The link between the S&T trees and the traditional TP analysis: a rigorous approach

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Date: June 5th 2013

Defining Parallel Assumptions

The Strategy and Tactic Tree (S&T) is a hierarchical structure that connects STEPs or NODEs in which there are entities that verbalize, at every level, objectives or Strategies (S), and the actions or Tactics (T) that describe how these objectives should be achieved.

The relationship between Strategy (S) and Tactic (T) is verbalized through a series of assumptions. These assumptions explain why:

• T is necessary to achieve S
• T is sufficient to achieve S
• T is feasible
• T is the best among the available alternatives

These sets of assumptions are known as "Parallel Assumptions" (we refer to them as "PA").

Thus the "Parallel Assumptions" belong to four subcategories:

• PA of necessity
• PA of sufficiency
• PA of feasibility
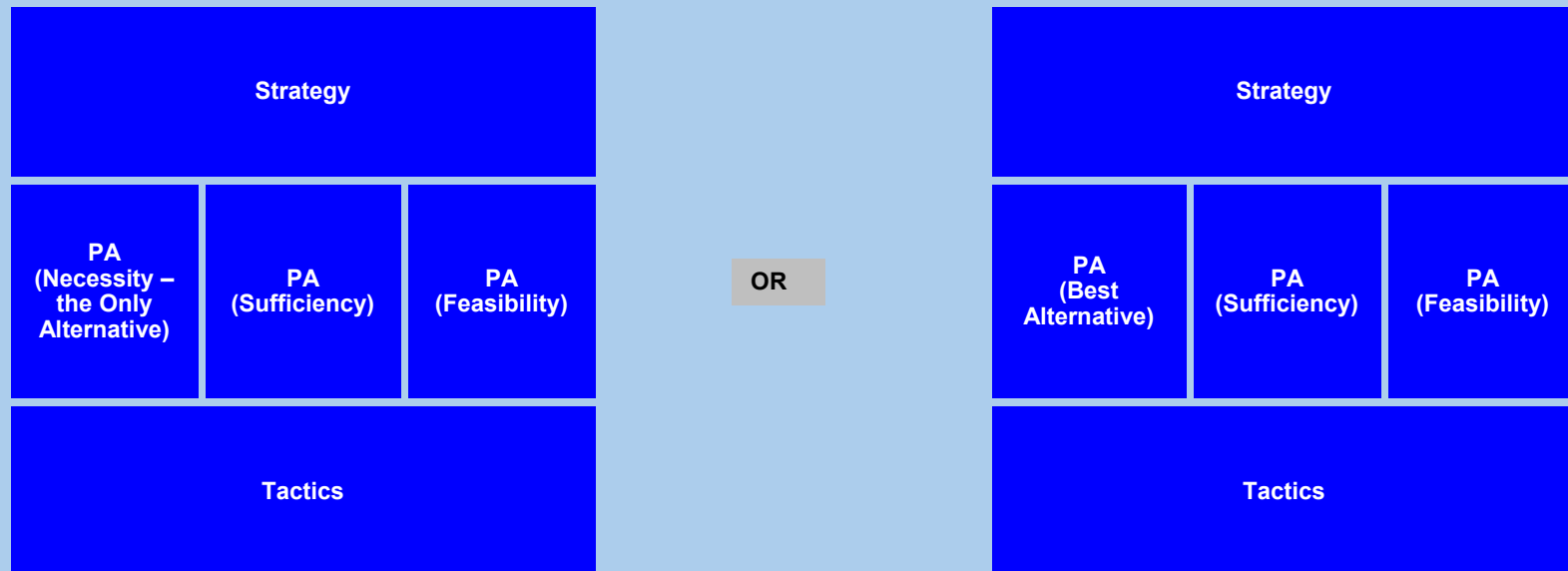• PA of "best alternative"

PA (Necessity – the Only Alternative)	PA (Sufficiency)	PA (Feasibility)	PA (Best Alternative)
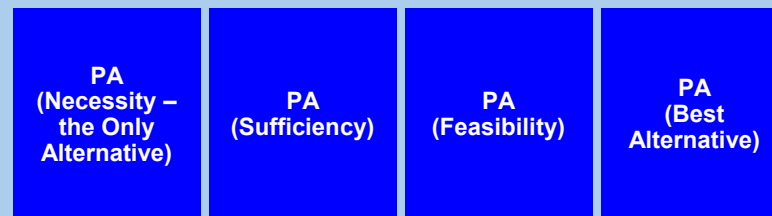
Defining Parallel Assumptions

The assumption of best alternative is redundant if there is a PA of necessity (whether an action has an alternative, it is not strictly necessary, since it can be replaced by another action).

If we succeed in verbalizing the PA of sufficiency, but not the PA of necessity, it is mandatory to verbalize the PA of best alternative; if we succeed in verbalizing the PA of necessity, the PA of best alternative doesn't make sense, as the necessity determines "the only alternative" . As a result, PA of best alternative and necessity are mutually exclusive.

Strategy		
PA (Necessity – the Only Alternative)	PA (Sufficiency)	PA (Feasibility)
Tactics		

OR

Strategy		
PA (Best Alternative)	PA (Sufficiency)	PA (Feasibility)
Tactics		

Defining Parallel Assumptions

For a clear verbalization of PA is useful to answer the following questions:

• why the Strategy (goal) is possible and under which conditions is it?

→ **PA (Feasibility)**

• Which specific elements, risks or obstacles to implementation must be considered when we decide the best way to achieve the Strategy?

→ **PA (Necessity – the Only Alternative)** | **PA (Sufficiency)** | **PA (Best Alternative)**

The first of the above questions helps to verbalize the PA of feasibility, whereas the second (more detailed) the PA of necessity, best alternative and sufficiency. By focusing on the risks and obstacles we can indeed verify the sufficiency (tactics must be able to remove all obstacles), and select the possible alternative tactics following a criterion of effectiveness in removing risks and obstacles.

STEP Consistency

To ensure the consistency of the STEPs, we can refer to the following logical model:
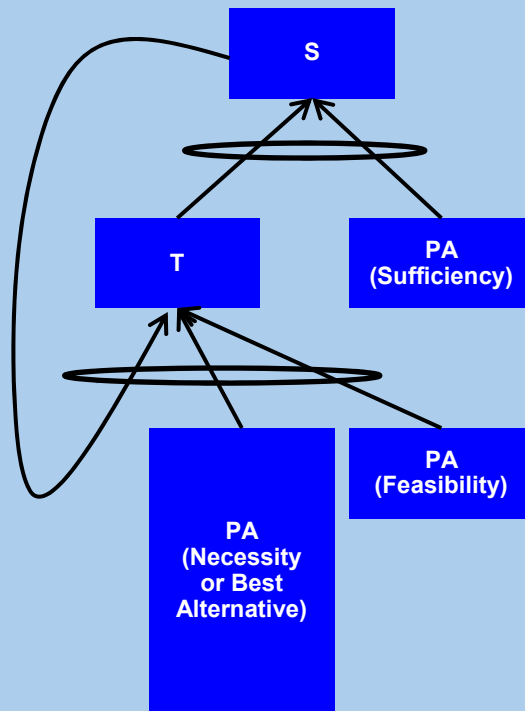
The circularity of causal dependence between Strategy and Tactic in the model represented (S depends on T and vice versa) demonstrates the duality of their relationship. We can also note that in a couple of "Strategy and Tactic" that is "consistent", T is always sufficient to achieve S, but not always necessary (it may simply be the best alternative among the possible Tactics).

The model is based on the category of logical sufficiency. The consistency comes from the fact that none of the PA must be questioned or invalidated.
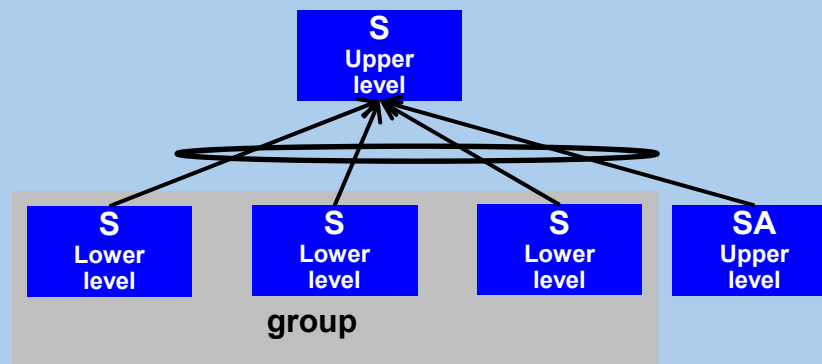
Having the Strategy with the PA of Feasibility and of Necessity or Best Alternative, we can define the Tactic. Having the Tactic and the PA of sufficiency, we can define the Strategy.

Consistency between levels

In a rigorous construction of an S&T tree, Group Sufficiency Assumptions should be verbalized, for each STEP, through the explanation of why the STEPs of the lower level related to it are sufficient (as a group) to achieve the Strategy of the STEP. In TOC language these assumptions are called "SA" (from "Sufficiency Assumptions") and are located, in any STEP, under the verbalization of Tactics.

The logical model is the following

```
            ┌──────────┐
            │    S     │
            │  Upper   │
            │  level   │
            └──────────┘
```

S Lower level	S Lower level	S Lower level	SA Upper level

group

Consistency between levels

In order to clearly verbalize the SA, we must consider the answers to the following questions:

• Why the GROUP of lower level STEPs allows to achieve the Strategy of the STEP?
• Why additional lower level STEPs in the GROUP are not required?
• Are there any conditions met without the need to deploy additional actions? - (we should avoid STEPS in the GROUP that are redundant for sufficiency)
• What can undermine, if not considered, the possibility of achieving the Strategy? - Warning signal!

In practice, the effort of verbalizing in a comprehensive manner the sufficiency assumptions is daunting and expensive, as it is necessary to refer to the partial contribution of each of the sub-targets of the lower level STEPs belonging to the group (Strategies of level n + 1) to the Strategy of level n.

If a group contains many STEPs, the group sufficiency, expressed in a rigorous way, can contain pages and pages of explanation.

Then the convention is to articulate the assumptions of sufficiency in response to a less ambitious goal:
we shouldn't forget the Strategies of lower level which, if not considered, can seriously jeopardize the sufficiency of the group and that, without a reminder or warning, have high probability to be left out.
So Sufficiency Assumptions (SA) usually contain only warning signals (last question in the above list) in order to be sure to consider lower level STEPs that, if ignored, will affect the sufficiency of the group.
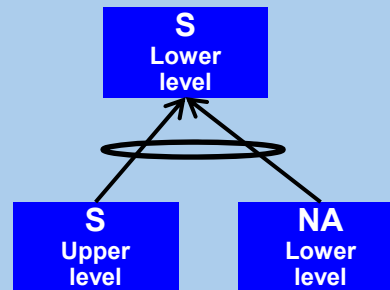
Consistency between levels

We must also explain why each STEP is necessary to achieve the Strategy verbalized in the higher level STEP to which it is linked.

The verbalization of this is done through the "Necessity Assumptions" (indicated by "NA"). The NA, in each STEP, are placed above the verbalization of Strategy.

The logical model is the following

```
        ┌──────────┐
        │    S     │
        │  Lower   │
        │  level   │
        └──────────┘
            ▲
   ┌───────────────┐
 ┌──────────┐   ┌──────────┐
 │    S     │   │    NA    │
 │  Upper   │   │  Lower   │
 │  level   │   │  level   │
 └──────────┘   └──────────┘
```

Consistency between levels

If a STEP is necessary, it's because something necessary (Strategy) can't be achieved without a specific action (Tactic). There is therefore a gap between the current situation and the desired situation, which is what is verbalized through the Necessary Assumption
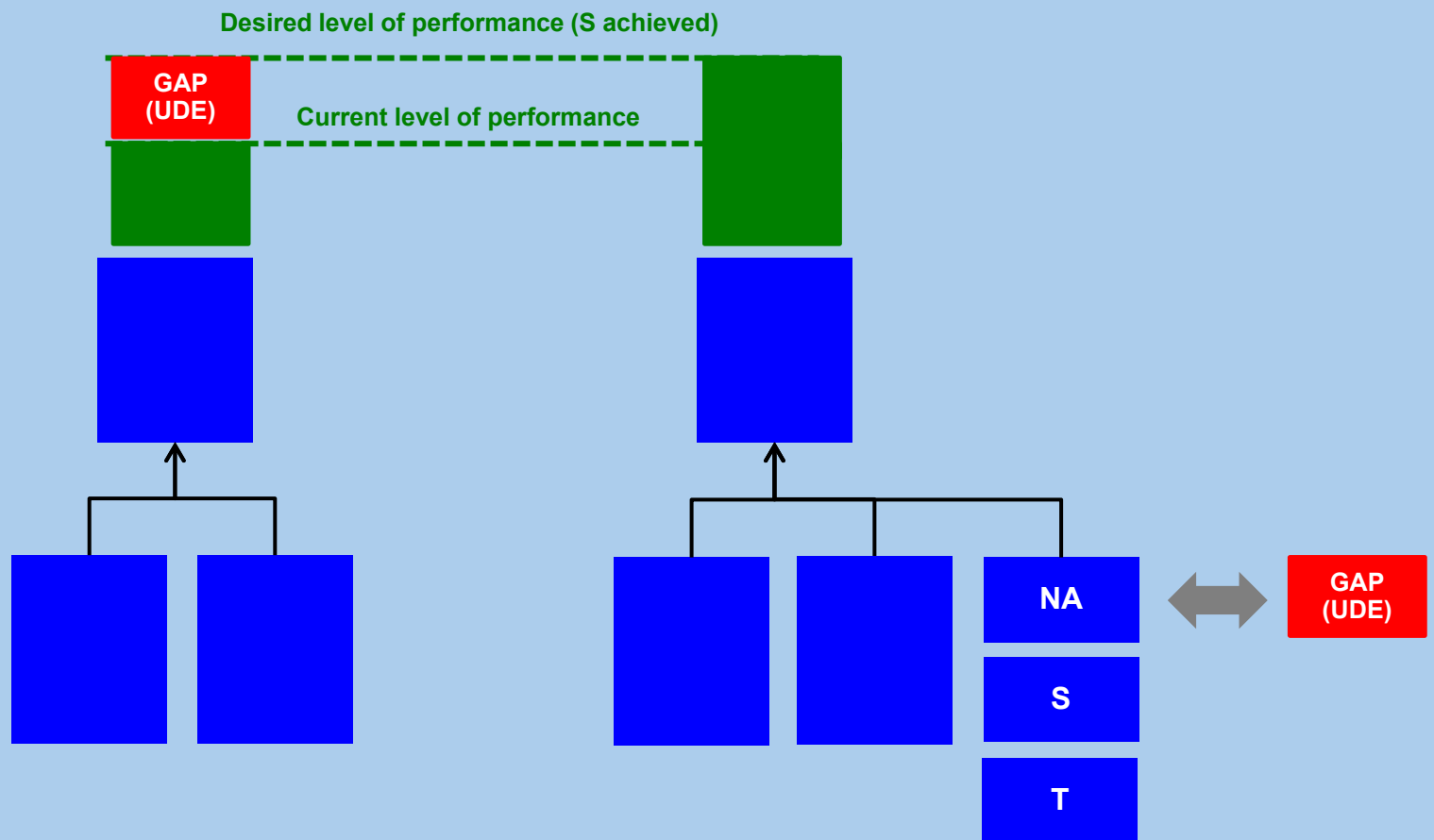
Since the gap is undesired, verbalizing NA means answering the following questions:

• Which specific undesired effect (gap) determines the need for change (and thus the need to implement the Tactic)?
• Why is it difficult to bridge the gap?
• why is it important to achieve the Strategy?
• if we don't implement the Tactic and we don't achieve the Strategy, what would be the side effect with which we'd live?
• why this undesired effect would prevent achieving the objective (Strategy) of the higher level?

Consistency between levels

The meaning of NA is the following

Desired level of performance (S achieved)

GAP
(UDE)

Current level of performance

NA

S

T

GAP
(UDE)

Consistency between levels

To ensure the consistency of the structure of an S&T is necessary to consider both the assumptions of necessity ("NA"), and the assumptions of sufficiency ("SA") related to the Strategies that must be accomplished. The logical models are based on sufficiency logic incorporating the entities "Strategy" at different levels and the assumptions of necessity and sufficiency. The consistency comes from the fact that both SA and NA must not be questioned or invalidated.
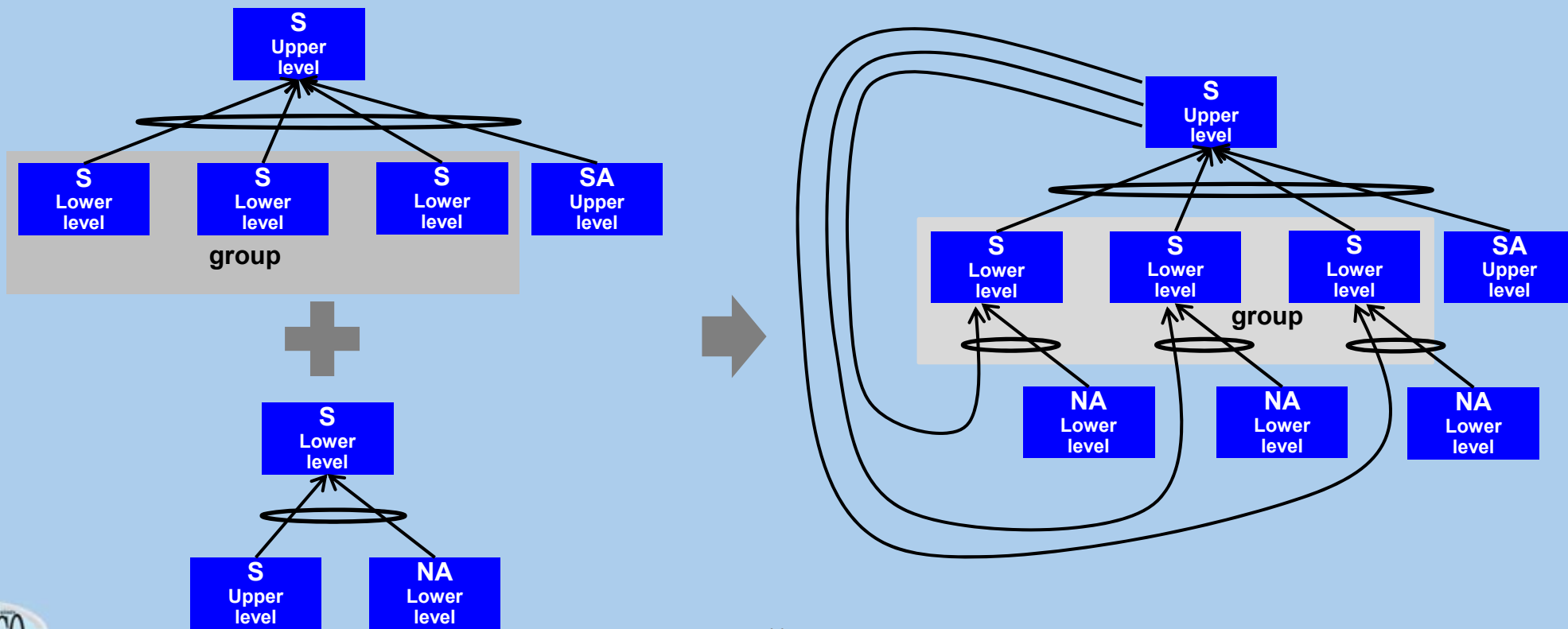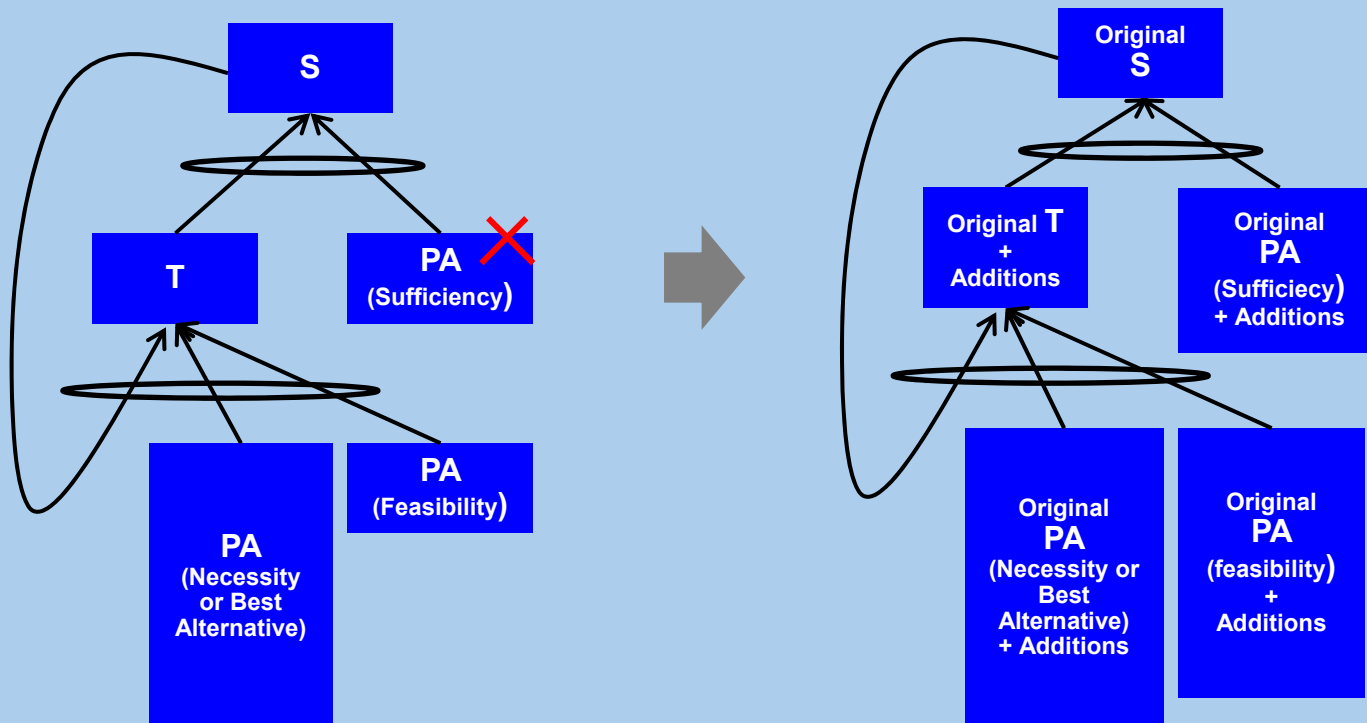
Challenging the Parallel Assumptions: Sufficiency
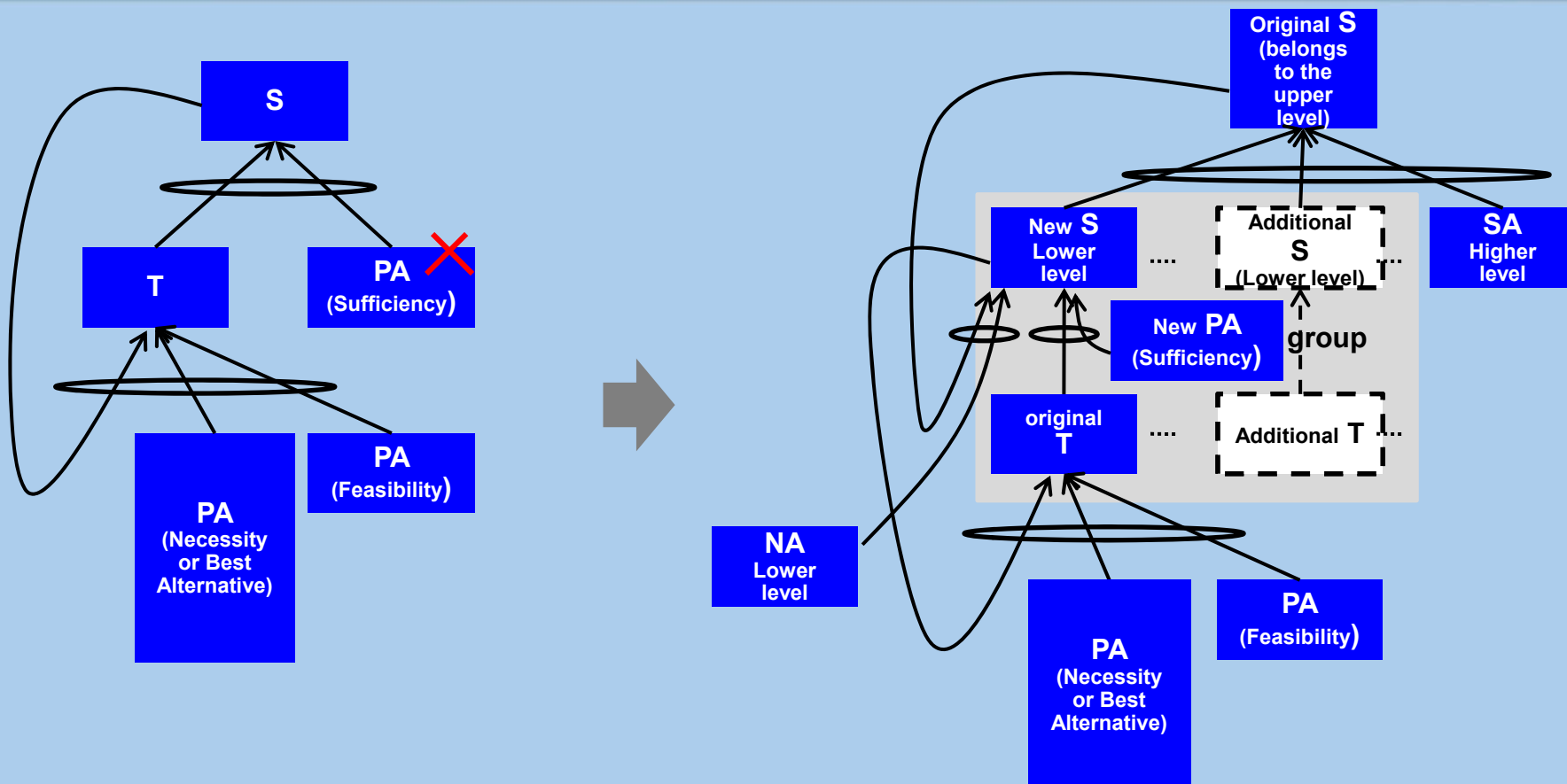
With reference to figure, invalidating the PA of sufficiency is equivalent to say that the Tactic, on its own, is not sufficient to achieve the corresponding Strategy. In this case, the starting Strategy belongs to a higher level than the Tactic considered. Such Tactic, anyway, allows to achieve an objective of the lower level (Strategy), that is therefore necessary to define. We have also to add lower level STEPS to achieve group sufficiency!

Alternatively, we can keep the original Strategy and make the STEP consistent adding something substantial to the Tactic. Together with the additions to T, we have to make additions to all the PAs, which need to incorporate in the verbalization the reason why the new Tactic (including additions) is necessary or the best alternative, is feasible and sufficient to achieve the Strategy.

# Challenging the Parallel Assumptions: Feasibility
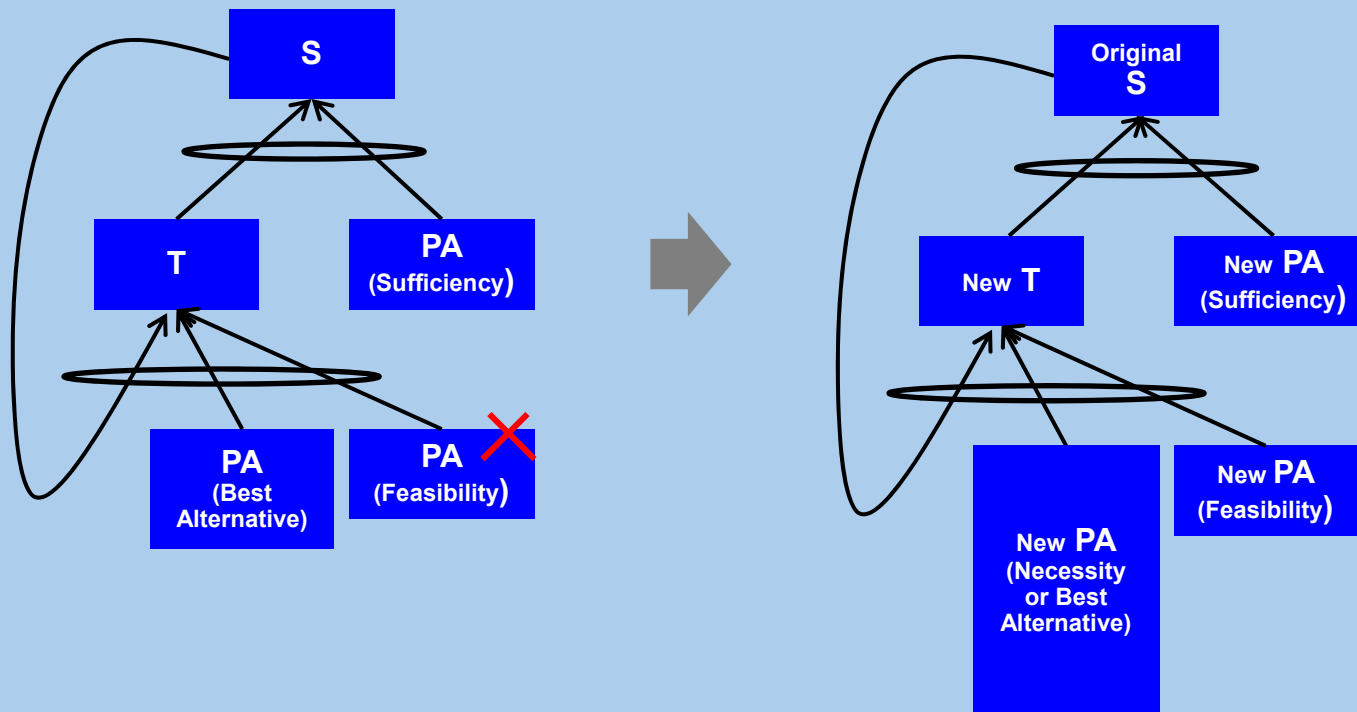
Invalidating the PA of feasibility obviously implies the need to define an alternative feasible Tactic. This implies the need to define all the PAs anew.

Challenging the Parallel Assumptions: Feasibility

But there is a problem.
The alternative Tactic can be defined if and only if the old Tactic is not the only alternative available to achieve the Strategy (we don't have in the STEP a PA of necessity, or, if we have one, we can invalidate it).
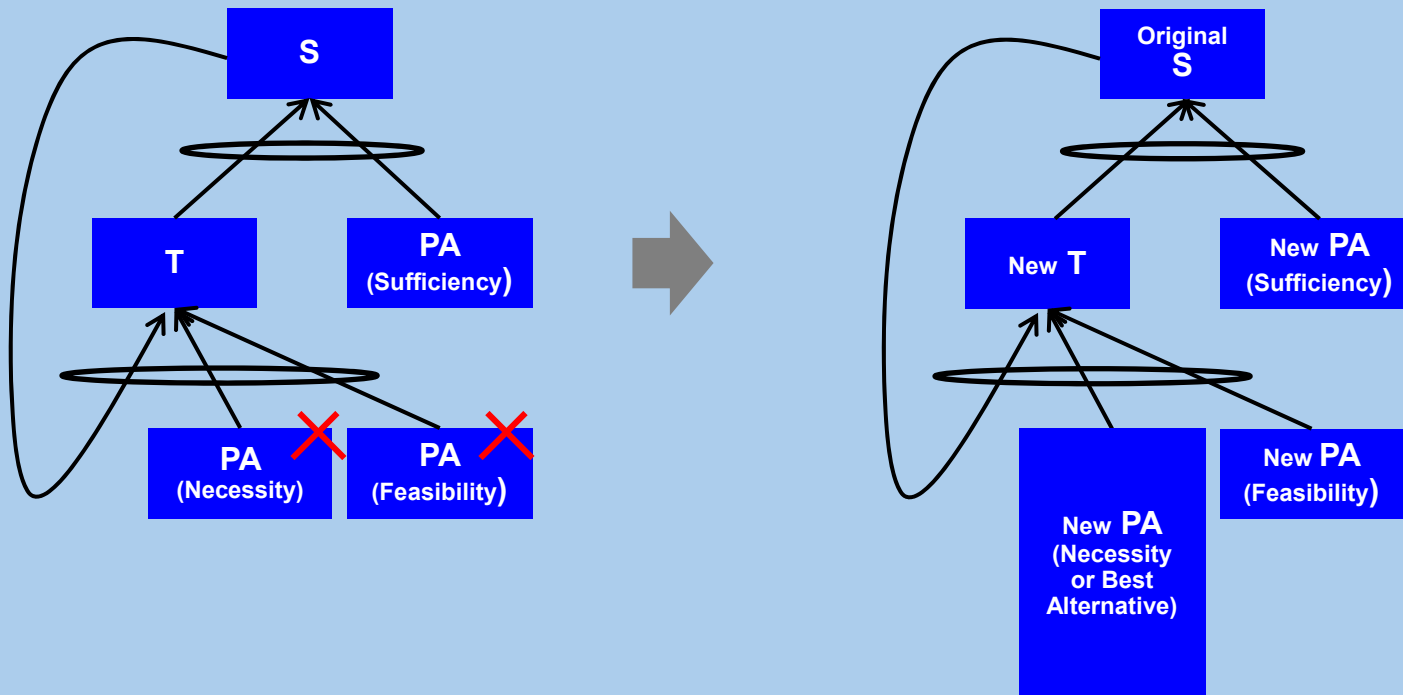
When a Tactic is necessary, but not feasible, it will be impossible to achieve the goal for which the action has to be taken (Strategy). In this case, we can keep the original Strategy by changing the Tactic and all the PAs only if we can also invalidate the PA of Necessity.

Challenging the Parallel Assumptions: Necessary but Not Feasible!

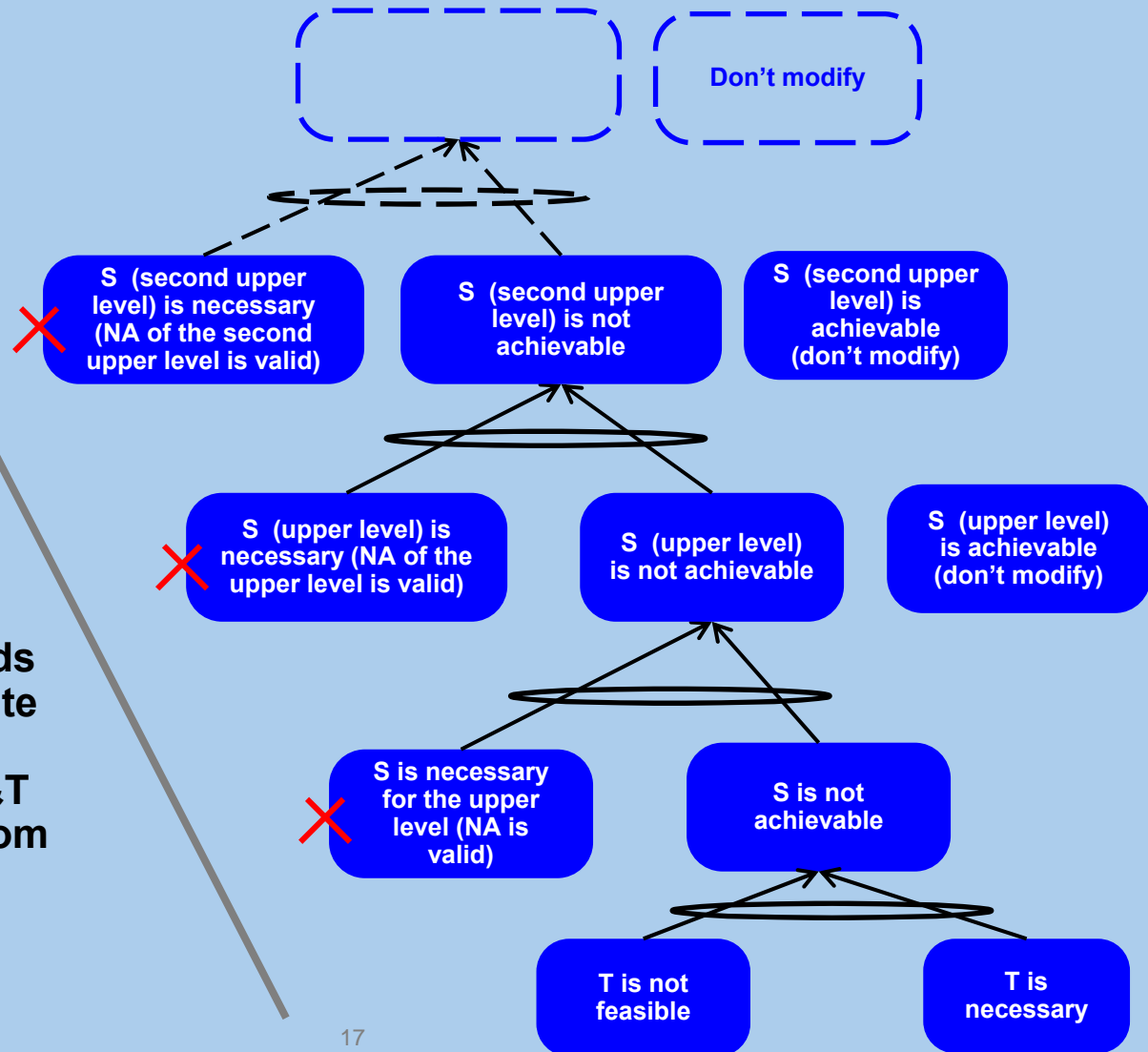If the Tactic is not feasible, but necessary, a large part of the S&T can be questioned.

In this situation it is necessary to focus on the NA, which explain why a Strategy (unfortunately not achievable) is necessary to achieve the objective (Strategy) of the upper level.

If we can invalidate the NA, it's possible to keep the higher level STEP unchanged, except for the SA, that could be changed.

It is necessary, however, to completely redefine the STEP not only with respect to T and the PAs, but also with regard to S and NA (redefinition can obviously also lead to the complete elimination of the STEP, if we are unable to verbalize a valid NA).
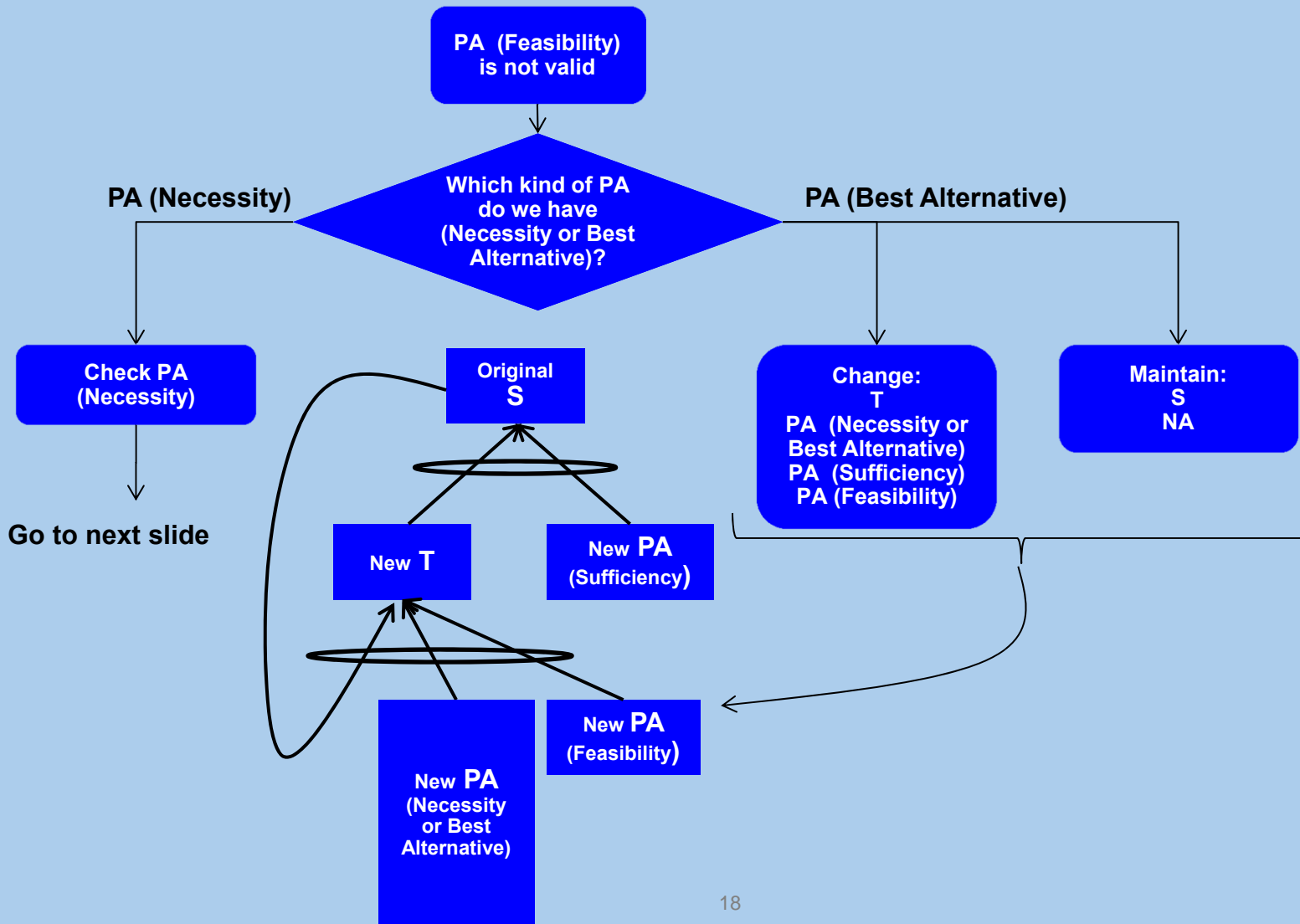
Challenging the Parallel Assumptions: Necessary but Not Feasible!

Don't modify

S (second upper level) is necessary (NA of the second upper level is valid) ✗

S (second upper level) is not achievable

S (second upper level) is achievable (don't modify)

S (upper level) is necessary (NA of the upper level is valid) ✗

S (upper level) is not achievable

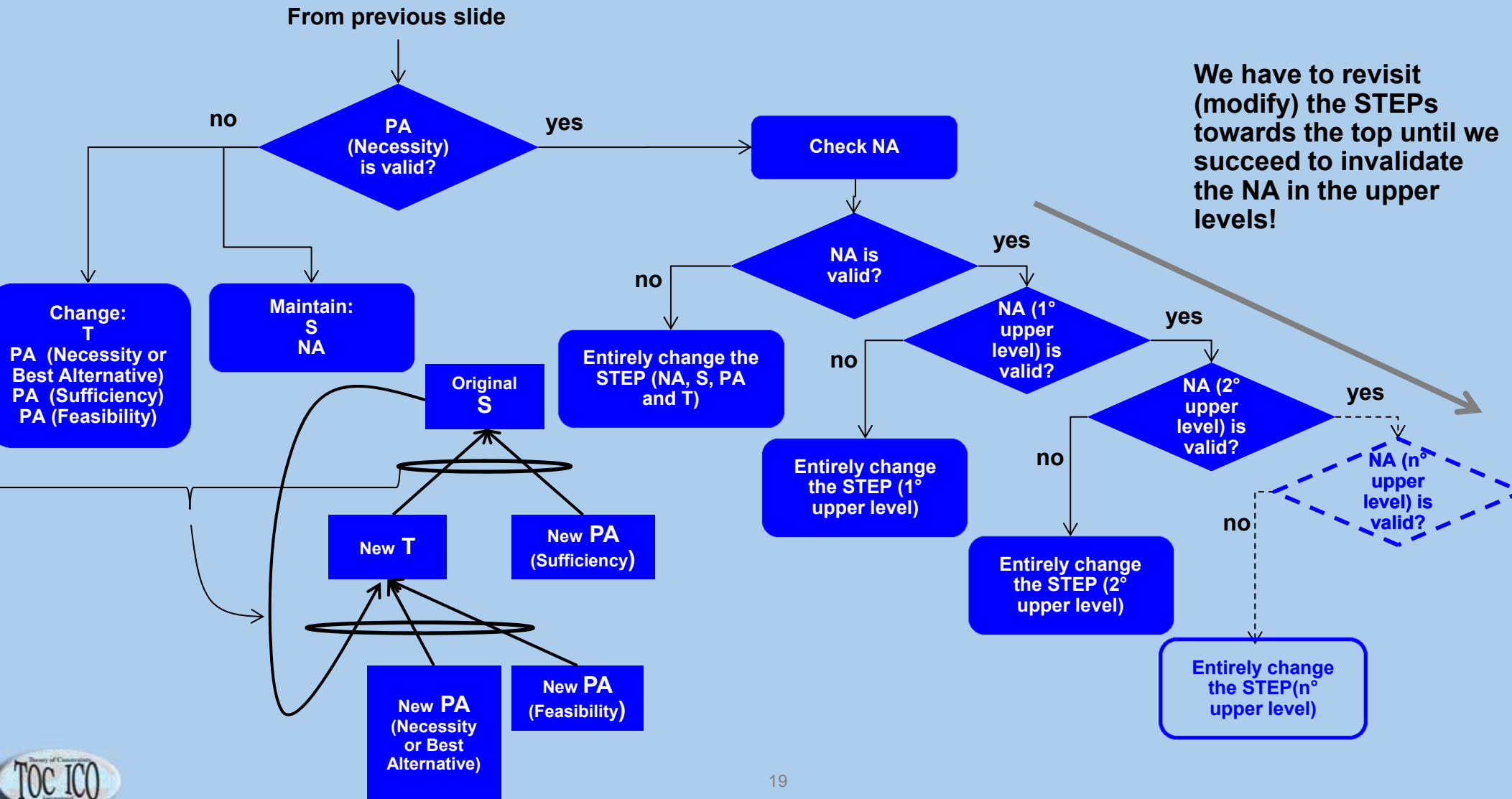S (upper level) is achievable (don't modify)

We have to check the STEPs towards the top until we succeed to invalidate the NA in the upper levels! The redefinition of the entities of the S&T must be implemented downward from the level of the STEP for which it is possible to invalidate the NA.

S is necessary for the upper level (NA is valid) ✗

S is not achievable

T is not feasible

T is necessary

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Challenging the Parallel Assumptions: Feasibility

PA (Feasibility) is not valid

Which kind of PA do we have (Necessity or Best Alternative)?

PA (Necessity)

PA (Best Alternative)

Check PA (Necessity)

Go to next slide

Original S

New T

New PA (Sufficiency)

New PA (Necessity or Best Alternative)

New PA (Feasibility)

Change:
T
PA (Necessity or Best Alternative)
PA (Sufficiency)
PA (Feasibility)

Maintain:
S
NA

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Challenging the Parallel Assumptions: Feasibility

From previous slide

We have to revisit (modify) the STEPs towards the top until we succeed to invalidate the NA in the upper levels!

PA (Necessity) is valid?

no

yes

Check NA

NA is valid?

no

yes

Entirely change the STEP (NA, S, PA and T)

NA (1° upper level) is valid?

no

yes

NA (2° upper level) is valid?

no

yes

NA (n° upper level) is valid?

no

yes

Entirely change the STEP (1° upper level)

Entirely change the STEP (2° upper level)

Entirely change the STEP(n° upper level)

Change:
T
PA (Necessity or Best Alternative)
PA (Sufficiency)
PA (Feasibility)

Maintain:
S
NA

Original S

New T

New PA (Sufficiency)

New PA (Necessity or Best Alternative)

New PA (Feasibility)

TOC ICO

Challenging the Parallel Assumptions: Necessity or Best Alternative
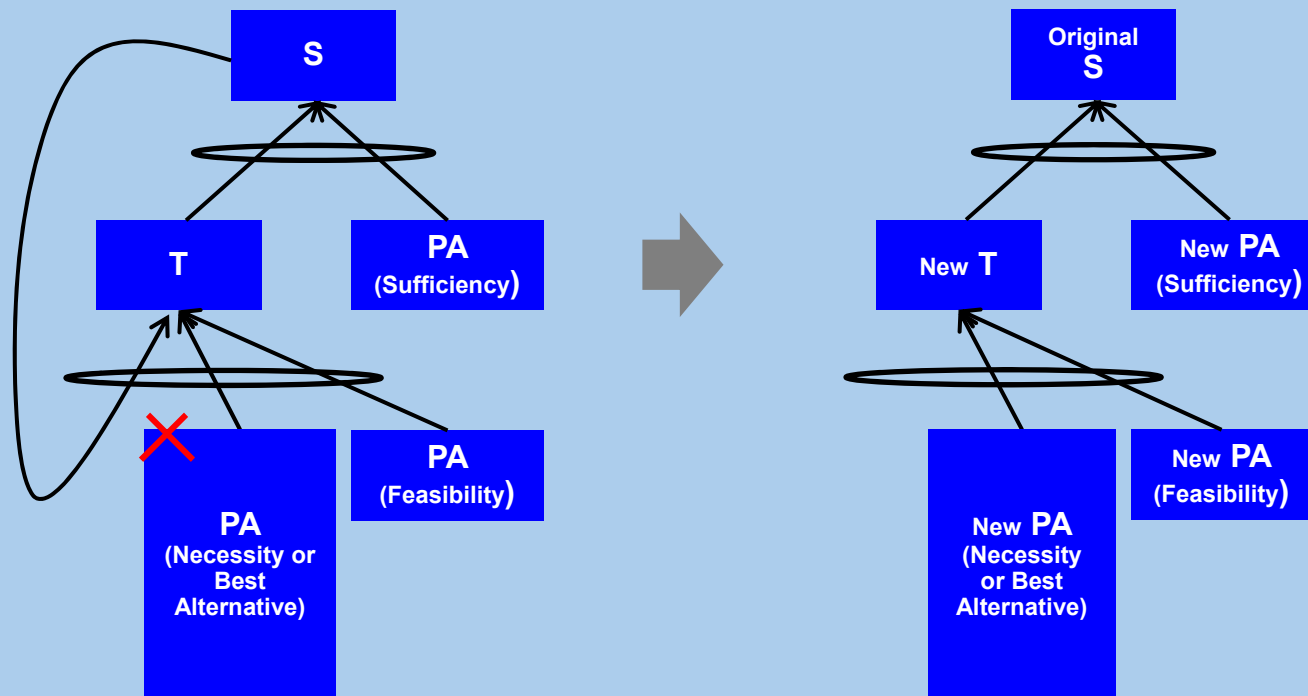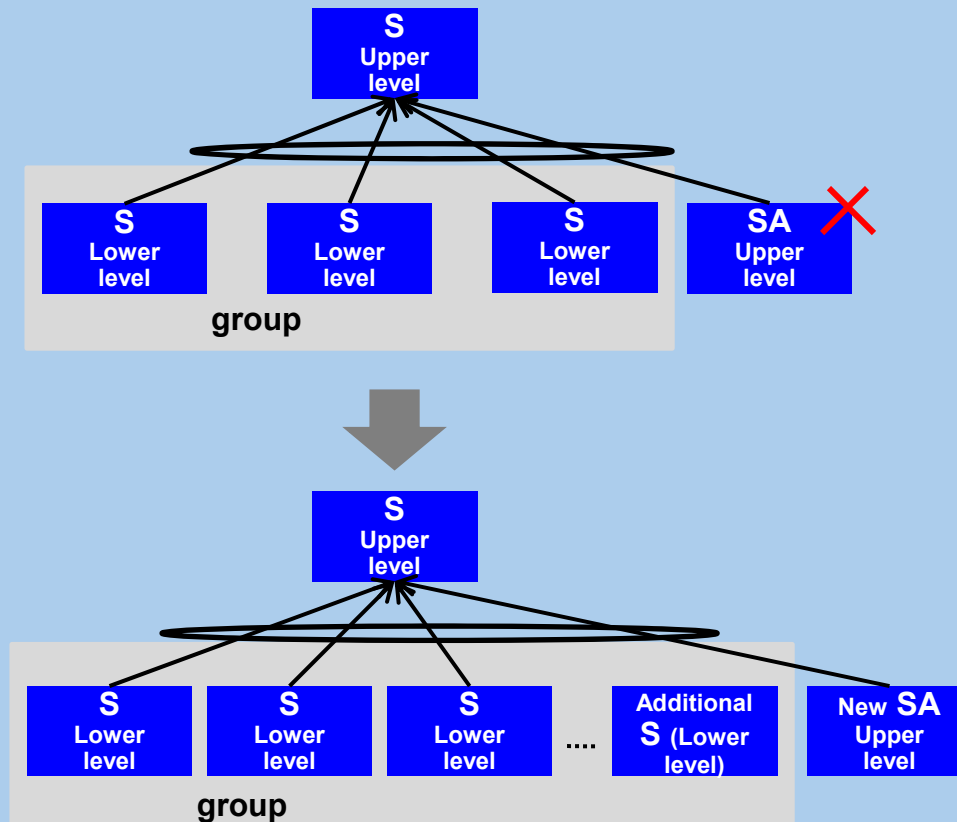
Invalidating the PA of necessity or best alternative implies the need to define an alternative feasible Tactic.
This implies the need to define all the PAs anew.
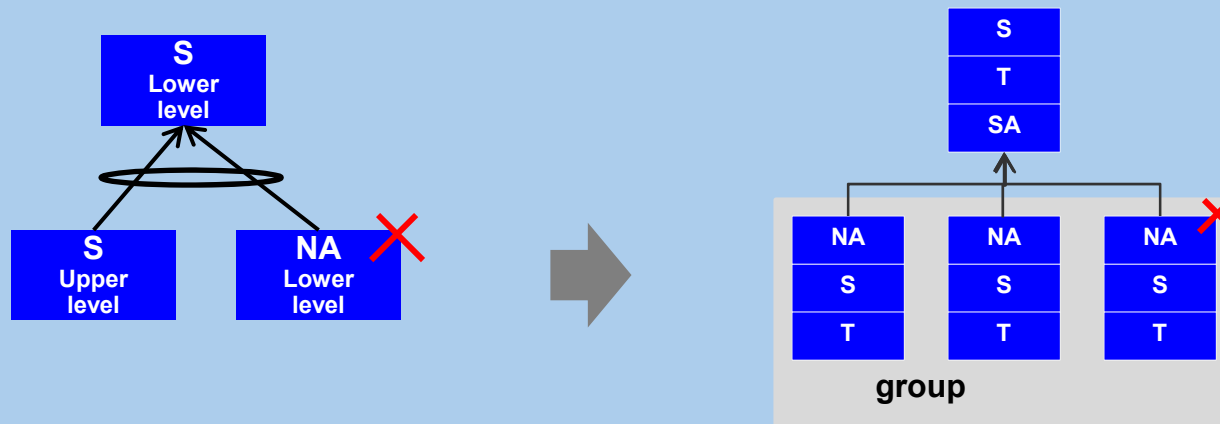
Challenging the Sufficiency Assumptions

Invalidating the SA of a STEP involves the need to add one or more lower level STEPs to obtain the group sufficiency. Reviewing the Group Sufficiency Assumption allows us to find the missing parts of a solution. If the SA is verbalized only as a warning, we have to check if something else, in the lower level Strategies, has not been mentioned and has high probability to be left out.

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Challenging the Necessity Assumptions

Invalidating the NA of a STEP can lead to its elimination.
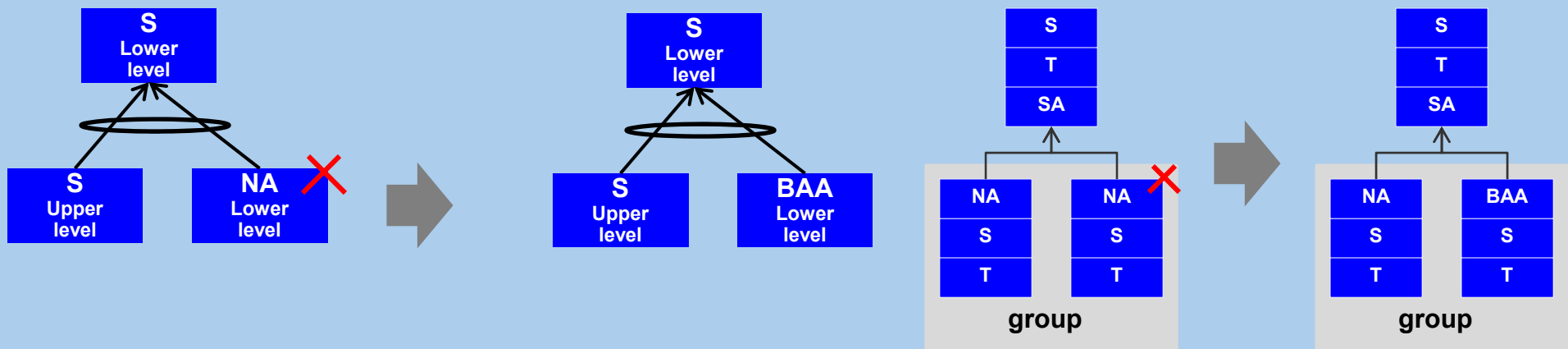

Remove the STEP (Lower level)

Challenging the Necessity Assumptions

In general, a STEP may not be strictly necessary, but may still contribute to the sufficiency of a group. This happens when there are other alternatives (other Strategies) that allow to achieve the Group Sufficiency. We have to choose, among these alternatives, the best one. Rigorously speaking, the NA should be formulated as a "Best Alternative Assumption" ("BAA").


Don't remove the STEP (Lower level)
NA becomes a Best Alternative Assumption (BAA)

Challenging the Necessity Assumptions

When a STEP does not contribute to the group sufficiency, it can still be useful in the sense that it facilitates the achievement of the higher level. In this case it is appropriate to represent it in the S&T structure, justifying its presence with a '"SuPPorting Assumption" ("SPPA").
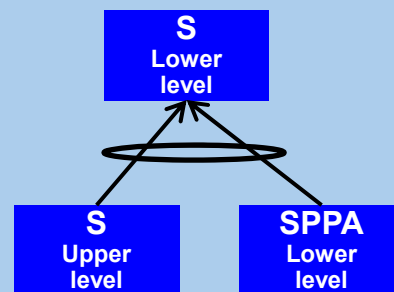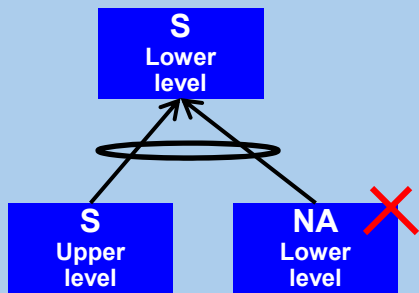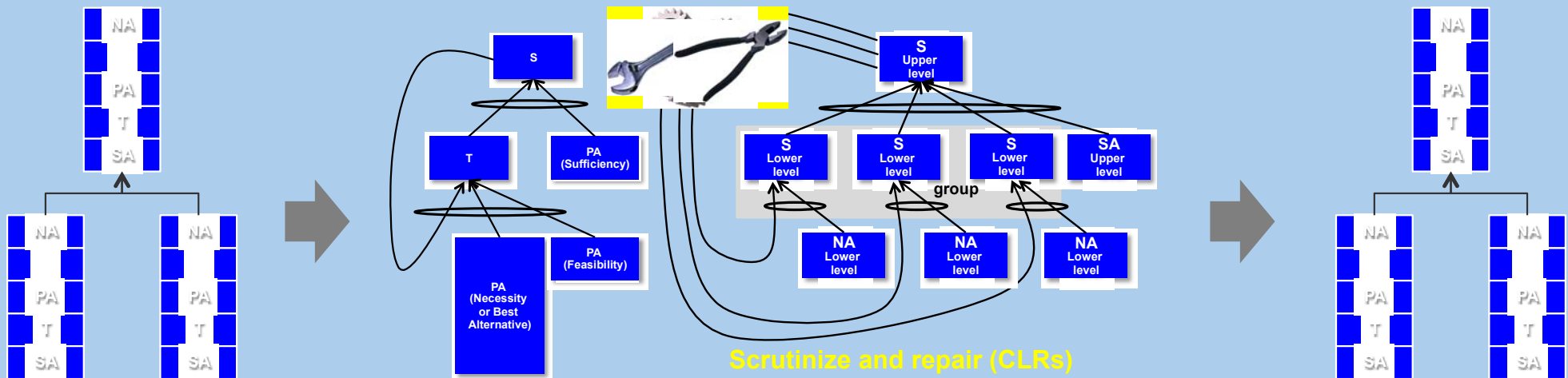

Don't remove the STEP (Lower level)
NA becomes a SuPPorting Assumption (SPPA)
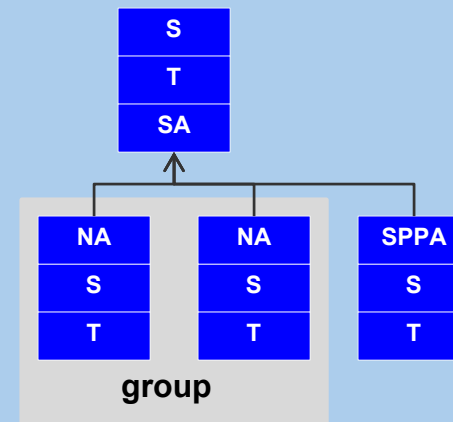
The Process

Apply the logical sufficiency models (to be questioned)

Scrutinize and repair (CLRs)

To be questioned…   **Logical sufficiency models revisited**   **S&T revisited**

Starting from a rigorous TP analysis

Let's suppose that we start from a rigorous TP analysis of the system that we want to improve. How can we build the S&T tree? The first thing that we have to do is to share with management which gap we have to fill so that we can transform our current situation in the new one related to the level of performance that we want to achieve. This gap exists because of some UDEs which limit the actual performance of the system.

Filling the gap means removing the UDEs (which must be the same as previously identified by our TP analysis).
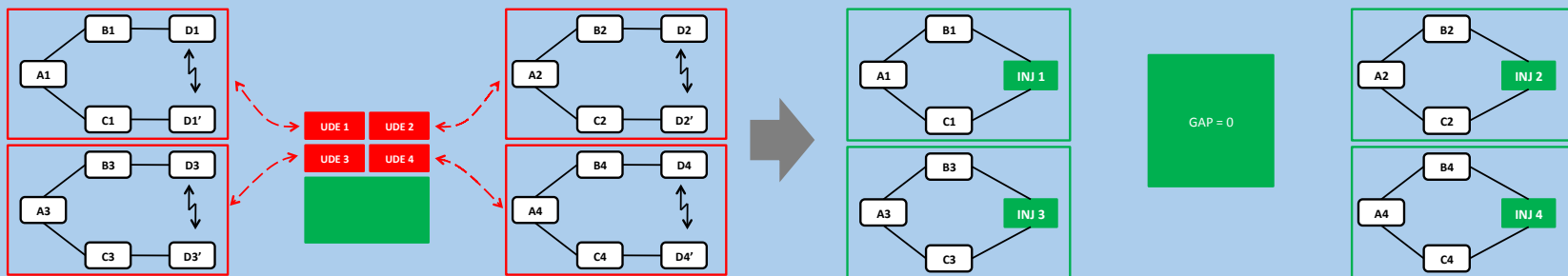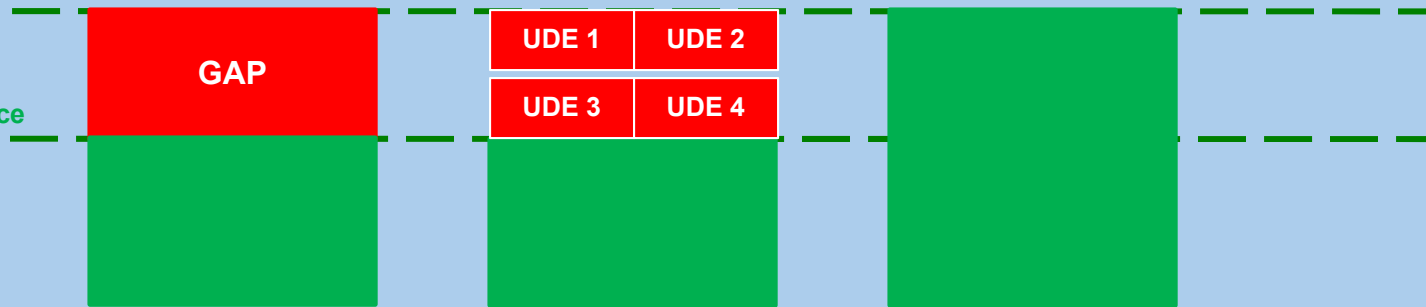
S&T Level 1 (starting level)
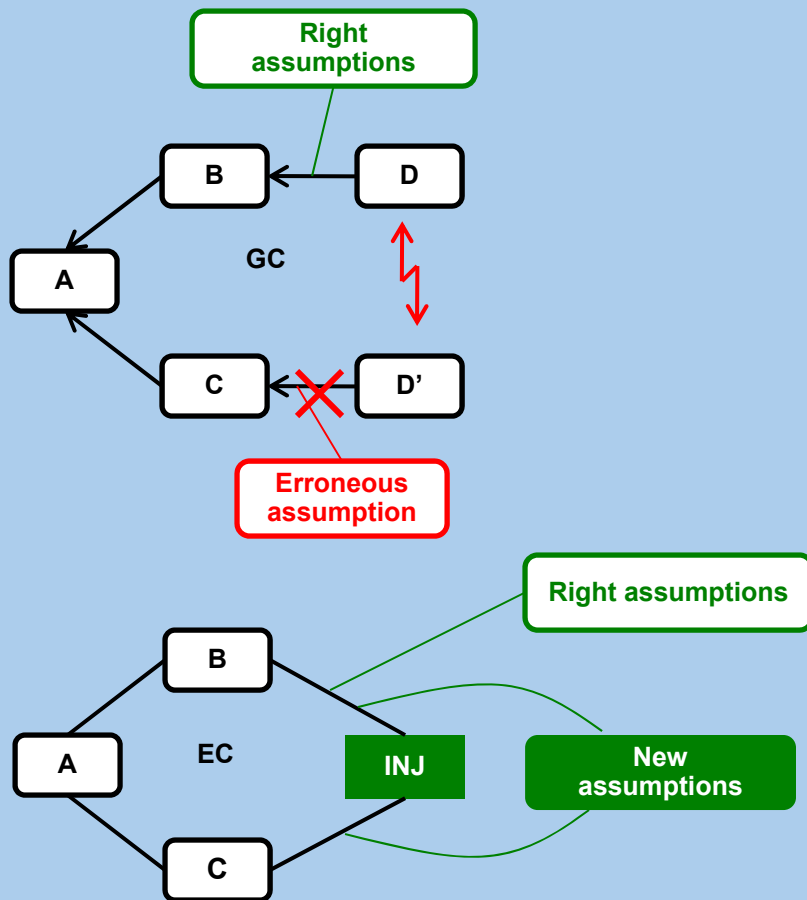
NA	GAP (Σ UDEs)
S	"A" (∑ Ai), "B","C" (GC)
PA	Right assumptions (GC)
	New assumptions (EC)
T	INJ for the generic conflict (∑ INJi)
SA	

PA
(Necessity or
Best
Alternative)

S&T Level 1 (starting level)
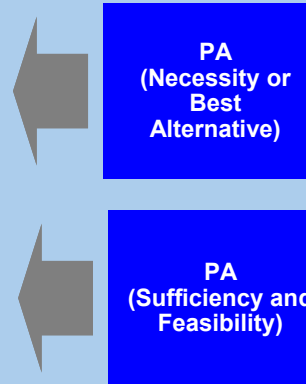
S&T Level 1 (starting level): summary

The NA of the STEP is explained through the verbalization of the GAP that we have to bridge in order to achieve the desired level of performance. The gap is caused by the sum of the UDEs related to the analysis.

The general objective (S) that we want to achieve can be taken from the entities "A", "B" and "C" of the generic cloud.

The general Injection that solves the generic conflict is the Tactic (T).

The PA of necessity or best alternative are the correct assumptions from the generic cloud and the new assumptions behind the connections between the general INJ that removes the conflict and the entities "B" and "C" of the evaporating cloud.

The PA of feasibility and sufficiency can be found in the FRT choosing the "most relevant" assumptions (those that best represent the "essence" of the Injection) in the logical structure.

The SA can be derived analyzing the potential risks associated with the generic solution: these risks are verbalized in the FRT (in the NBR branches). The Warnings contained in the SA must be related to the need, at lower level, to deal with the problem of invalidating the root assumptions of the NBR branches (if we forget to do this, the presence of PUDEs will jeopardize the results).

Referring to a rigorous FRT is also possible to check the group sufficiency of the lower level, focusing on the logical connections between the DEs and the entities "A", "B" and "C" of the generic cloud.

S&T Level 2 (starting level – 1)
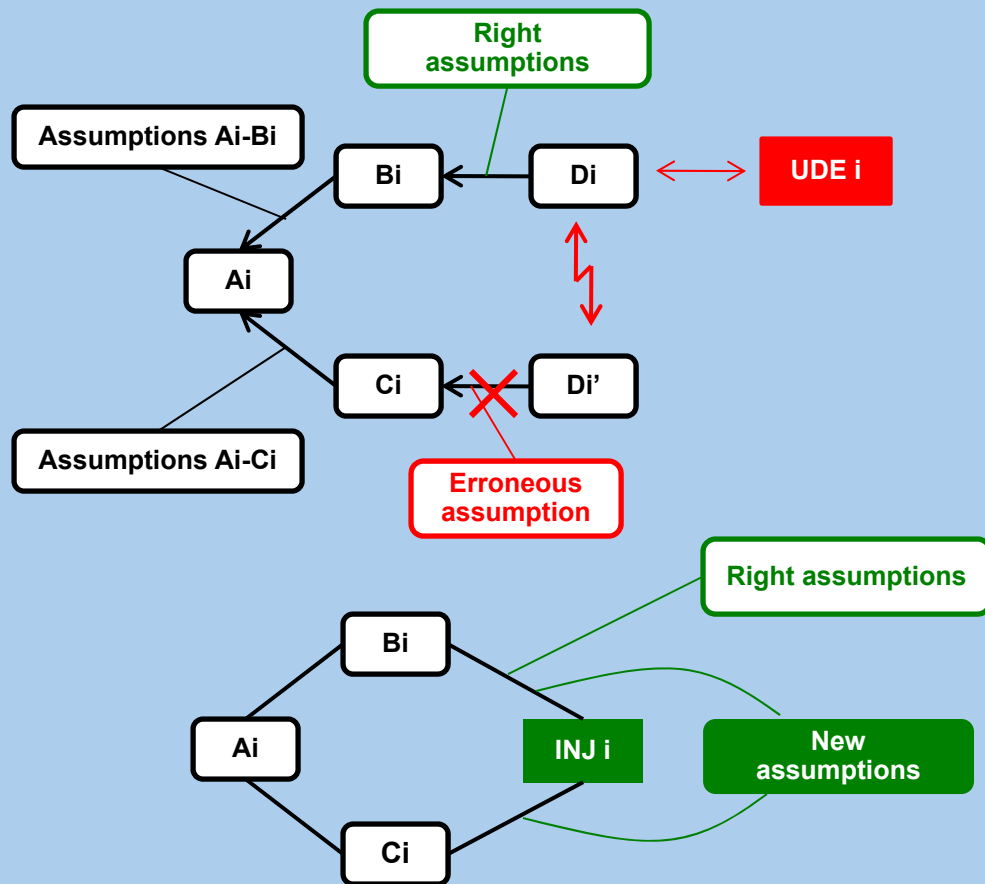
NA	Assump. Ai-Bi and Ai-Ci
	UDE i
S	DE i = Bi + Ci
PA	Right assumptions New assumptions
T	INJ i
SA	

PA (Necessity or Best Alternative)

S&T Level 2 (starting level – 1)

- Area in which we can find the detail of the generic INJ that removes the specific UDE and determines the specific DE
  e.g.
  INJ-> SDBR
  INJ i -> Chock the release
  DE i -> The real constraint is identified and it does not wonder

FRT

NA	Ass. Ai-Bi and Ai-Ci / UDE i
S	DE i = Bi + Ci
PA	Right assumptions / New assumptions ← PA (Necessity or Best Alternative) / Assumptions (from part of FRT) ← PA (Sufficiency and Feasibility)
T	INJ i
SA	

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S&T Level 2 (starting level – 1)

Starting level

NA	Ass. Ai-Bi and Ai-Ci / UDE i	PUDE i
S	DE i = Bi + Ci	New DE i
PA	Right assumptions / New assumptions / Assumptions (from part of FRT)	VERBALIZE PA NECESSITY OR BEST ALTERNATIVE: Why is the new INJ necessary or the best alternative to achieve the new DE? / Assumptions (from NBR solved)
T	INJ i	New INJ i
SA	Where can we find a help? We need more details……	Where can we find a help? We need more details……

PA (Necessity or Best Alternative)

PA (Sufficiency and Feasibility)

S&T Level 2 (starting level – 1)

SA

Where can we find a help?
We need more details……

TrT

New expected effect

New rationale for next level need

Existing reality

New need

Specific new action

Expected effect (I.O.)

Rationale for next level need

Existing reality

Need (to overcome the OBST)

Specific action (that removes the OBST)

NA	Ass. Ai-Bi and Ai-Ci / **UDE i**	
S	$DE\ i = Bi + Ci$	
PA	Right assumptions / New assumptions / Assumptions (from part of FRT)	
T	**INJ i**	
SA	WARNING: find it among "Rationales for next level need" (TrT) and recall the I.O. associated with it	

NA	**PUDE i**
S	New DE i
PA	VERBALIZE PA NECESSITY OR BEST ALTERNATIVE: Why is the new INJ necessary or the best alternative to achieve the new DE? / Assumptions (from NBR solved)
T	New INJ i
SA	WARNING: find it among "Rationales for next level need" (TrT) and recall the I.O. associated with it

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S&T Level 2 (starting level – 1): summary

The second level STEPs are required for the removal of conflicts related to individual UDEs, which together determine the gap between the current situation and the achievement of the general objective of the starting level.

The NA of each STEP contains both the verbalizations of individual UDEs and the assumptions that explain why "B" and "C" are necessary to achieve "A" .

The objectives (S) are DEs contained in the FRT, defined as the simultaneous achievement of the necessary conditions of individual conflict clouds associated with UDEs (entities "B" and "C").

The Tactics (T) are the Injections which allow to eliminate the conflicts associated with individual UDEs.

The PA of necessity or best alternative are the correct assumptions from the individual clouds and the new assumptions behind the connections between the INJs that remove the conflicts and the entities "B" and "C" of each cloud.

The PA of feasibility and sufficiency can be found in the FRT among the assumptions in the logical structure linking the specific INJ with the specific DE.

In order to avoid the Negative Branches, we need to add STEPs at the second level. The reason why the added STEPs are necessary (NA) can be explained through the verbalization of PUDE related to the NBR branch.

The Strategies of these STEPS are the DEs resulting from the removal of PUDEs. In order to solve the NBR branch, we need to add a new INJ. This INJ is the Tactic of the added STEP.

The PA of feasibility and sufficiency can be found among the assumptions of the FRT after the resolution of the NBR branch, between the new INJ and the new DE. Verbalizing the PA of sufficiency or best alternative, we must give an answer to the question:" Why is the new INJ necessary or the best alternative to achieve the new DE?"

The SA of all the second level STEPs must be found among the "rationales for the next level need" in the TrT".

S&T Level 3 (starting level – 2)

Level 2 (starting level - 1)

INJ i   INJ j

O

I.O.   I.O.   I.O.

O

O

I.O.

PRT

New expected effect

New rationale for next level need

Existing reality

New need

Specific new action

TrT

Expected effect (I.O.)

Rationale for next level need

Existing reality

Need (to overcome the OBST)

Specific action (that removes the OBST)

	NA	OBST i		NA	OBST i+1
	S	I.O. i		**S**	I.O. i + 1
	PA	Entities – Assumptions from TrT		**PA**	Entities – Assumptions from TrT
	T	Specific action (that removes the OBST i)		**T**	Specific action (that removes the OBST i + 1)
	SA	Warning: do we need lower levels? Explain why I.O. i is too generic and T does not allow clarity about responsibilities on the actions: detailing the actions enables to define more specific and clear objectives that contribute to I.O. i		**SA**	Warning: do we need lower levels? Explain why I.O. i is too generic and T does not allow clarity about responsibilities on the actions: detailing the actions enables to define more specific and clear objectives that contribute to I.O. i

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Static and dynamic logic

Both sufficiency and necessity conditions, in general, may refer to static or dynamic situations. The static logic describes situations in which the existence of cause and effect are simultaneous. The dynamic logic describes a situation in which the cause that generates the effect, or that is necessary in order to achieve the effect, is an action. The S&T tree contains both kinds of logic. The Strategies verbalized in the tree are achieved through the evolution of the situation (change) over time. Such evolution is caused by actions.

The logical models that are useful to achieve both the STEP consistency and the consistency between levels are based on different kinds of logic.

STEP Consistency:
dynamic or "transition" logic
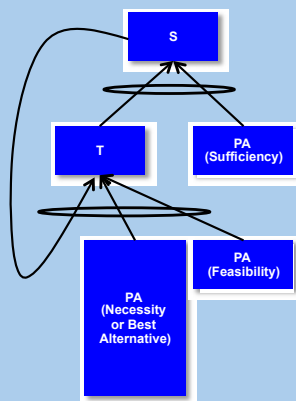
Consistency between levels:
static or "situational" logic
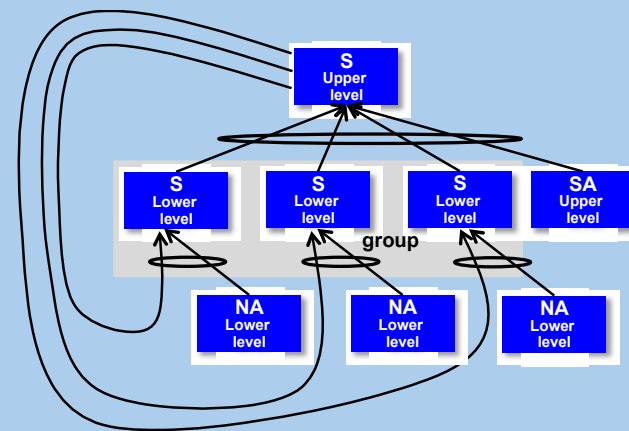
Static and dynamic logic: executing a transition S&T tree

Bridging the GAP (OBST 4)

S 3.2.2

T 3.2.2

Dynamic logic

Bridging the GAP (UDE 2)

S 1

S 2.1 **S 2.2**

Static logic

Level S 1 = System status 4

DE 2

DE 1

System status 4 (S 3.1.1 + S 3.1.2 + S 3.2.1 + S 3.2.2 = S 2.1 + S2.2 = S1)

S 1

S 2.1 **S 2.2**

S 3.1.1 **S 3.1.2** **S 3.2.1** **S 3.2.2**

Bridging the GAP (UDE 4)

S 2.1

S 3.1.1 **S 3.1.2**

Static logic

Bridging the GAP (OBST 3)

S 3.2.1

T 3.2.1

Dynamic logic

Bridging the GAP (OBST 2)

S 3.1.2

T 3.1.2

Dynamic logic

System status 3

Bridging the GAP (OBST 1)

S 3.1.1

T 3.1.1

Dynamic logic

System status 2 (S 3.1.1 + S 3.1.2 = S 2.1)

Level S 1

UDE 2 System status 2

DE 1

System status 1 (S 3.1.1)

System status 0

Level S 1

GAP = ∑ UDEs **UDE 2**

UDE 1 System status 0

Static and dynamic logic: an example

Static logic (S&T structure)

Strategy 1 — GAP — UDE 1 + UDE 2

Strategy 2.1 — GAP=0 — Strategy 2.2 — UDE 1 — Strategy 2.3 — UDE 2
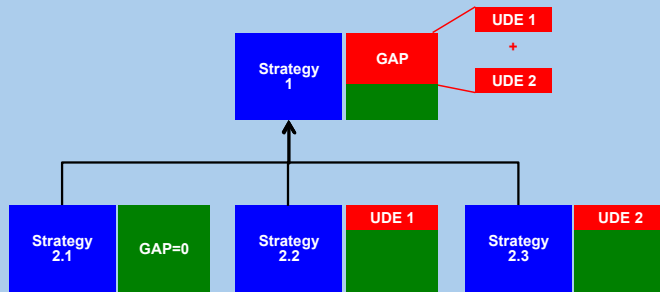
Is STEP 2.1 necessary?

Dynamic logic (Transition S&T - case 1)

Strategy 1

SA — 2.2 and 2.3 are sufficient because 2.1 is satisfied in a stable way

Strategy 2.2 — Strategy 2.3

Dynamic logic (Transition S&T - case 2)

Strategy 1

SA — Warning: control 2.1 (monitor the gap)

NA — Even if S2.1 is now achieved, variability can jeopardize its achievement — Strategy 2.2 — Strategy 2.3

S — Strategy 2.1

T — Take all the actions in order to guarantee that 2.1 is reached
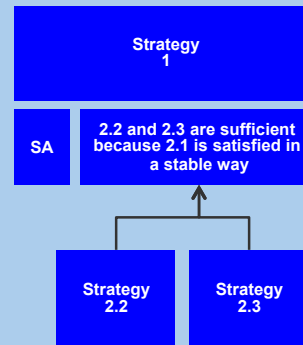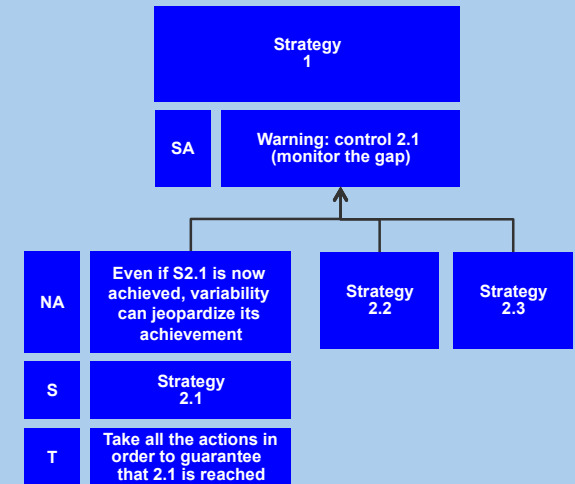
In order to achieve S 1, the static logic shows that we have to achieve S 2.1, S 2.2 and S 2.3. Let's suppose that in our reality S 2.1 is already achieved. This means that we don't need 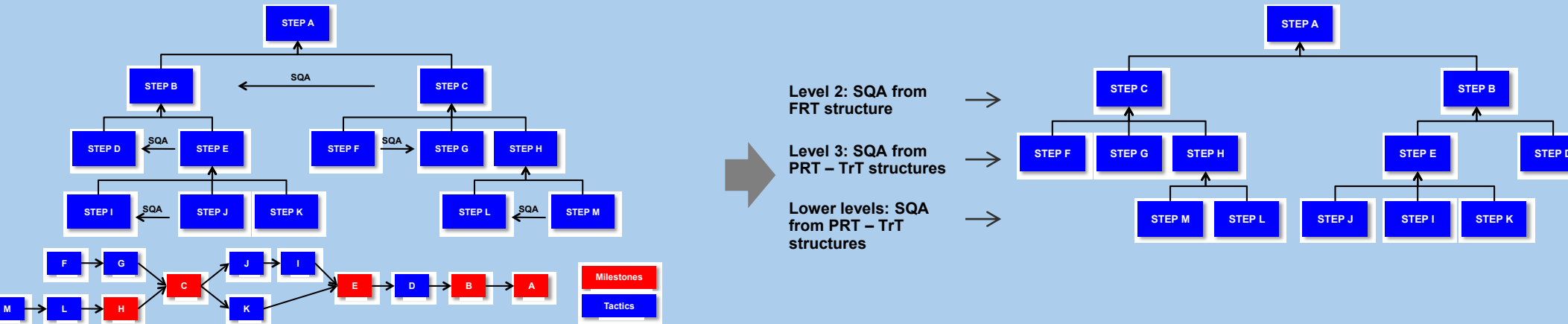any action to bridge the gap between the actual and the desired level of performance (the GAP is 0). Is STEP 2.1 necessary?

If we are confident that S 2.1 is always achieved, without any risk of performance degradation (the Strategy is satisfied in a stable way), the transition tree should not contain S 2.1. We can explain through SA of the higher STEP why S 2.2 and S 2.3 are sufficient (as a group) to achieve S 1.

On the other hand, even if S 2.1 is achieved NOW, if there are possibilities that, for any reason something can jeopardize the achievement (for example variability), the transition tree should contain S 2.1. In this case, if we don't implement all the actions that guarantee S 2.1 achievement in a stable way, we may find ourselves in the uncomfortable situation of the appearance of a new UDE that would prevent us from bridging the gap. Moreover, the SA of the higher level should be verbalized as a warning (monitor S 2.1) and in NA of the lower STEP we should explain why we need an action, even if NOW we don't have any GAP.

Sequency Assumptions

Dealing with dynamic logic means dealing with actions, so we need to define the order in which the various Tactics must be implemented and as a result in which order the Strategies must be achieved. What to do first and what next? The answer to the question comes from the definitions of the Sequency Assumptions (SQA). The SQA must be defined at each level of the S&T tree and can be deduced, depending on the level, from FRT, PRT or TrT.

Level 2: SQA from FRT structure →

Level 3: SQA from PRT – TrT structures →

**Lower levels: SQA from PRT – TrT structures** →

In a S&T tree correctly represented, the order of STEPs must comply, from left to right, with the sequence imposed by SQA. If for some STEPs there is not an imposed sequence, for STEPs that can be achieved in parallel the order of representation is discretionary.

Sequency Assumptions

When we define a SQA between two STEPs, the assumption means that the Tactic of the successor is feasible if and only if we have completed the implementation of the Tactic of the previous STEP (strict assumption). It could also simply be preferable, before implementing a Tactic, to complete the implementation of one ore more previous Tactics.

In both cases, verbalizing a SQA is equivalent to define (or to reinforce) a PA of feasibility for the successor. We can conclude that the SQA are a subset (belong to the subcategory) of the PA of feasibility.
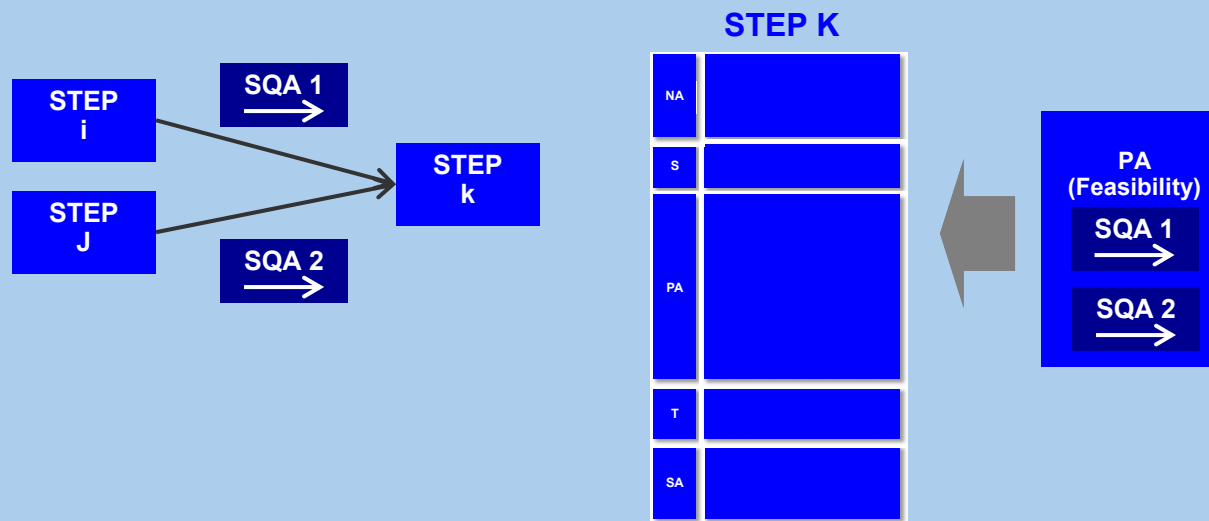
S&T Level 3 (starting level – 2)
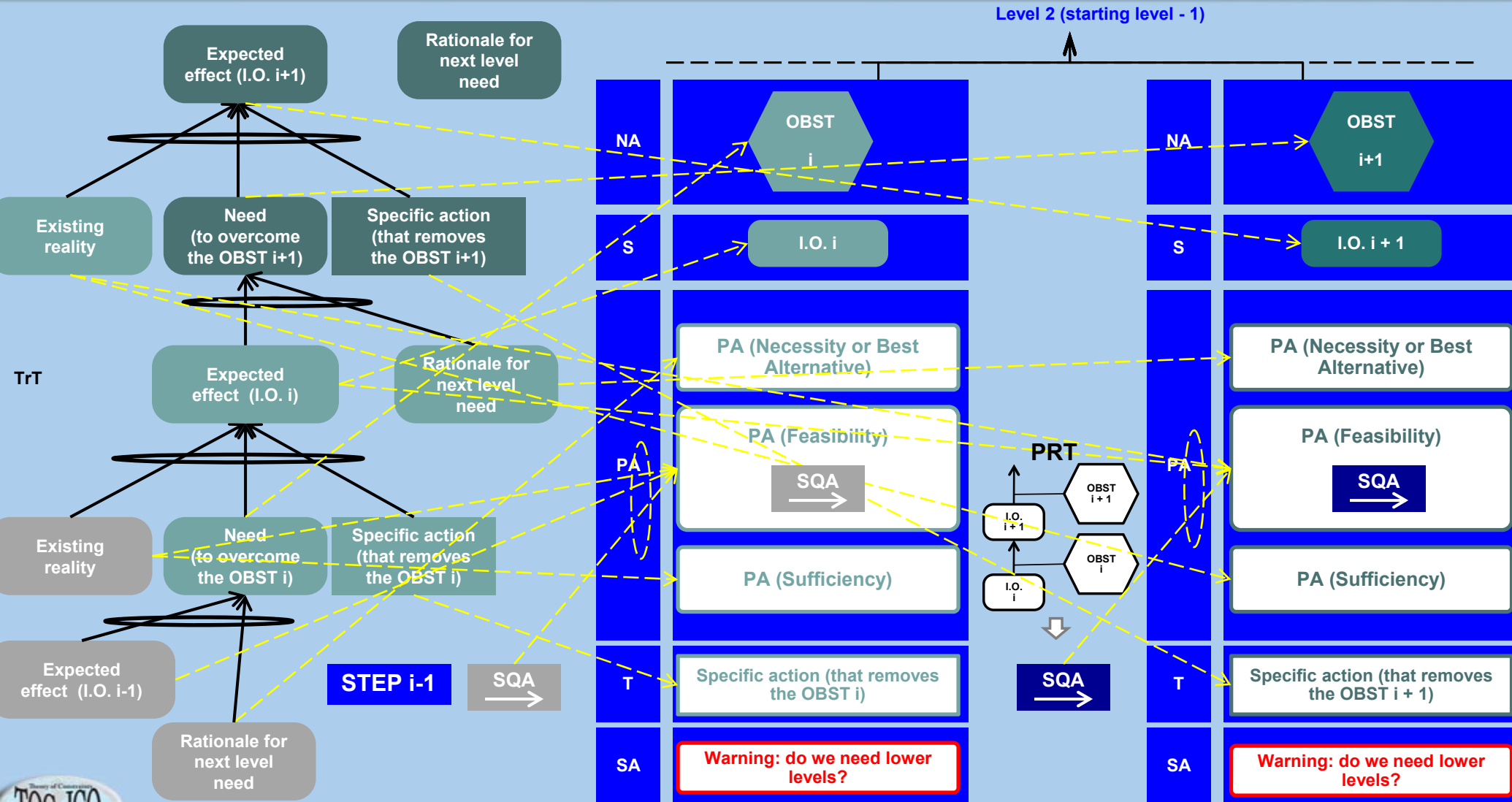
S&T Level 3 (starting level – 2): summary

The third level STEPs are required in order to remove all the obstacles related to the implementation of the various Injections (Tactics of the second level).

The NA of the STEPs are defined verbalizing the obstacles that we have to overcome if we want to implement the higher level Tactic.

Overcoming these obstacles will lead us to achieve the Strategy of the STEPs, that can be verbalized as the I.O. achieved after the removal of the obstacles.

The PA of necessity or best alternative can be deduced from TrT structure in the entities that explain why, after an I.O. has been achieved, another I.O. should be achieved through another action. This means to focus on "Rationale for next level need" in the TrT.

The PA of feasibility can be obtained considering some assumptions regarding the existing reality (from TrT) together with the achievement of the previous Strategy (the I.O. of the previous STEP) and the SQA which links the STEP with its predecessor. The SQA can be directly deduced from the PRT structure.

The PA of sufficiency can be deduced from the TrT, considering the assumptions that describe the existing reality, after the achievement of the previous I.O..
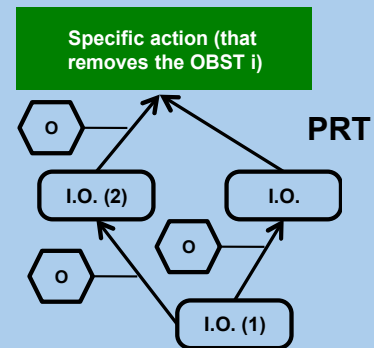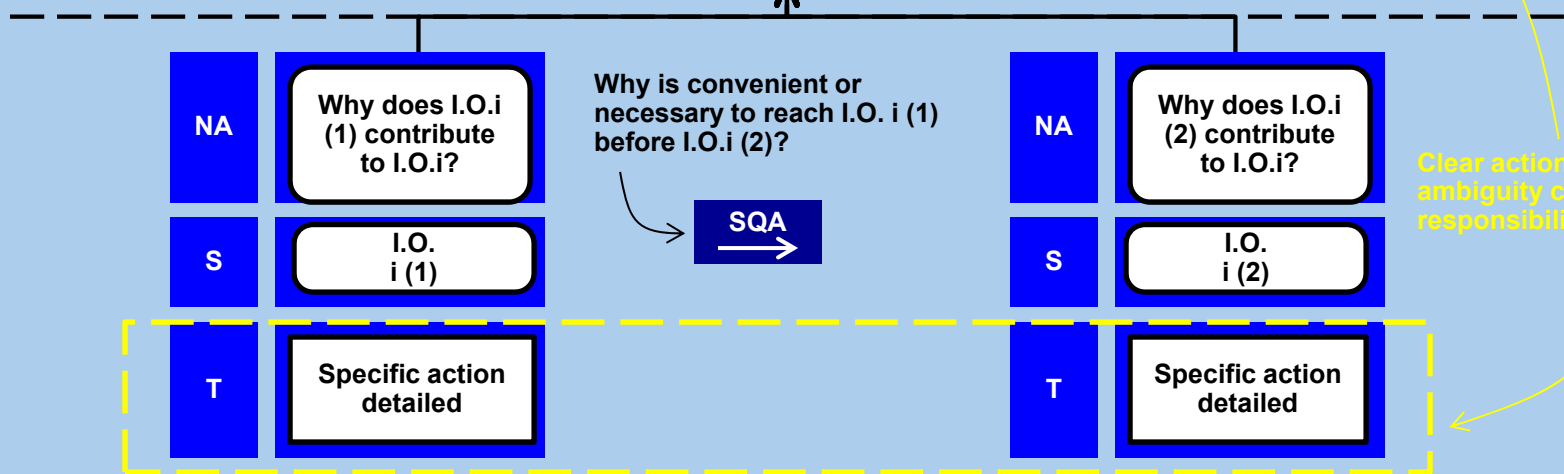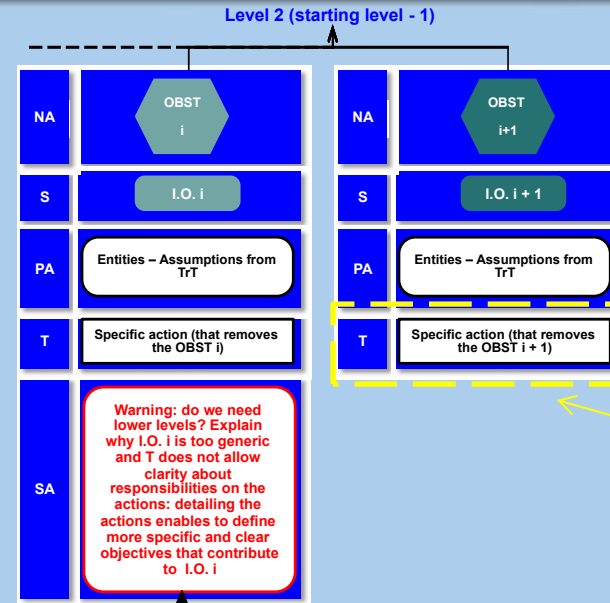
The Tactic is the action that removes the obstacle in the TrT structure.

What about the SA? Do we need a lower level? Eventually, we have to explain why the I.O. (Strategy) is too generic and T does not allow clarity about responsibilities on the actions: detailing the actions enables to define more specific and clear objectives that contribute to the Strategy.

TOC ICO

S&T Lower levels

We have to detail the Tactic of level 3 until we succeed in defining unambiguous responsibilities both at the Strategy and at the Tactic level. Furthermore, we have to verbalize the SQA of the lower level.

All the PA belonging to the various subcategories can be verbalized following the hints given before in the presentation (eventually developing new PRTs or TrTs in which we have to substitute the INJ i with the specific action that removes the obstacle i).

Level 2 (starting level - 1)

NA	OBST i
S	I.O. i
PA	Entities – Assumptions from TrT
T	Specific action (that removes the OBST i)
SA	Warning: do we need lower levels? Explain why I.O. i is too generic and T does not allow clarity about responsibilities on the actions: detailing the actions enables to define more specific and clear objectives that contribute to I.O. i

NA	OBST i+1
S	I.O. i + 1
PA	Entities – Assumptions from TrT
T	Specific action (that removes the OBST i + 1)

Specific action (that removes the OBST i)

PRT

O

I.O. (2)   I.O.

O

O

I.O. (1)

NA	Why does I.O.i (1) contribute to I.O.i?
S	I.O. i (1)
T	Specific action detailed

Why is convenient or necessary to reach I.O. i (1) before I.O.i (2)?

SQA →

NA	Why does I.O.i (2) contribute to I.O.i?
S	I.O. i (2)
T	Specific action detailed

Clear actions without ambiguity concerning responsibilities

Q&A …

Thank You