while the tree is proceeding to move upward, as shown in Figure 2 (Dettmer, 2007).

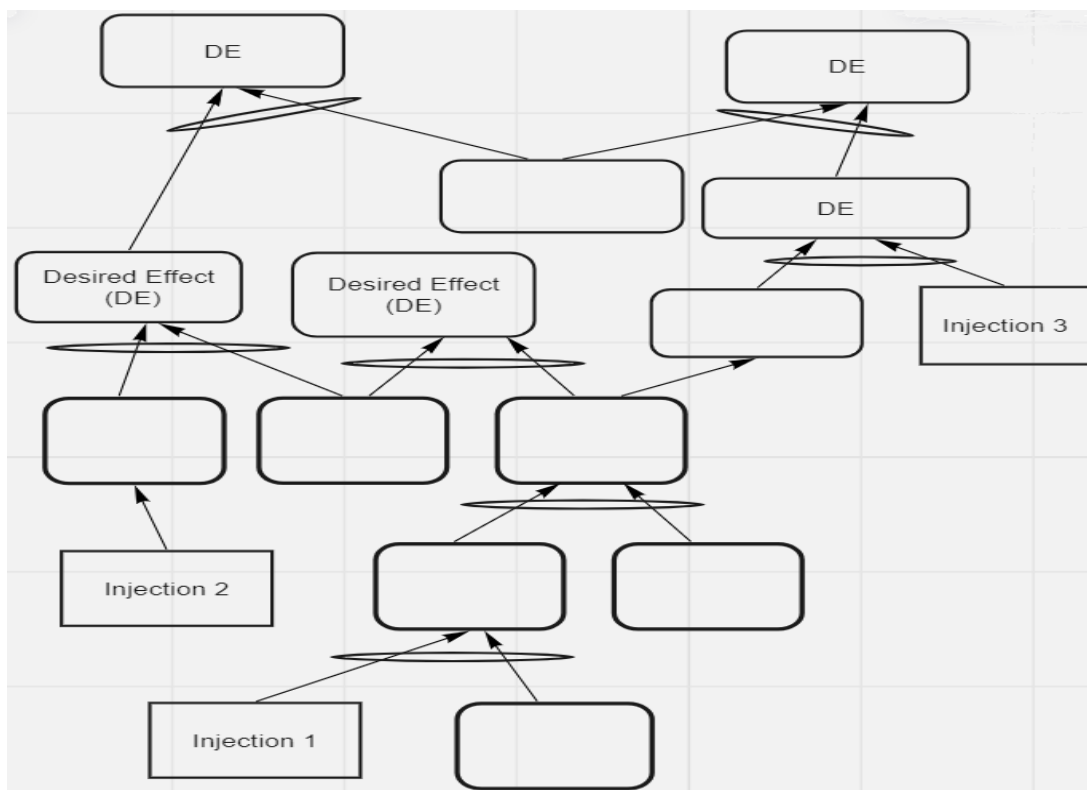


Figure 2: The FRT (Dettmer, 2007).

In order to appreciate how we understand and use these trees, definitions/descriptions of the CRT and FRT from the literature have been collated in Table 1 (**Bolding** is ours).

“Reality is that which, when you stop believing in it, doesn’t go away”.

Philip K Dick, 1985. Quoted by Scheinkopf 1999 p 144.

Table 1: Definitions of the Current Reality Tree (CRT) and Future Reality Tree (FRT)

Source	CRT	FRT
Goldratt (1994)	Ch 15 of <i>It's Not Luck</i> describes developing the CRT for Bob's company by connecting pairs of entities. p112-130, Ch 17. Uses an example of Sharon's problems translated into 3 clouds to suggest the 3-cloud method for constructing a generic conflict cloud. p 151.	Ch 20 is devoted to describing the construction of an FRT. "We'll start with this injection and, using if ... then ... arrows, we'll try to reach those two objectives. We'll use additional statements that are correct even now and if necessary, we'll add more injections, until we reach the objectives." p 179
Kendall (1998)	A diagram that provides the focus of our improvement efforts. Through cause-effect logic, it shows the connections between the undesirable effects (symptoms) in a given environment and the core problem leading to those undesirable effects. The CRT answers the question of "What to change?" p 322	The strategic solution to our core problem, identifying the minimum projects and ideas necessary to cause improvement. The FRT is a cause-effect diagram that allows us to test the validity of actions and solutions before proceeding with a proposed idea making sure the idea will eliminate undesirable effects without creating any negative side effects. It answers the question of "What to change to?" p 323
Scheinkopf (1999)	It is used to pinpoint a core driver – a common cause for many effects. ... to identify a core problem, which can be thought of as the invisible constraint responsible for many of the system's current problems. p 144	FRTs contain 4 distinctive parts: A. Injections are always entry points to the tree. B. Entities that do currently exist in the systems' reality. In a FRT, this type of entity will usually be an entry point and is typically not found in the body of the tree. C. Entities that do not yet exist in the system. When entities that currently exist (B) are combined with injections (A), the (C) entities will (at least they're predicted to) exist in the future. D. Reinforcing loops are often placed in FRTs, as a means to create patterns of sustained and continuous improvement. <i>The key to creating the desired future reality is implementing the injections.</i> p 110

Source	CRT	FRT
Cox, Blackstone & Schleier (2003)	Quotes APICS Dictionary (2002, p27) the CRT is defined as a “logic-based tool for using cause-and-effect relationships to determine root problems that cause the observed undesirable effects of the system”. p 117-8	According to the APIC Dictionary (2002, p 49) the FRT is defined as “a logic-based tool for constructing and testing potential solutions before implementation . The objectives are to (1) develop, expand, and compete the solution and (2) identify and solve or prevent new problems created by implementing the solution”. p 174
Dettmer (2007) Earlier texts by Dettmer (1994, 1997, 1998) provide similar descriptions	CRT is a logical structure designed to depict the state of reality as it currently exists in a given system. It reflects the most probable chain of cause and effect given a specific, fixed set of circumstances. Note a CRT is not a complete picture of reality. It reflects only the part perceived to be unfavourable. So, if a system is functioning properly 80% of the time, the CRT will show only 20% when it does not. p 92 Dettmer adamantly opposes the use of the 3-cloud method which he critiques in Appendix E. pp 359-368	Sufficiency-type logic structure designed to predict how changes to the status quo would affect reality – specifically to produce desired effects (DE) . It is an expression of reality that does not yet exist. ... visually unfolds the cause-and-effect relationship between changes we make to existing systems and their resulting outcomes. p 206
Ferguson (2010)	“The map of all the cause-and-effect connecting the core conflict or root cause to all the undesirable effects (UDEs) in the system.” p 1036	“The logical map connecting all the injections (solution elements) through cause-and-effect to the desirable effects (thus ensuring no UDEs of the CRT continue to occur). ” p 1036
Mabin & Davies (2010)	The CRT is a sufficiency (if-then) logic-based tool used to identify and describe cause-effect relationships that may help to determine core problems that cause the undesirable effects (UDEs) of the system (Cox, Blackstone, and Schleier, 2023, Sullivan et al 2007) Designed to answer the question What to change? taking care to avoid actions that merely deal with symptoms. p 634	The FRT process begins with the identification of actions, conditions, or solutions of choice, which Goldratt collectively names as injections, and then through the mapping of sufficiency-based logic relations, checks whether the causal links will lead to what we have decided are desirable outcomes, that is the removal or closing of Dettmer’s ‘mismatches’. p 635 The negative branch reservation (NBR) is formally a sub-tree of the FRT but can be

Source	CRT	FRT
		used as a stand-alone tool to improve critical feedback and develop half-formed ideas. p 635
Scheinkopf (2010)	A cause-effect model of an existing situation. The main use is to answer the question, What to change? so the cause-effect relationships focused on in the CRT are the UDEs – the aspects of the situation that we want to improve. p 751 Scheinkopf demonstrates 2 methods used to construct a CRT, namely the traditional ‘snowflake’ method and the 3-cloud approach	FRT and NBR are both processes that model the predicted effects of injections. The FRT is used to model the intended effects – the desired improvements – that comprise the full solution. FRTs typically contain several injections and many entities.... The NBR is used to show how an injection would lead to undesirable consequences, and then modify the idea (by modifying an injection or adding additional injections) to the degree that predicted undesirable consequences would be prevented. The guideline is to build the FRT first, and then use the NBR process to modify and solidify the solution to ensure that it is win-win. P 760
TOCICO Dictionary, Cox et al (2012)	The sufficiency-based logic diagram facilitates answering the question (from the CQS): What to change? By illustrating the cause-and-effect relationships between the core problem and the undesirable effects of the system, p 53. There are 2 approaches to developing a CRT – the traditional approach which starts with a list of UDEs and connects them using cause-and-effect logic, and the three-cloud approach, which starts with 3 ECs from which is developed generic cloud that becomes the basis for the CRT. p 54	The sufficiency-based logic diagram facilitates answering the question “To what to change?” by presenting a sequence of cause-and-effect relationships that links proposed injection(s) to desired effects (DEs). p 82

These definitions/descriptions concur that the CRT describes the situation as it currently exists; and that the FRT describes the future reality expected after injections have been implemented, including any supplementary injections identified using NBRs. Further, they state plainly that UDEs in the CRT are replaced by DEs in the FRT through the implementation of injections. These descriptions also accord with common practice.

SOSG Step 4 – Identify the conceptual difference between the reality that was improved so dramatically by the giant and the area untouched

The CRT and FRT work really well when we are adopting a process of change to bring about improvement. However, the CRT only applies to current reality – everything in the CRT must exist, now. The FRT, while focusing on the future, shows the likely results of the proposed actions, which are intended to lead to a desirable future. The FRT helps in creating solutions that, when implemented, mean that DEs take the place of the existing UDEs. A complete FRT shows only DEs.

But this is not the situation we are addressing. For example, if things are getting worse, or there is a future threat, or an adequate change is not made, some UDEs in the current reality are likely to get worse and new UDEs will arise. Therefore, the resulting future reality tree will be full of UDEs, not DEs, contrary to an FRT as we know it.

Using the Negative Branch Reservation (NBR) process, the FRT would normally be amended to prevent or mitigate potential new UDEs. However, the UDEs so addressed result from implementing the solution/injection, not from inaction, or actions/trends coming from outside.

Therefore, neither the FRT nor the NBR are useful when the chosen action is "do nothing" or some other undesired starting condition/action or external change.

In situations where there is no recognition of the need to change, or no desire to change, and therefore no change is going to occur to avoid a worsening of the situation, the CRT does not work and neither does the FRT.

The CRT cannot be used because the UDEs lie in the future. The FRT cannot be used because this is expected to contain mostly DEs once we have implemented the injection(s). And the NBR also assumes we implemented a change. Hence, we cannot use the existing TP trees¹.

SOSG Step 5 – Identify the wrong assumption

The wrong assumption is that people understand when they are facing a negative situation, and will think through and make appropriate changes to improve a situation.

¹ Another tree, unofficially called a 'knowledge tree' (Dettmer, pers. comm.), uses causal relationships to explain a situation, but does not aim to address a problem to be solved. It explains why something happened using cause-effect logic and may or may not terminate with an UDE or DE. For example, Dettmer uses this tree to explain how the gauge of American railroads came to be 4 feet, 6 inches wide, or how ill-advised tax policy led to the fall of the ancient Roman Republic. The cause-effect structure in a knowledge tree explains why things happened, without embodying a problem to be solved. It therefore also does not fill the identified gap.

However, this is not true, because:

- Sometimes people do not realise (till too late) the situation they are in, so do not change – ‘boiled frog syndrome’.
- Even when they are aware of the situation, sometimes people/ organisations are not fully aware, and do not choose the best or even adequate options to fix a situation or avert disaster.
- Sometimes people/organisations simply choose to do nothing.

Why?

- People may not realise that conditions are about to change, and/or have not thought through the consequences and the impact they could have on them.
- People sometimes do not know what change to make or how to make that change.
- They may be scared they might not make the right choice.
- Sometimes it is hard to do the right thing, due to inertia; decision makers feel frozen, and the effort to make the change is simply too great.

We can explain some of this reluctance to act by using Goldratt’s Change Matrix (Goldratt, 2010b), and specifically the expanded 6-box change matrix introduced by Richard Zultner (2023), which consists of 3 phases: lakeshore, transition, and mountaintop (see Figure 3).

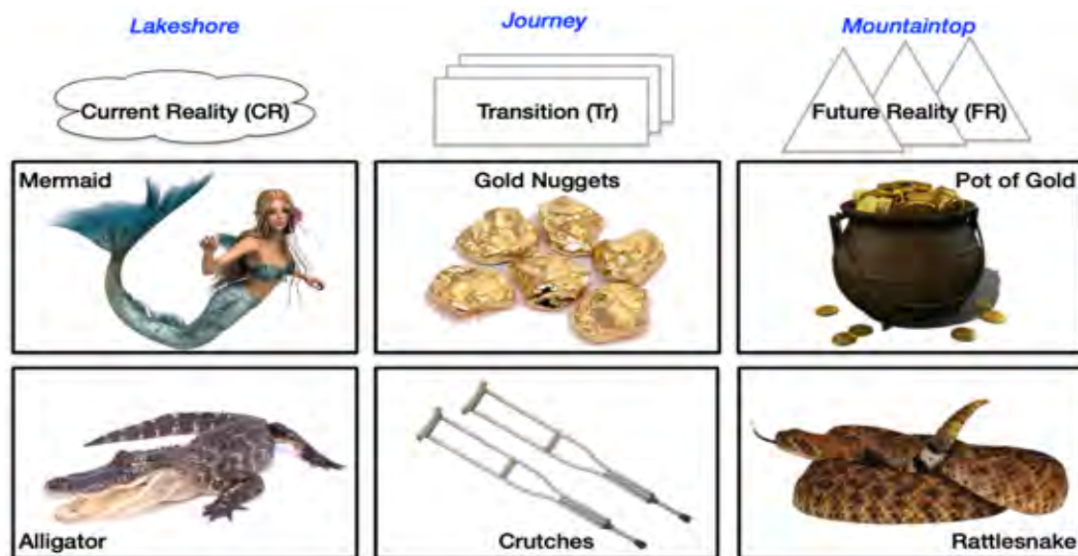


Figure 3: The 6-box change matrix (Zultner, 2023).

People sometimes resist change, because:

- It might not be in the interests of decision makers to take action to remove UDEs (they want to keep their ‘mermaids’)
- The effort/risk of making the change is simply too great (they fear the ‘crutches’ and ‘rattlesnakes’)

- They do not feel the pain is big enough to make the change (they are protected from the ‘alligators’)
- They cannot foresee sufficient benefits from changing (gold nuggets or the pot of gold) (Ferguson, 2010).

Zultner’s matrix adds factors that arise in the transition from the current situation to the desired future. However, the situations we are considering involve a future scenario resulting from no positive change, hence no gold nuggets, but instead from threats/external changes that can be represented by even more alligators. Thus, we have added a 4th phase as shown in Figure 4. The new phase, ‘near lakeshore’, represents the expected reality that the Cond. RT works on during negative situations. It is designated ‘near lakeshore’ because they have taken no action or only inadequate action(s), so remain very close to the original position, in an increasingly negative situation (Youssef & Mabin, 2023).



Figure 4: The 8-box Change Matrix (Adapted from Zultner, 2023, by the authors).

In the situations described above, decision makers may take no action. Then the situation gets worse because people don’t realise what’s happening or choose to do nothing even when they do. In some cases, even when there is an impending disaster, the situation gets worse because people still do nothing, or take actions that are insufficient to stop the negative effects from becoming worse.

Taking no action leads to worsening problems in many situations, such as those shown in Table 2. Some of these are already very evident, such as opioid addiction, while others are believed to be looming disasters at a societal/international, environmental, business, workplace, or personal level.

Table 2: Taking no action may lead to worse problems in many situations (Youssef & Mabin, 2023).

Societal	Environmental	Business	Workplace	Personal
Population growth	Climate crisis	Bad reviews	Bullying	Conflict
International disputes and wars	Plastic pollution in landfills, rivers, oceans, food chain ...	Running out of cash bankruptcy	Office politics/tribalism	Abuse and other relationship issues
Extreme views/ radicalism/terrorism/ Disinformation	Delaying or refusing to evacuate in a natural disaster	Sales slump	Conflicts	Addictions – drugs, vaping, alcohol, digital devices, social media
Civil unrest, political divides	Reliance on fossil fuels	New taxes, laws, policies or rules	Unethical behaviour	Eating and behavioural disorders
Corruption, inequality, modern slavery	Resource depletion eg precious metals	Recession	Corruption	Overspending

Such situations of future crises are not properly catered for in the existing TOC TP.

SOSG Step 6 – Conduct the full analysis to determine the core problem, solution, etc.

The Cond. RT has been developed to clarify the causal relationships leading to UDEs that are expected to arise in the future if certain conditions prevail, including UDEs not yet foreseen. It is a conditional tree based on a situation that, while imminent, does not exist yet. This tree can be used to highlight the UDEs related to negative situations/conditions/cases that are expected to take place if no action or insufficient action is taken now, with consequences yet to be seen (Youssef, 2023). Also, it could work on uncertain futures based on seemingly positive conditions, such as a sudden spike in sales caused by a competitor going bankrupt, where a mix of DEs and UDEs may arise.

Additionally, the results obtained by the Cond. RT, like any of the TOC TP tools, depend on the underlying assumptions and applied conditions to construct the tree. This underlines the importance of delving deeply into surface-hidden assumptions so that the future situation is captured fully and correctly, and the appropriate decisions can be made.

The Cond. RT contains many UDEs—possibly more and worse than in the original CRT which describes the present situation. The name Conditional Reality Tree (Cond. RT) reflects the fact that it is based on a future condition which is necessary for the tree to be true, while it is a reality tree using sufficiency-based logic.

The essential features of the new tool are listed next.

- TP protocols - The new tree, Cond. RT still uses the TP protocols.
- Logic – The Cond. RT combines the TOC’s two TP logics, “necessity logic” and “sufficiency logic”.

The Cond. RT uses necessity logic at the base of the tree, to state the condition(s) under which the tree will hold. It then uses sufficiency logic to causally link the base to the UDEs. The necessity logic indicates that “In order to form the Cond. RT, the condition(s) assumed must be true.” The condition (i.e. the context, circumstance, or situation that would create these results) must be satisfied before the UDEs formed in this Cond. RT can happen. If the condition/s is/are satisfied, the tree itself follows the normal “sufficiency logic” like other reality trees.

- Tree Construction - The tree is built from the necessary condition(s) – The Cond. RT clarifies all the RCs and UDEs regarding an expected conditional reality by using the logic, “If _____, and _____, then _____” to present unbroken chains of cause-and-effect relationships from the starting condition/s upward to the expected undesirable effects.
- In contrast to the FRT, the Cond. RT can show how an existing reality, described by a CRT, is likely to develop into a future reality which contains many UDEs, depending on specified starting conditions. So, these problems/UDEs will arise or are expected to arise in the near future if certain conditions prevail.
- Using the NBR is inadequate here. NBRs are used (as part of the FRT construction process) to deal with any potential UDEs that occur after we made decisions and implemented the injections. However, Cond. RT works in a prior phase. The Cond. RT is used for situations that are expected to take place, with consequences yet to be seen, **before** we implement change. So, neither the situation nor the consequences are there yet. It can be viewed as a tool for ‘what if’ analysis or as a ‘do-nothing’ tree to show what will happen if no action is taken.

A TOCICO Dictionary definition follows:

Usage:

The Cond. RT uses necessity logic at the base of the tree, and sufficiency logic to causally link the base to the UDEs.

It starts with the condition(s) that must be satisfied for the tree to be valid, the necessity part, building the tree upwards. The necessity logic indicates that “In order to form the Cond. RT, the (one or more) conditions assumed must be true.” The conditions (i.e. the context, circumstance,

or situation that would create these results) must be satisfied before the UDEs formed in this Cond. RT can exist.

If the conditions are satisfied, the tree itself follows the normal “sufficiency logic” like all reality trees. It works out all the RCs and UDEs regarding an expected conditional reality by using the logic, “If _____, and _____, then _____” to present unbroken chains of cause-and-effect relationships, from the core problem or core conflict and the assumed conditions upward to the expected undesirable effects. These internal linkages between the RCs, sufficiency assumptions, and the UDEs present the reasoning supporting the connections, as is seen in Figure 3. This figure represents a simplified skeleton of the Cond. RT.

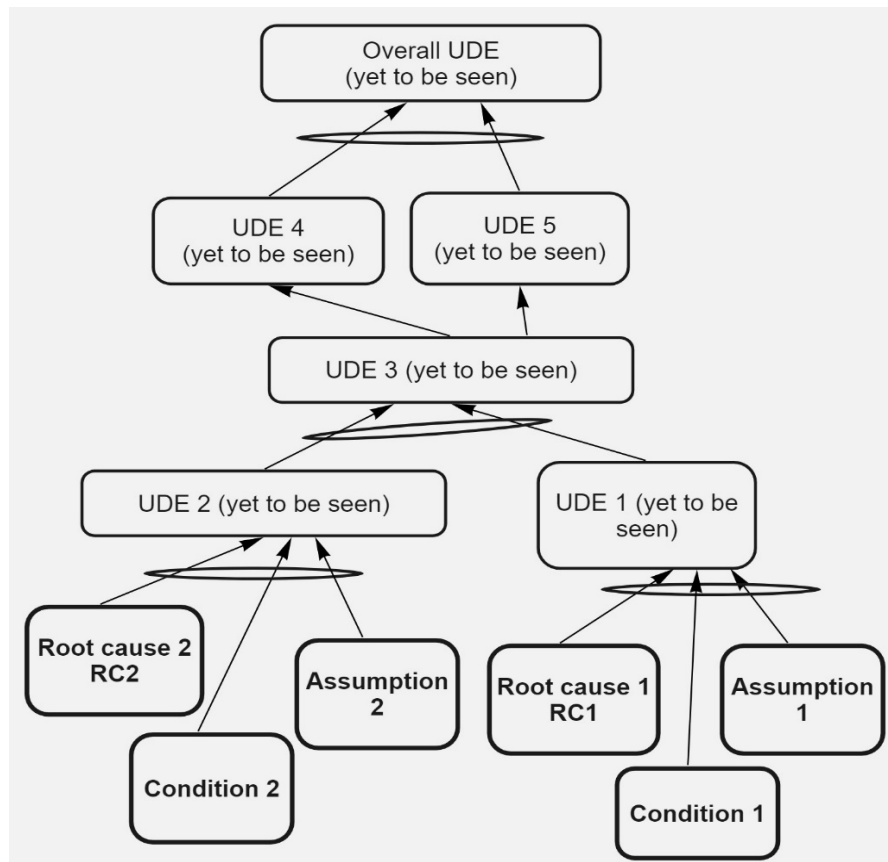


Figure 5: A Cond. RT

The process of constructing the tree:

Process Step 1. Start with a CRT (not essential but advised).

Process Step 2. State the starting condition(s) for the future reality at the bottom of the tree.

Process Step 3. Revise the CRT tree, based on the condition(s), to create the Cond. RT, adding in sufficiency assumptions.

Process Step 4. Read and scrutinise the tree, as usual, using the Categories of Legitimate Reservation (CLR). This includes checking for new UDEs not yet foreseen.

Example 1: Cond. RT for global population growth

Cond. RT 1 was developed to show the expected population growth impacts in 2030 if we do nothing/make no changes to our current actions now. The necessity logic at the base of the tree is “In order to form the Cond. RT, the condition(s) assumed must be true.” The first condition is “Global population increases to over 8.6bn by 2030”, along with “No changes are made to our current actions”. The first condition is based on current predictions of the expected population growth that are expected to lead to a negative future situation.

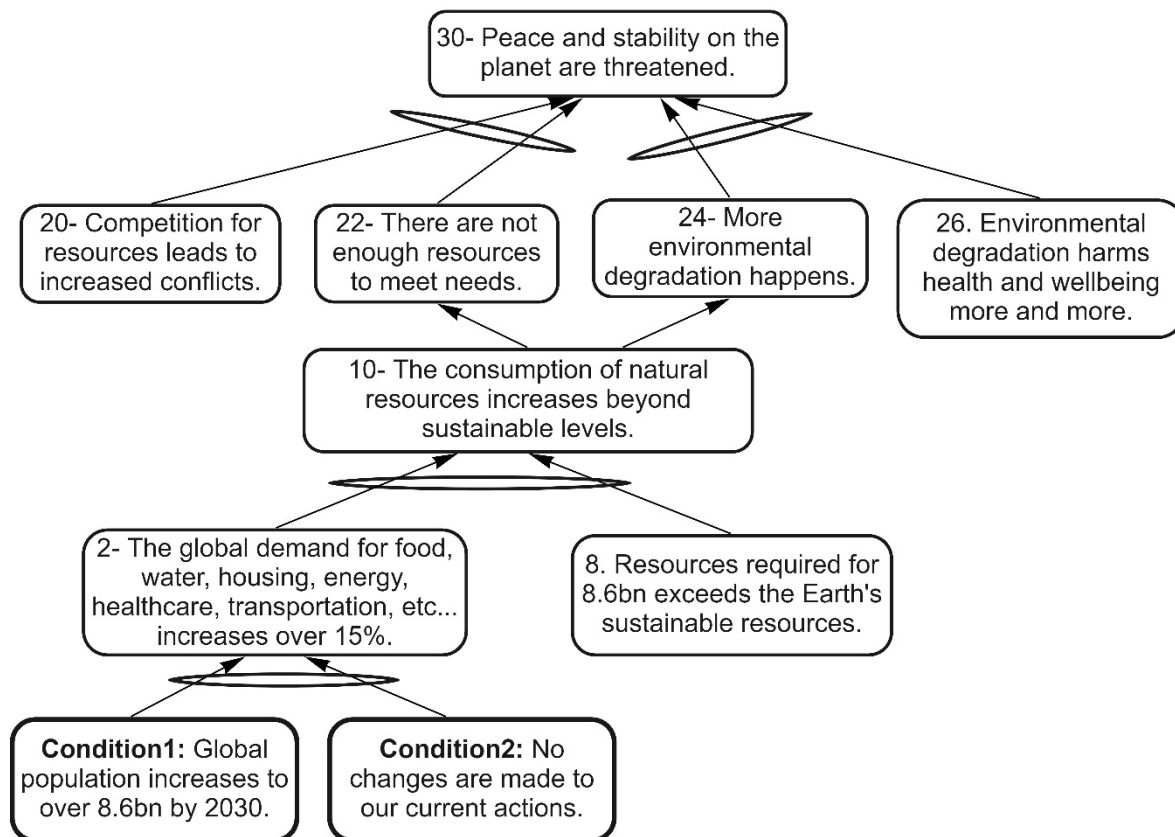


Figure 6: Cond. RT 1 shows the impacts of expected population growth by 2030.

Example 2: Cond. RT for an international water dispute

Cond. RT 2 examines the impact of an international water dispute over a shared watercourse that could arise if a newly constructed dam reservoir is filled at a fast rate. The dam is almost finished, and the upstream country has already drawn small portions of the river's water to test its lowest turbines. The upstream country is keen to complete the filling and operate the dam, so that it can reap the benefits quickly. However, if the upstream country chooses to fill the reservoir quickly, it will reduce river flow significantly till the higher turbines are covered, and downstream countries will suffer. The Cond. RT predicts the undesirable effects on one of the downstream countries if this condition holds.

The base of the Cond. RT 2 represents the following logic “In order to form the Cond. RT, the fast filling of the dam reservoir must be true.” This condition must be met before the entities in the

rest of the tree exist. The fast-filling process must start before the UDEs are shown in this Cond. RT can happen. Again, a second condition, that no major changes are made by the downstream countries, is added for clarity.

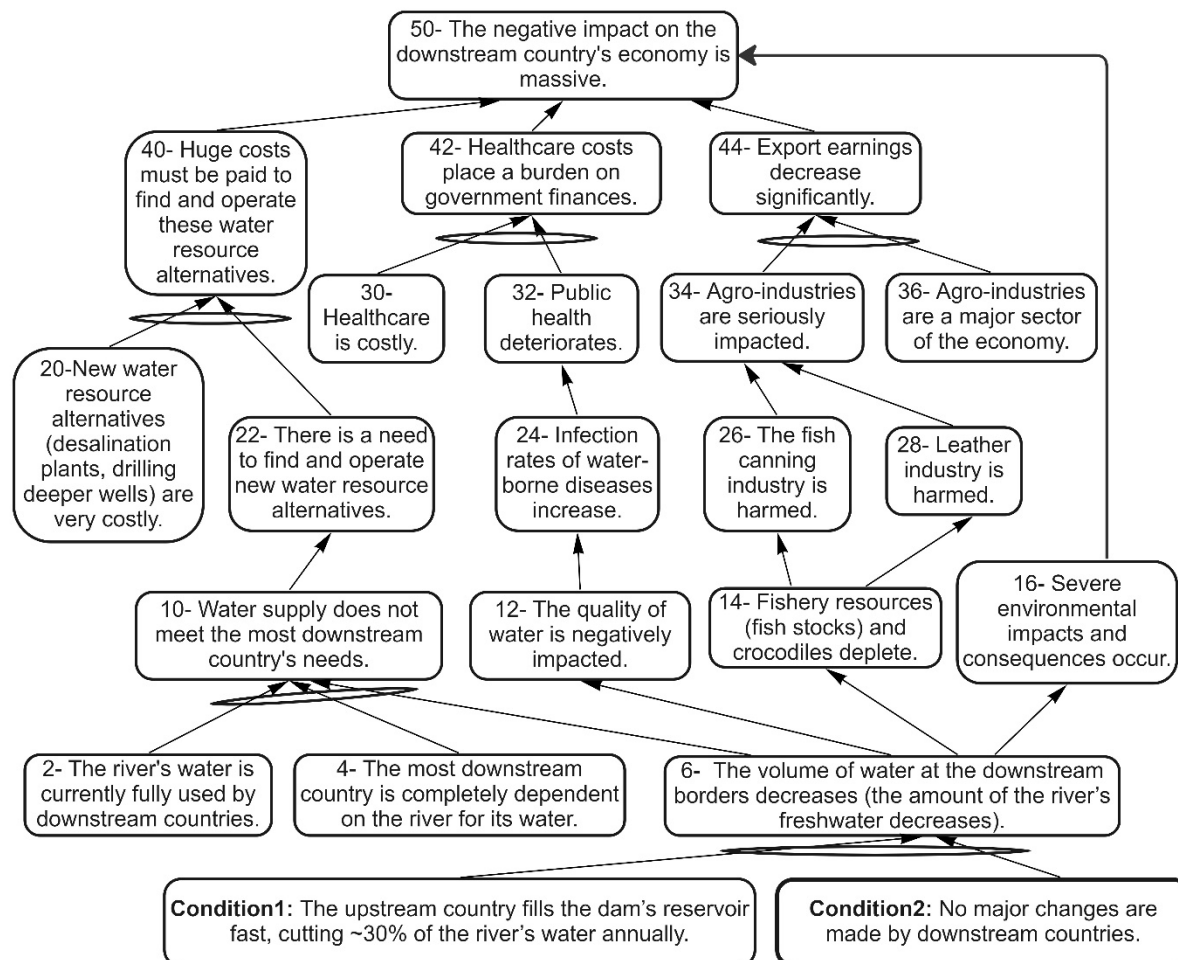


Figure 7: Cond. RT 2 shows the expected impact of an international water dispute over a shared watercourse.

Example 3: Cond. RT for a business

JA is a retailer on the Main Street in the city where there's been increasing competition over the last decade from chain stores coming in, eating into revenues for the established stores and pushing rents/rates up for everyone. So far, JA has not had any direct competition from these large chains, but there is a strong possibility that a big chain in the same industry might come and locate close by, which would be the end of JA. They've been in the same prime location for 55 years and understandably do not want to move, but the owner is still refusing to address the situation.

The Cond. RT shown for this example illustrates how the Cond. RT can be linked to a core conflict (based on an evaporating cloud, evident at the base). Above this are the 2 conditions: 1. JA

refuses to change, and 2. New big chain store in direct competition with JA, sets up a store nearby, which then lead to the severe predicted outcomes.

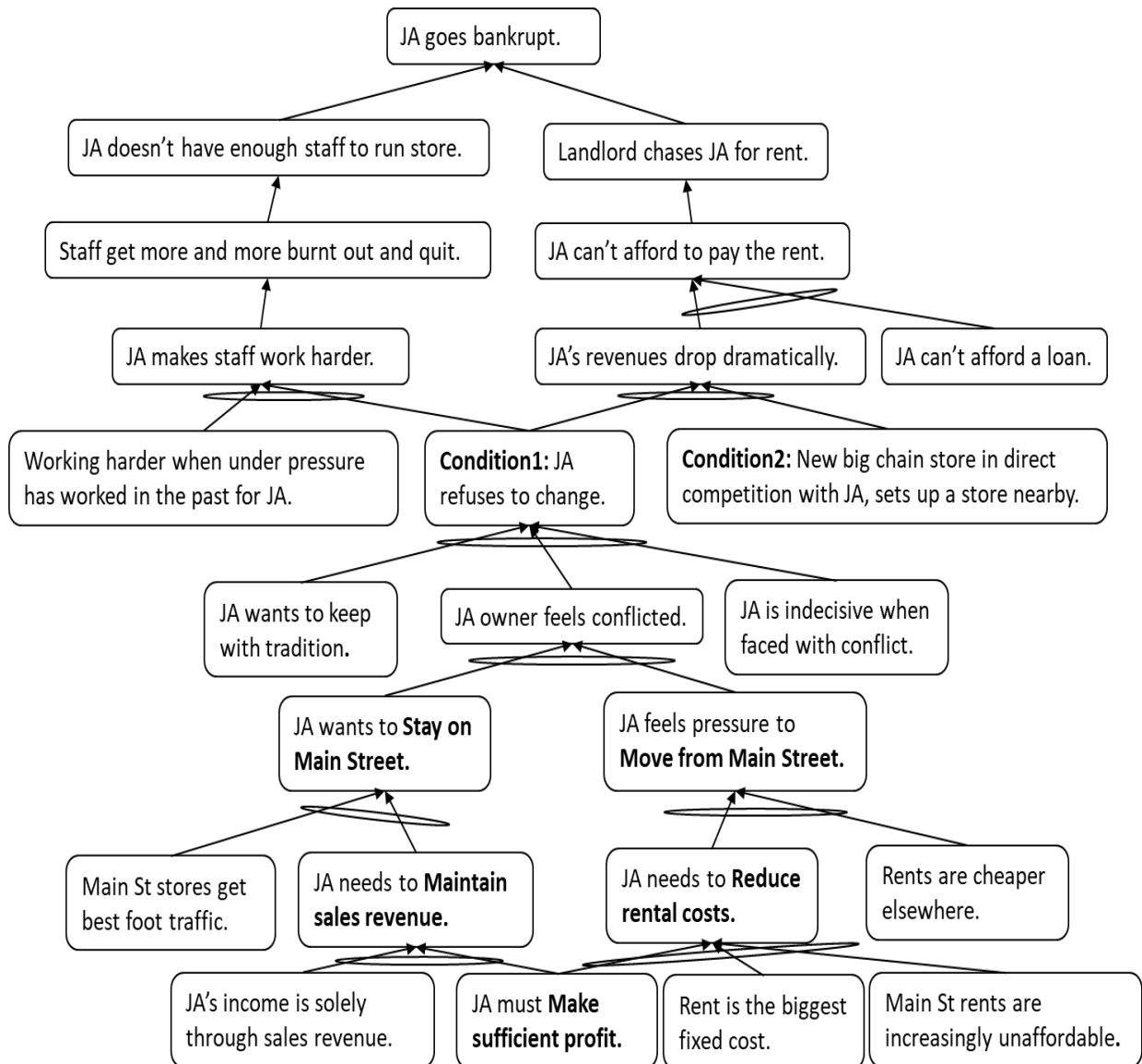


Figure 8: Cond. RT 3 shows the expected impact of a lack of action by a business owner facing a possible new major competitor.

Suggested Usage:

Scenarios/situations where the Cond. RT would be useful include:

- The Cond. RT is suited for impending realities due to, for example, competitive situations, resource shortages, climate change, unsustainable growth, international disputes, or political unrest,
- It analyses potential situations if an expected positive change occurs, e.g., a competitor going broke and leading to a rapid spike in sales which the remaining firm cannot cope with while maintaining service levels,

- It works on personal, workplace or local issues as well as national or global issues,
- Cond. RT helps separate facts from emotions, and
- It works well when studying disputes/conflicts on national and international levels.

Corollary to the Conditional Reality Tree

The Cond. RT can be followed by ECs, Conditional FRT, Conditional PRTs and TrTs to answer the full change questions sequence, providing a comprehensive plan for addressing the expected near future reality, and UDEs in the Cond. RT.

Conclusion

It is often said that “Necessity is the mother of invention”. This is absolutely true in this case. We needed to develop this tree to analyse the case study of the doctoral thesis (Youssef, 2023), as none of the TP trees could handle the still unknown future situation.

Cond. RT. has been developed to explain the UDEs that will arise or are expected to arise in a future situation, based on specific conditions. Thus, the Cond. RT complements the CRT and FRT and addresses a particular need that neither of those trees fills.

The tree starts from the bottom with RCs and assumed conditions and moves upward to the expected UDEs. The Cond. RT as a tool works on clarifying the UDEs on a reality that does not yet exist. It works on the negative situations/conditions/cases that are expected to take place, if no action is taken now, with consequences yet to be seen. It works well as a ‘do nothing’ RT to show what will happen if no action is taken. “Do nothing” often leads to the worsening of problems that need addressing.

Cond. RT can also be used for ‘What if’ analyses to prepare for uncertain futures, based on any possible starting positive or negative conditions. It can be used at all levels – societal, environmental, national, organisational, community, workplace, business, and personal.

As has been explained in this paper, the Cond. RT shares some of the CRT and FRT characteristics. It clarifies the UDEs (like the CRT) and works in future situations (like the FRT). However, it complements the CRT which works only in current existing situations, and the FRT which shows only the DEs that result from implementing change.

The Cond. RT maps the UDEs expected to result in the future, in situations where little or no changes are made to bring good outcomes.

Also, the Cond. RT can be used to map uncertain futures based on seemingly-positive starting conditions that actually result in UDEs, either unforeseen initially, or due to inadequate decisions or failure to implement needed change.

This tool is important to deal with any significant external change. The FRT as it is defined today, deals only with new injections that we initiate. It does not deal with external changes that impact our reality.

The CRT and FRT cannot cope with such situations because the TP protocols dictate that all entities in CRTs are worded using the present tense. Every entity has to be present/has to exist. Moreover, the FRT is more concerned with DEs in the future brought about by implementing change, not UDEs, and so does not help to clarify UDEs expected to occur in the near future, or DEs that are not caused by making decisions or implementing change.

So, the need arose for constructing a new tree that can clarify UDEs in the near future or clarify expected DEs, where the expected DEs are not caused due to implementing change. This tree is conditional based on a negative or positive situation that, while imminent, does not exist yet. Cond. RT is therefore deserving of inclusion in the TOC Body of Knowledge.

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