

AATRIZINVENTOR SOLUTION FOR INNOVATION BASED ON NATURE'S L.I. Working Document to Build a Specific Solution.

INNOVATION CHALLENGE: Improve long-distance voice communication affected by environmental interference

APPLICATION OF NATURE'S LANGUAGE OF INNOVATION / Nature's L.I.

Web site: www.aatrizinventor.com

Reference book: The Nature's Language of Innovation, José Roberto Espinoza, Amazon, Kindle.

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FACTORS OF INNOVATION:

FUNCTION AFFECTED: long-distance voice communication affected by environmental interference

PHYSICAL VARIABLE OR CHARACTERISTIC: Less Communication quality

S1 OBJECT: EMITTER'S VOICE MESSAGE Type: Moving

S2 OBJECT: RECIEVER Type: Moving

DESIRED ACTION VERB: Improve

INNOVATION CHALLENGE:

CHALLENGE: Improve long-distance voice communication affected by environmental interference

DESIRED GOAL: More Communication quality

EVALUATED OBJECT: EMITTER'S VOICE MESSAGE

NEED TO SATISFY > 39. Productivity

SELECTED INNOVATION PARAMETERS TO EVALUATE:

A. UNDESIRABLE EFFECTS CAUSES OF DISSATISFACTION (UDEs)

There are More difficulty to Improve long-distance voice communication affected by environmental interference because:

EMITTER'S VOICE MESSAGE Has More Own length or relative distance, whether physical or figurative interacting with S2

EMITTER'S VOICE MESSAGE Has Less Appropriate shape, composition, or configuration interacting with S2

EMITTER'S VOICE MESSAGE Has Less Emission intensity interacting with S2

EMITTER'S VOICE MESSAGE Has More Harmful factors affecting it by interacting with S2

There are undesirable effects that cause dissatisfaction because:

There is Less Communication quality

B. DESIRED EFFECT FOR NEED TO SATISFY

There is More ease to Improve long-distance voice communication affected by environmental interference because:

EMITTER'S VOICE MESSAGE Has More Desired productivity to interact with S2

There is desirable effect for need to satisfy because:

There is More Communication quality

Table I. RELATIONSHIP WITH UNIVERSAL TRIZ INNOVATION PARAMETERS (maximum of 7

undesirable effects)

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This table presents the selected innovation parameters to evaluate the challenge that must be resolved for the interaction between an Object S1 and an Object S2, and no others. The choice of undesirable effects must be based on a thorough review of the current situation, identifying them based on the objective evidence present within the predefined space and time of evaluation. Fulfilling this requirement is crucial: If you do not connect the dots of the current situation properly, the algorithm will deliver a disconnected solution.

The selection of the need to satisfy should reflect the best estimation of the innovation-evolution state of the object S1 being evaluated.

Recognizing the criticality of this selection process, the Aatrizinventor algorithm provides flexibility to change parameters and conducts a sensitivity analysis in order to offer alternative solutions. These alternatives are based on different combinations of the entered parameters, also including a different need to satisfy from the one originally posed.

Parameters to evaluate(s)	It is understood as EMITTER'S VOICE MESSAGE has:
Parámetros of undesirable effects (UDE):	Undesirable effects causes of dissatisfaction:
(+) 3. Length of moving object	More Own length or relative distance, whether physical or figurative interacting with S2
(-) 12. Shape / composition / configuration	Less Appropriate shape, composition, or configuration interacting with S2
(-) 18. Emission intensity	Less Emission intensity interacting with S2
(+) 30. Object-affected harmful factors	More Harmful factors affecting it by interacting with S2
Desirable parameter (DE):	Desirable Effect for Need to satisfy:
(+) 39. Productivity	More Desired productivity to interact with S2
TRIZ undesirables parameters for sensitivity analysis	It is understood as EMITTER'S VOICE MESSAGE has:
(-) 21. Power/ Energy per unit of time	Less Power or energy per unit of time interacting with S2
(+) 24. Loss of Information	More Loss of information or lack of communication interacting with S2
n/a	
n/a	
n/a	

EVALUTION RESULTS TABLES

TABLE II. SPECIFIC CONTRADICTION MATRIX FOR UNDESIRABLE EFFECTS AND NEED TO SATISFY. FOR EVALUATED OBJECT: EMITTER'S VOICE MESSAGE AND NEED TO BE SATISFIED > 39.

Productivity

CHALLENGE: Improve long-distance voice communication affected by environmental interference

(*) Preferred parameters: Improve 30. Object-affected harmful factors & Attenuate or preserve 18. Emission intensity.

Contradictions/ E.C: Essential, Comp.:Complementary, Top 5: Up to the major fifth, noted if outside the preferred parameters.

Parameters in the first row are the same as those in the first column.

Parameter to attenuate or preserve => Parameter to improve	Var.	(+) Par.3	(-) Par.12	(-) Par.18 PREF.	(+) Par.30	(+) Par.39	Sum wt
(+) 3. Length of moving object	wt		wt.9	wt.15 Compl.	wt.5 Top 5	wt.13	33%
	IP(s)	0,0,0,0	1,8,10,29	32,0,0,0	1,15,17,24	14,4,28,29	
(-) 12. Shape / composition / configuration	wt	wt.17		wt.4 Compl.	wt.3 Top 5	wt.7	54%
	IP(s)	29,34,5,4	0,0,0,0	13,15,32,0	22,1,2,35	17,26,34,10	
(-) 18. Emission intensity	wt	wt.14	wt.16		wt.10	wt.19	21%
	IP(s)	19,32,16,0	32,30,0,0	0,0,0,0	15,19,0,0	2,25,16,0	
(+) 30. Object-affected harmful factors PREF.	wt	wt.8 Compl.	wt.6 Compl.	wt.2 Compl.		wt.11 Compl.	67%
	IP(s)	17,1,39,4	22,1,3,35	1,19,32,13	0,0,0,0	22,35,13,24	
(+) 39. Productivity	wt	wt.20	wt.18	wt.1 E.C.	wt.12		54%
	IP(s)	18,4,28,38	14,10,34,40	26,17,19,1	22,35,13,24	0,0,0,0	
Sum wt		22%	26%	100%	56%	26%	

This table shows the essential contradiction (E.C.) that determines the solution strategy. Additionally, preferred parameters are established where complementary contradictions (Compl.) are found, allowing the definition of the Base Solution shown in Table III.

As a complement to the Base Solution, Table II also provides the following information that could be relevant to obtain an optimal solution:

a) The algorithm identifies the top 5 contradictions from the entire Table II and highlights those that are outside the preferred parameters for further review.

b) There are inventive principles present in Table II that are not part of the Recommended Solution proposed in Table V. In the latter, the top three most relevant ones are highlighted, and the contradictions they involve are presented to evaluate whether they contribute significant aspects to the desired solution. For further details, Table VIII provides a prioritization of the inventive principles from Table II, and those not included in the Recommended Solution in Table V are marked with ***.

TABLE III. BASE SOLUTION FOR THE EVALUATED OBJECT: EMITTER'S VOICE MESSAGE NEED TO SATISFY > 39. Productivity

CHALLENGE: Improve long-distance voice communication affected by environmental interference

Table II Selection: Essential Contradiction wt.1 y Complementary contradictions with preferred parameters (*) wt.2/wt.4/wt.6/wt.8							
Parameter to improve	Parameter to attenuate or preserve	Contradict.	Wt.n	IP. Ord.1	IP Ord 2	IP Ord 3	IP Ord 4
(+) 39. Productivity	(-) 18. Emission intensity	Essential	wt.1	26 Es.	17 Es.	19 Es.	1 Es.
(+) 30. Object-affected harmful factors	(-) 18. Emission intensity	Compl. 1	wt.2	1 Es.	19 Es.	32	13
(-) 12. Shape / composition / configuration	(-) 18. Emission intensity	Compl. 2	wt.4	13	15	32	0
(+) 30. Object-affected harmful factors	(-) 12. Shape / composition / configuration	Compl. 3	wt.6	22	1 Es.	3	35
(+) 30. Object-affected harmful factors	(+) 3. Length of moving object	Compl. 4	wt.8	17 Es.	1 Es.	39	4

Inventive Principles (IP) selected for the Base Solution

- IP.26. Copying/ Replicating - strategic type
- IP.17. Another Dimension or Field - tactical type
- IP.19. Time-Varying Action/ Periodic or Pulsating - strategic type
- IP.1. Segmenting/ Integrating - strategic type
- IP.32. Perception/ Appearance/ Color Changes - strategic type
- IP.13. Reverse or Indirect Action - strategic type
- IP.15. Dynamics - strategic type
- IP.22. Convert harm in benefit - strategic type
- IP.3. Local Quality - strategic type
- IP.35. Transformation / Parameter Changes - strategic type
- IP.39. Inert Atmosphere / Environment - **operative type**
- IP.4. Asymmetry/ Symmetry - **operative type**

Table III shows the essential contradiction, the one with the highest weight, plus the following 4 complementary contradictions in weight, which are located in the row and column of the preferred parameters selected in Table II. These contradictions are considered relevant for the solution and are described as the Base Solution in Table IX.

Keep in mind that all inventive principles selected for a solution must be evaluated according to the specific context of the contradictions in which they participate.

Inventive principles marked with 'Es.' correspond to inventive principles that belong to the essential contradiction.

TABLE IV. CONTRADICTION MATRIX COVERAGE FOR SOLUTION AMONG NEEDS TO SATISFY FOR EVALUATED OBJECT: EMITTER'S VOICE MESSAGE, NEED TO BE SATISFY: 39. Productivity

Coverage is defined as the extent to which the inventive principles from Table II encompass the inventive principles from Table IV. If weighted coverage is higher, it has been observed that the obtained solution is more likely to have the lowest cost and the maximum benefit-to-cost ratio.

Parameter to improve	Parameter to preserve	IP. Ord.1	IP Ord 2	IP Ord 3	IP Ord 4
39. Productivity	38. Extent of automation/ autonomy	5	12 nT2	35	26
39. Productivity	33. Ease of operation	1	28	7 nT2	10
39. Productivity	35. Adaptability or versatility	1	35	28	37 nT2
39. Productivity	34. Ease of change, repair or maintain	1	32	10	25 nT3
39. Productivity	32. Ease of achieving desired outcome	35	28	2 nT3	24 nT3
39. Productivity	19. Use of energy by moving object	35	10	38 nT3	19
39. Productivity	39. Productivity	0	0	0	0
39. Productivity	27. Reliability	1	35	10	38 nT3
39. Productivity	13. Stability	35	3	22	39
39. Productivity	15. Duration of action of moving object	35	10	2 nT3	18 nT3

Inventive Principles (IP) selected for the Solution of relevant Contradictions between Needs to Satisfy

IP.5. Merging/ Separating - operative type

IP.12. Equipotentiality - tactical type

IP.35. Transformation / Parameter Changes - strategic tpe

- IP.26. Copying/ Replicating - strategic tpe
- IP.1. Segmenting/ Integrating - strategic tpe
- IP.28. Mechanics Substitution - strategic tpe
- IP.7. Nesting/ Dispersing - tactical type
- IP.10. Preliminary Action - strategic tpe
- IP.37. Useful Perceptible Change - **operative type**

95.54 % weighted coverage of the inventive principles (IP) included in Table IV. of Contradictions between Needs to Satisfy (NS), in relation to the IP included in Table II Specific Contradiction Matrix.

The inventive principles labeled with nT2 are not found in Table II. Due to this condition, the first three contradictions in Table IV containing principles marked with nT2 are described as a Solution among Needs to Satisfy in Table IX. This solution, combined with the previously mentioned Base Solution, forms the Recommended Solution by the Aatrizinventor Algorithm, shown in Table V.

From practical experience, if Table IV contains more than 3 contradictions with inventive principles not included in Table II, then it is likely to be more challenging to construct a specific solution. In that case, it is recommended to look for an alternative combination of parameters in Table VI of sensitivity analysis. It is also an option to select another need to satisfy, which is shown in Table VII Essential Contradictions of Needs to Satisfy (NS) for the same undesirable effects already evaluated for EMITTER'S VOICE MESSAGE.

To evaluate the recommended inventive principles here and the corresponding contradictions in which they participate, it is necessary for the Base Solution to guide an initial context for the solution, as the contradictions between Needs to Satisfy do not identify which variable of the evaluated object S1 should be operated.

Inventive principles labeled with nT3 are included in Table II, but do not participate in the Recommended Solution shown in Table V. The Innovation Team must review the contradictions where they participate, to determine if there were other specific aspects that could be significant for the solution.

Unmarked inventive principles are included in Table II Specific Contradiction Matrix and in Table V Recommended Solution.

TABLE V. RECOMMENDED SOLUTION FOR INNOVATION CHALLENGE FOR EVALUATED OBJECT EMITTER'S VOICE MESSAGE

CHALLENGE: Improve long-distance voice communication affected by environmental interference

Evaluated need to satisfy in this report: **39. Productivity**

UDEs: (+) 3. Length of moving object// (-) 12. Shape / composition / configuration// (-) 18. Emission intensity// (+) 30. Object-affected harmful factors

Parameter to improve	Parameter to attenuate or preserve	Contradict.	Wt.n	IP. Ord.1	IP Ord 2	IP Ord 3	IP Ord 4
(+) 39. Productivity	(-) 18. Emission intensity	Essential	wt.1	26 Es.	17 Es.	19 Es.	1 Es.
(+) 30. Object-affected harmful factors	(-) 18. Emission intensity	Compl. 1	wt.2	1 Es.	19 Es.	32	13

(-) 12. Shape / composition / configuration	(-) 18. Emission intensity	Compl. 2	wt.4	13	15	32	0
(+) 30. Object-affected harmful factors	(-) 12. Shape / composition / configuration	Compl. 3	wt.6	22	1 Es.	3	35
(+) 30. Object-affected harmful factors	(+) 3. Length of moving object	Compl. 4	wt.8	17 Es.	1 Es.	39	4
39. Productivity	38. Extent of automation/ autonomy	NS.1	wns.1	5	12	35	26 Es.
39. Productivity	33. Ease of operation	NS.2	wns.2	1 Es.	28	7	10
39. Productivity	35. Adaptability or versatility	NS.3	wns.3	1 Es.	35	28	37

Relevant inventive principles from Table II not included in Recommended Solution

Before deciding on the solution, make sure you have previously reviewed the contradictions with relevant Inventive Principles from Table II, not included in the Recommended Solution. The 3 most relevant are shown below.

IP.14. Spheroidality - Curvature - Angle (Pos.5) ***	IP. Tac.	[Par.39][Par.12][IP(s) : 14,10,34,40] - [Par.3][Par.39][IP(s) : 14,4,28,29] -
IP.2. Taking out/ Adding (Pos.10) ***	IP. Str.	[Par.12][Par.30][IP(s) : 22,1,2,35] - [Par.18][Par.39][IP(s) : 2,25,16,0] -
IP.29. Controllable Soft Variables (Pos.11) ***	IP. Tac.	[Par.12][Par.3][IP(s) : 29,34,5,4] - [Par.3][Par.12][IP(s) : 1,8,10,29] - [Par.3][Par.39][IP(s) : 14,4,28,29] -

Inventive Principles (IP) selected for Recommended Solution:

To develop a Specific Solution based on the contradictions provided in Table V, where S1: EMITTER'S VOICE MESSAGE interacts with S2: RECIEVER, the Innovation Team must analyze the recommended innovation concepts for each selected inventive principle listed below. At least one concept from each principle that is applicable to the challenge under evaluation should be chosen.

Once the concepts are selected per inventive principle, it is essential to conduct an 'integrated reading' of the contradictions indicated in Table V. If this 'integrated reading' can demonstrate a coherent logical thread for each selected contradiction and as a whole, then it can be considered that there is a potential innovation solution.

To complete the definition of the specific solution, it is necessary to review the relevant inventive principles from Table II that were not included in the Recommended Solution in Table V, which are

presented above.

For more details on the selected contradictions, you can review the complete descriptions of the inventive principles by contradiction, as shown in Table IX.

In the Starting Manual, Fundamentals of Aatrizinventor, Point 11, an example is provided for developing the Specific Solution based on the Recommended Solution by the Aatrizinventor algorithm, based on the 'Language of Nature Innovation.' The identification of a specific solution is a systematic and iterative process involving multiple concepts, aiming to determine a comprehensive solution with minimal implementation costs and maximum benefit-to-cost ratio.

It's important noting that an asterisk (*) has been added to the name of the object under evaluation to remind that the descriptions of the inventive principles may consider that EMITTER'S VOICE MESSAGE can be in its current physical and functional state, or in a modified state, or even in a new state, as needed to achieve the desired objective. Please, make the most of your relational thinking skills.

Summary description of the Inventive Principles included in the Recommended Solution shown above, applicable to the challenge under evaluation for the defined space and time:

N°1 Improve: (+) 39. Productivity and Attenuate or Preserve: (-) 18. Emission intensity

IP.26. Copying/ Replicating - strategic type (1)

- a. Instead of using EMITTER'S VOICE MESSAGE*, or any of its unavailable, expensive, fragile parts or properties, use simpler and inexpensive copies or replicates to perform the desired function and, if possible, do so with improved characteristics and properties, while disregarding the harmful, undesirable, or unnecessary ones.
- b. Imitate EMITTER'S VOICE MESSAGE*, or any of its parts or properties, leveraging the relevant available environment.
- c. If simple copies, or replicates are already being used, apply copies, or replicates of a higher level or technical

IP.17. Another Dimension or Field - tactical type (2)

- a. Add or remove physical dimensions or fields of action of EMITTER'S VOICE MESSAGE*.
- b. Move EMITTER'S VOICE MESSAGE* to a new dimension in space or performance field.
- c. Use for EMITTER'S VOICE MESSAGE* multi-story arrangement of objects instead of a single-story arrangement.
- d. Tilt or re-orient EMITTER'S VOICE MESSAGE*; lay it on its side.
- e. Use another side of a given dimension or field of EMITTER'S VOICE MESSAGE*.

IP.19. Time-Varying Action/ Periodic or Pulsating - strategic type (3)

- a. Instead of using continuous action in, or for, EMITTER'S VOICE MESSAGE*, use time-varying, periodic, or pulsating actions.
- b. If the action of EMITTER'S VOICE MESSAGE* is already periodic, change the periodic magnitude or frequency.
- c. Use pauses between impulses to perform a different action of EMITTER'S VOICE MESSAGE*.
- d. If the current action of EMITTER'S VOICE MESSAGE* is time-varying, and if necessary, change to an action higher or lesser time-varying.

IP.1. Segmenting/ Integrating - strategic type (4)

- a. Divide EMITTER'S VOICE MESSAGE* into existing and/or new parts, shapes, phases, states, or conditions.

- b. Integrate different existing or new parts, forms, phases, states or conditions of EMITTER'S VOICE MESSAGE* in a single entity.
- c. Make EMITTER'S VOICE MESSAGE* easy to disassemble or assemble.
- d. Increase or reduce the degree of fragmentation or segmentation of EMITTER'S VOICE MESSAGE*.

N°2 Improve: (+) 30. Object-affected harmful factors and Attenuate or Preserve: (-) 18. Emission intensity

IP.1. Segmenting/ Integrating - strategic type (5)

- a. Divide EMITTER'S VOICE MESSAGE* into existing and/or new parts, shapes, phases, states, or conditions.
- b. Integrate different existing or new parts, forms, phases, states or conditions of EMITTER'S VOICE MESSAGE* in a single entity.
- c. Make EMITTER'S VOICE MESSAGE* easy to disassemble or assemble.
- d. Increase or reduce the degree of fragmentation or segmentation of EMITTER'S VOICE MESSAGE*.

IP.19. Time-Varying Action/ Periodic or Pulsating - strategic type (6)

- a. Instead of using continuous action in, or for, EMITTER'S VOICE MESSAGE*, use time-varying, periodic, or pulsating actions.
- b. If the action of EMITTER'S VOICE MESSAGE* is already periodic, change the periodic magnitude or frequency.
- c. Use pauses between impulses to perform a different action of EMITTER'S VOICE MESSAGE*.
- d. If the current action of EMITTER'S VOICE MESSAGE* is time-varying, and if necessary, change to an action higher or lesser time-varying.

IP.32. Perception/ Appearance/ Color Changes - strategic type (7)

- a. Change how is perceived, the appearance or shape of EMITTER'S VOICE MESSAGE* in relation to the object S2 with which it interacts.
- b. Change the color, or appearance, of EMITTER'S VOICE MESSAGE* or its external environment.
- c. Change the transparency of EMITTER'S VOICE MESSAGE* or its external environment.

IP.13. Reverse or Indirect Action - strategic type (8)

- a. Inverse the applied action or apply an indirect action to perform the current function of EMITTER'S VOICE MESSAGE* to interact with object S2 It should be identified how EMITTER'S VOICE MESSAGE* currently performs an action with Object S2 and from there evaluate an inverse or indirect action.
- b. Make moving parts of EMITTER'S VOICE MESSAGE* (or the external environment) fixed, and fixed parts moving.
- c. Turn EMITTER'S VOICE MESSAGE* (or process) 'upside down', 'change the position', 'change the condition'.

N°3 Improve: (-) 12. Shape / composition / configuration and Attenuate or Preserve: (-) 18. Emission intensity

IP.13. Reverse or Indirect Action - strategic type (9)

- a. Inverse the applied action or apply an indirect action to perform the current function of EMITTER'S VOICE MESSAGE* to interact with object S2 It should be identified how EMITTER'S VOICE MESSAGE* currently performs an action with Object S2 and from there evaluate an inverse or indirect action.
- b. Make moving parts of EMITTER'S VOICE MESSAGE* (or the external environment) fixed, and fixed parts moving.
- c. Turn EMITTER'S VOICE MESSAGE* (or process) 'upside down', 'change the position', 'change the

condition'.

IP.15. Dynamics - strategic type (10)

- a. Allow (or design) the characteristics of EMITTER'S VOICE MESSAGE*, external environment, or process to change to an optimal, or to find an optimal, operating condition.
- b. Divide EMITTER'S VOICE MESSAGE* into parts that are capable of relative movement between each other.
- c. If EMITTER'S VOICE MESSAGE* (or process) is rigid or inflexible, make it flexible or adaptive.
- d. To enhance the dynamics of EMITTER'S VOICE MESSAGE* or the process, use feature(s) or object(s) available in the nearby environment.

IP.32. Perception/ Appearance/ Color Changes - strategic type (11)

- a. Change how is perceived, the appearance or shape of EMITTER'S VOICE MESSAGE* in relation to the object S2 with which it interacts.
- b. Change the color, or appearance, of EMITTER'S VOICE MESSAGE* or its external environment.
- c. Change the transparency of EMITTER'S VOICE MESSAGE* or its external environment.

N°4 Improve: (+) 30. Object-affected harmful factors and Attenuate or Preserve: (-) 12. Shape / composition / configuration

IP.22. Convert harm in benefit - strategic type (12)

- a. Use harmful factors, or external effects related to harmful factors, for OBJECT S1 (particularly, effects of the environment or surroundings) to achieve a positive effect with EMITTER'S VOICE MESSAGE*.
- b. Eliminate a harmful primary action by adding another action to EMITTER'S VOICE MESSAGE*, which counteracts the harmful action to solve the problem.
- c. Amplify a harmful factor or a part of EMITTER'S VOICE MESSAGE*, to such a degree that it is no longer harmful.

IP.1. Segmenting/ Integrating - strategic type (13)

- a. Divide EMITTER'S VOICE MESSAGE* into existing and/or new parts, shapes, phases, states, or conditions.
- b. Integrate different existing or new parts, forms, phases, states or conditions of EMITTER'S VOICE MESSAGE* in a single entity.
- c. Make EMITTER'S VOICE MESSAGE* easy to disassemble or assemble.
- d. Increase or reduce the degree of fragmentation or segmentation of EMITTER'S VOICE MESSAGE*.

IP.3. Local Quality - strategic type (14)

- a. Improve quality in a localized way, for parts, components, or conditions of EMITTER'S VOICE MESSAGE*.
- b. Change the structure, action, or procedure of EMITTER'S VOICE MESSAGE* from uniform to non-uniform, or vice versa.
- c. Change the external environment (or external influence) of EMITTER'S VOICE MESSAGE* from uniform to non-uniform, or vice versa.
- d. Make each part of EMITTER'S VOICE MESSAGE* function in the conditions that are most suitable for its operation.
- e. Make each part of EMITTER'S VOICE MESSAGE* fulfill a different and useful function.

IP.35. Transformation / Parameter Changes - strategic type (15)

- a. Change EMITTER'S VOICE MESSAGE*'s physical or chemical state (e.g., in shape, in composition, to a gas, liquid, solid or plasma).
- b. Change the composition or condition of EMITTER'S VOICE MESSAGE* by adding or removing

components.

c. Change the concentration or consistency; change the degree of flexibility; change the temperature or the level of internal activity of EMITTER'S VOICE MESSAGE*.

N°5 Improve: (+) 30. Object-affected harmful factors and Attenuate or Preserve: (+) 3. Length of moving object

IP.17. Another Dimension or Field - tactical type (16)

- a. Add or remove physical dimensions or fields of action of EMITTER'S VOICE MESSAGE*.
- b. Move EMITTER'S VOICE MESSAGE* to a new dimension in space or performance field.
- c. Use for EMITTER'S VOICE MESSAGE* multi-story arrangement of objects instead of a single-story arrangement.
- d. Tilt or re-orient EMITTER'S VOICE MESSAGE*; lay it on its side.
- e. Use another side of a given dimension or field of EMITTER'S VOICE MESSAGE*.

IP.1. Segmenting/ Integrating - strategic type (17)

- a. Divide EMITTER'S VOICE MESSAGE* into existing and/or new parts, shapes, phases, states, or conditions.
- b. Integrate different existing or new parts, forms, phases, states or conditions of EMITTER'S VOICE MESSAGE* in a single entity.
- c. Make EMITTER'S VOICE MESSAGE* easy to disassemble or assemble.
- d. Increase or reduce the degree of fragmentation or segmentation of EMITTER'S VOICE MESSAGE*.

IP.39. Inert Atmosphere / Environment - operative type (18)

- a. Replace a currently harmful or undesirable environment for EMITTER'S VOICE MESSAGE* with an inert one, either fully or partially.
- b. Add neutral parts, or inert additives to OBJECT S1 or its environment.
- c. Leave the harmful environment for OBJECT S1 towards another environment or dimension.

IP.4. Asymmetry/ Symmetry - operative type (19)

- a. Change the shape of EMITTER'S VOICE MESSAGE* from symmetrical to asymmetrical, permanent, or variable in time, or vice versa.
- b. If EMITTER'S VOICE MESSAGE* is asymmetrical, increase its degree of asymmetry, or vice versa.

N°6 Improve: 39. Productivity and Preserve: 38. Extent of automation/ autonomy

IP.5. Merging/ Separating - operative type (20)

- a. Bring EMITTER'S VOICE MESSAGE* closer or merge with other objects with similar or identical operations or functions.
- b. Bring EMITTER'S VOICE MESSAGE* closer or merge with other objects with similar operations or functions for them to act together at the same time.
- c. Merge different shapes or actions into EMITTER'S VOICE MESSAGE*.
- d. If there are objects fused to EMITTER'S VOICE MESSAGE*, and if necessary, apply a separation action.

IP.12. Equipotentiality - tactical type (21)

- a. In a potential field, limit position changes or energy variations of EMITTER'S VOICE MESSAGE*.
- b. Change operating conditions to eliminate the need to change the position or energy quality of EMITTER'S VOICE MESSAGE* in a potential field.

IP.35. Transformation / Parameter Changes - strategic type (22)

- a. Change EMITTER'S VOICE MESSAGE*'s physical or chemical state (e.g., in shape, in composition, to a gas, liquid, solid or plasma).

b. Change the composition or condition of EMITTER'S VOICE MESSAGE* by adding or removing components.

c. Change the concentration or consistency; change the degree of flexibility; change the temperature or the level of internal activity of EMITTER'S VOICE MESSAGE*.

IP.26. Copying/ Replicating - strategic type (23)

a. Instead of using EMITTER'S VOICE MESSAGE*, or any of its unavailable, expensive, fragile parts or properties, use simpler and inexpensive copies or replicates to perform the desired function and, if possible, do so with improved characteristics and properties, while disregarding the harmful, undesirable, or unnecessary ones.

b. Imitate EMITTER'S VOICE MESSAGE*, or any of its parts or properties, leveraging the relevant available environment.

c. If simple copies, or replicates are already being used, apply copies, or replicates of a higher level or technical

N°7 Improve: 39. Productivity and Preserve: 33. Ease of operation

IP.1. Segmenting/ Integrating - strategic type (24)

a. Divide EMITTER'S VOICE MESSAGE* into existing and/or new parts, shapes, phases, states, or conditions.

b. Integrate different existing or new parts, forms, phases, states or conditions of EMITTER'S VOICE MESSAGE* in a single entity.

c. Make EMITTER'S VOICE MESSAGE* easy to disassemble or assemble.

d. Increase or reduce the degree of fragmentation or segmentation of EMITTER'S VOICE MESSAGE*.

IP.28. Mechanics Substitution - strategic type (25)

a. Replace a direct or manual action in, or for, EMITTER'S VOICE MESSAGE*, with a mechanical action or a tool.

b. Replace a mechanical means in, or for, EMITTER'S VOICE MESSAGE*, with sensory (optical, acoustic, vibration, taste, smell, feelings or other sensory fields) means.

c. Use mechanical, pneumatic, hydraulic, electric, magnetic, and electromagnetic, chemical, biological, psychological or other fields to improve action of EMITTER'S VOICE MESSAGE*.

d. Change from static fields in, or for, EMITTER'S VOICE MESSAGE* to moving fields, from unstructured fields to those with structure, or vice versa.

e. Use fields in conjunction with field-activated parts, components, or particles (e.g., magnetic field and ferromagnetic particles) in, or for, EMITTER'S VOICE MESSAGE*.

IP.7. Nesting/ Dispersing - tactical type (26)

a. Place EMITTER'S VOICE MESSAGE* fully or partially inside another object; place each object, in turn, fully or partially inside the other.

b. Make one part of OBJECT S1 pass through a cavity in the other, or vice versa.

c. If EMITTER'S VOICE MESSAGE* is nested with another object, and if necessary, apply a dispersing action.

IP.10. Preliminary Action - strategic type (27)

a. Perform the required change in, or for, EMITTER'S VOICE MESSAGE*, before it is needed (either fully or partially).

b. Pre-arrange EMITTER'S VOICE MESSAGE* and other objects, if necessary, in such a way that they can come into action from the most convenient place and without losing time for their delivery.

N°8 Improve: 39. Productivity and Preserve: 35. Adaptability or versatility

IP.1. Segmenting/ Integrating - strategic type (28)

- a. Divide EMITTER'S VOICE MESSAGE* into existing and/or new parts, shapes, phases, states, or conditions.
- b. Integrate different existing or new parts, forms, phases, states or conditions of EMITTER'S VOICE MESSAGE* in a single entity.
- c. Make EMITTER'S VOICE MESSAGE* easy to disassemble or assemble.
- d. Increase or reduce the degree of fragmentation or segmentation of EMITTER'S VOICE MESSAGE*.

IP.35. Transformation / Parameter Changes - strategic type (29)

- a. Change EMITTER'S VOICE MESSAGE*'s physical or chemical state (e.g., in shape, in composition, to a gas, liquid, solid or plasma).
- b. Change the composition or condition of EMITTER'S VOICE MESSAGE* by adding or removing components.
- c. Change the concentration or consistency; change the degree of flexibility; change the temperature or the level of internal activity of EMITTER'S VOICE MESSAGE*.

IP.28. Mechanics Substitution - strategic type (30)

- a. Replace a direct or manual action in, or for, EMITTER'S VOICE MESSAGE*, with a mechanical action or a tool.
- b. Replace a mechanical means in, or for, EMITTER'S VOICE MESSAGE*, with sensory (optical, acoustic, vibration, taste, smell, feelings or other sensory fields) means.
- c. Use mechanical, pneumatic, hydraulic, electric, magnetic, and electromagnetic, chemical, biological, psychological or other fields to improve action of EMITTER'S VOICE MESSAGE*.
- d. Change from static fields in, or for, EMITTER'S VOICE MESSAGE* to moving fields, from unstructured fields to those with structure, or vice versa.
- e. Use fields in conjunction with field-activated parts, components, or particles (e.g., magnetic field and ferromagnetic particles) in, or for, EMITTER'S VOICE MESSAGE*.

IP.37. Useful Perceptible Change - operative type (31)

- a. Use state, dimension or condition changes occurring to EMITTER'S VOICE MESSAGE*, because of a modification or application of an external or self-generated field, which is perceptible by and can influence to object S2 with which it interacts. The change may be permanent or variable in time.

Relevant inventive principles from Table II not included in Recommended Solution

IP.14. Spheroidality - Curvature - Angle (Pos.(5) - tactical type (32)

- a. For the interaction between EMITTER'S VOICE MESSAGE* and Object S2, instead of using rectilinear parts, surfaces, or shapes, use curvilinear, enveloping, or angled parts.
- b. For the interaction between EMITTER'S VOICE MESSAGE* and Object S2, instead of acting in a linear or direct way, interact in an indirect way or with curvilinear, surrounding, or angled movements.
- c. Move EMITTER'S VOICE MESSAGE* from flat to spherical surfaces; from parts shaped as a cube (parallelepiped) to ball-shaped structures.
- d. Use rolls, balls, spirals, domes in, or for, EMITTER'S VOICE MESSAGE*.
- e. Go from linear to rotary motion, use centrifugal forces in, or for, EMITTER'S VOICE MESSAGE*.
- f. If there is Spheroidality, curvature or angle, increase or reduce, as applicable, in, or for, EMITTER'S VOICE MESSAGE*.

IP.2. Taking out/ Adding (Pos.(10) - strategic type (33)

- a. Separate an interfering part or a property from EMITTER'S VOICE MESSAGE*, or single out the only

necessary part (or property) of EMITTER'S VOICE MESSAGE*. **b.** Add new parts or properties to EMITTER'S VOICE MESSAGE*.

IP.29. Controllable Soft Variables (Pos.(11) - tactical type (34)

a. Use external, controllable soft variables (manual, physical, mechanical, pneumatic, hydraulic, electrical, magnetic, electromagnetic, digital, chemical, biological, social, psychological, physiological , etc.) to interact with EMITTER'S VOICE MESSAGE* facilitating goal fulfillment of the function performed with Object S2.

b. Make easier EMITTER'S VOICE MESSAGE* interact with Object S2 using internal, controllable soft variables (manual, physical, mechanical, pneumatic, hydraulic, electrical, magnetic, electromagnetic, digital, chemical, biological, social, psychological, physiological , etc.) available in S1 and / or S2, facilitating goal fulfillment.

TABLE VI. RESULTS OF SENSITIVITY ANALYSIS FOR THE EVALUATED OBJECT EMITTER'S VOICE MESSAGE

CHALLENGE: Improve long-distance voice communication affected by environmental interference

Coverage obtained for the current evaluation to compare with sensitivity analysis

Order	Par.1	Par.2	Par.3	Par.4	Par.5	Cob. NS (%)	Cob. EC (%)	Cob. GL (%)
#	3	12	18	30	39. Productivity	95.54	100	96.65

Table VI presents the 10 most favorable parameter combinations recommended by the Aatrizinventor algorithm. It is suggested to evaluate the 2 or 3 most relevant ones. Practice teaches that they often contain the best solution for the evaluated challenge.

(E) Combination of TRIZ innovation parameters evaluated in this Aatrizinventor Solution is prioritized here

(U) Combination of TRIZ innovation parameters shows a match only in the evaluated undesirable effects.

A. PRIORITISED CONTRADICTIONS BY GLOBAL COVERAGE (Cob.GL)

Par.5 is automatically selected

Order	Par.1	Par.2	Par.3	Par.4	Par.5	Cob. NS (%)	Cob. EC (%)	Cob. GL (%)
I.a	3	12	18	30	39. Productivity (E)	95.54	100	96.65
II.a	3	12	21	30	33. Ease of operation	95.51	100	96.63
III.a	3	12	30	0	33. Ease of operation	94.65	100	95.98
IV.a	3	18	24	30	19. Use of energy by moving object	94.26	100	95.7
V.a	3	12	18	30	33. Ease of operation (U)	96.72	92.06	95.56

B. PRIORITIZATION OF CONTRADICTIONS BY COVERAGE OF NEEDS TO SATISFY (Cob.NS)

Par.5 is automatically selected

Order	Par.1	Par.2	Par.3	Par.4	Par.5	Cob. NS (%)	Cob. EC (%)	Cob. GL (%)	Table VI.A
I.b	3	12	24	30	33. Ease of operation	97.06	77.33	92.12	-
II.b	3	12	18	30	33. Ease of operation (U)	96.72	92.06	95.56	V.a
III.b	3	12	18	30	39. Productivity (E)	95.54	100	96.65	I.a
IV.b	3	12	21	30	33. Ease of operation	95.51	100	96.63	II.a
V.b	3	18	21	30	27. Reliability	95.44	16.2	75.63	-

TABLE VII ESSENTIAL CONTRADICTIONS MATRIX FOR NEEDS TO SATISFY (NS) FOR THE SAME UNDESIRABLE EFFECTS EVALUATED OF: EMITTER'S VOICE MESSAGE

CHALLENGE: Improve long-distance voice communication affected by environmental interference

Evaluated need to satisfy in this report: **39. Productivity**

UDEs: (+) 3. Length of moving object// (-) 12. Shape / composition / configuration// (-) 18. Emission intensity// (+) 30. Object-affected harmful factors

This table allows the Innovation Team to compare the coverages obtained for the evaluated need to satisfy with those of the other defined needs, for the same undesirable effects. This way, they can decide whether to choose any of the suggested innovation parameter combinations here that offer better coverage.

Need to Satisfy	Parameter to improve	Parameter to attenuate or preserve	Contradict. Essential	Cob. NS (%)	Cob. between EC (%)	Cob. GL (%) 3/1
39. Productivity	(+) 39. Productivity	(-) 18. Emission intensity	[26,17,19,1]	95.54	100	96.65
33. Ease of operation	(+) 30. Object-affected harmful factors	(-) 18. Emission intensity	[1,19,32,13]	96.72	92.06	95.56
19. Use of energy by moving object	(+) 30. Object-affected harmful factors	(-) 18. Emission intensity	[1,19,32,13]	93.05	92.06	92.8
13. Stability	(+) 30. Object-affected harmful factors	(-) 18. Emission intensity	[1,19,32,13]	91.15	92.06	91.38
32. Ease of achieving desired outcome	(+) 30. Object-affected harmful factors	(-) 18. Emission intensity	[1,19,32,13]	90.38	92.06	90.8

27. Reliability	(+) 30. Object-affected harmful factors	(-) 18. Emission intensity	[1,19,32,13]	89.68	92.06	90.28
35. Adaptability or versatility	(+) 30. Object-affected harmful factors	(-) 18. Emission intensity	[1,19,32,13]	89.68	92.06	90.27
15. Duration of action of moving object	(+) 30. Object-affected harmful factors	(-) 18. Emission intensity	[1,19,32,13]	74.98	92.06	79.25
34. Ease of change, repair or maintain	(+) 30. Object-affected harmful factors	(-) 18. Emission intensity	[1,19,32,13]	72.94	92.06	77.72
38. Extent of automation/ autonomy	(+) 38. Extent of automation/ autonomy	(-) 12. Shape / composition / configuration	[15,32,1,13]	62.98	57.39	61.58

Table VII shows the essential contradictions obtained for each of the defined Needs to Satisfy, taking into account the same undesirable effects that have been evaluated. This table is based on the calculation of a global coverage (Cob.GL), which is determined by combining two values: the coverage from Table IV (Cob.NS) already explained, and a relative coverage (Cob. between EC) that is obtained in this table VII, when each other comparing the essential contradictions identified for the 10 parameters of Needs to Satisfy.

This global coverage (GL) is based on expert weighting criteria to prioritize the solutions for the different Needs to Satisfy. Experience with aatrizinventor indicates that the most effective solutions are those with higher global coverage, preferably exceeding 90%, if possible.

The Innovation Team may decide if it is appropriate to carry out a new evaluation with another Need to Satisfy, selected from the results provided in Table VII. This decision will be primarily made when the evaluated Need to Satisfy is not ranked in the first position of Table VII. In this table, the position of the evaluated Need to Satisfy is highlighted: 39. Productivity.

TABLE VIII. ORDER OF INCIDENCE OF INVENTIVE PRINCIPLES (POS.n)

CHALLENGE: Improve long-distance voice communication affected by environmental interference

Participation analysis of inventive principles in TABLE II SPECIFIC CONTRADICTION MATRIX.

Evaluated parameters for Object EMITTER'S VOICE MESSAGE:

Par. UDEs:

(+) 3. Length of moving object

(-) 12. Shape / composition / configuration

(-) 18. Emission intensity

(+) 30. Object-affected harmful factors

Par. NS: (+) 39. Productivity

***: Inventive Principles from the Specific Contradiction Matrix (Table II) not described in the Recommend

Solution (Table IX). It is recommended to perform an additional review following the order of position.

Inventive principles of Table II	IP type	Tables	Contradictions
IP.22. Convert harm in benefit (Pos.1)	IP. Str.	II / III / IV	[Par.30][Par.12][IP(s) : 22,1,3,35] - [Par.12][Par.30][IP(s) : 22,1,2,35] - [Par.39][Par.30][IP(s) : 22,35,13,24] - [Par.30][Par.39][IP(s) : 22,35,13,24] -
IP.1. Segmenting/ Integrating (Pos.2)	IP. Str.	II / III / IV	[Par.30][Par.3][IP(s) : 17,1,39,4] - [Par.3][Par.12][IP(s) : 1,8,10,29] - [Par.30][Par.12][IP(s) : 22,1,3,35] - [Par.30][Par.18][IP(s) : 1,19,32,13] - [Par.39][Par.18][IP(s) : 26,17,19,1] - [Par.3][Par.30][IP(s) : 1,15,17,24] - [Par.12][Par.30][IP(s) : 22,1,2,35] -
IP.32. Perception/ Appearance/ Color Changes (Pos.3)	IP. Str.	II / III / IV	[Par.18][Par.3][IP(s) : 19,32,16,0] - [Par.18][Par.12][IP(s) : 32,30,0,0] - [Par.3][Par.18][IP(s) : 32,0,0,0] - [Par.12][Par.18][IP(s) : 13,15,32,0] - [Par.30][Par.18][IP(s) : 1,19,32,13] -
IP.17. Another Dimension or Field (Pos.4)	IP. Tac.	II / III / IV	[Par.30][Par.3][IP(s) : 17,1,39,4] - [Par.39][Par.18][IP(s) : 26,17,19,1] - [Par.3][Par.30][IP(s) : 1,15,17,24] - [Par.12][Par.39][IP(s) : 17,26,34,10] -
IP.14. Spheroidality - Curvature - Angle (Pos.5) ***	IP. Tac.	II /	[Par.39][Par.12][IP(s) : 14,10,34,40] - [Par.3][Par.39][IP(s) : 14,4,28,29] -
IP.19. Time-Varying Action/ Periodic or Pulsating (Pos.6)	IP. Str.	II / III / IV	[Par.18][Par.3][IP(s) : 19,32,16,0] - [Par.30][Par.18][IP(s) : 1,19,32,13] - [Par.39][Par.18][IP(s) : 26,17,19,1] - [Par.18][Par.30][IP(s) : 15,19,0,0] -
IP.15. Dynamics (Pos.7)	IP. Str.	II / III / IV	[Par.12][Par.18][IP(s) : 13,15,32,0] - [Par.3][Par.30][IP(s) : 1,15,17,24] - [Par.18][Par.30][IP(s) : 15,19,0,0] -
IP.26. Copying/ Replicating (Pos.8)	IP. Str.	II / III / IV	[Par.39][Par.18][IP(s) : 26,17,19,1] - [Par.12][Par.39][IP(s) : 17,26,34,10] -
IP.13. Reverse or Indirect Action (Pos.9)	IP. Str.	II / III / IV	[Par.12][Par.18][IP(s) : 13,15,32,0] - [Par.30][Par.18][IP(s) : 1,19,32,13] - [Par.39][Par.30][IP(s) : 22,35,13,24] - [Par.30][Par.39][IP(s) : 22,35,13,24] -
IP.2. Taking out/ Adding (Pos.10) ***	IP. Str.	II / IV	[Par.12][Par.30][IP(s) : 22,1,2,35] - [Par.18][Par.39][IP(s) : 2,25,16,0] -
IP.29. Controllable Soft Variables (Pos.11) ***	IP. Tac.	II /	[Par.12][Par.3][IP(s) : 29,34,5,4] - [Par.3][Par.12][IP(s) : 1,8,10,29] - [Par.3][Par.39][IP(s) : 14,4,28,29] -
IP.18. Mechanical Vibrations/ Energy Variations (Pos.12) ***	IP. Tac.	II / IV	[Par.39][Par.3][IP(s) : 18,4,28,38] -

IP.35. Transformation / Parameter Changes (Pos.13)	IP. Str.	II / III / IV	[Par.30][Par.12][IP(s) : 22,1,3,35] - [Par.12][Par.30][IP(s) : 22,1,2,35] - [Par.39][Par.30][IP(s) : 22,35,13,24] - [Par.30][Par.39][IP(s) : 22,35,13,24] -
IP.4. Asymmetry/ Symmetry (Pos.14)	IP. Oper.	II / III /	[Par.12][Par.3][IP(s) : 29,34,5,4] - [Par.30][Par.3][IP(s) : 17,1,39,4] - [Par.39][Par.3][IP(s) : 18,4,28,38] - [Par.3][Par.39][IP(s) : 14,4,28,29] -
IP.34. Discarding and Recovering (Pos.15) ***	IP. Tac.	II /	[Par.12][Par.3][IP(s) : 29,34,5,4] - [Par.39][Par.12][IP(s) : 14,10,34,40] - [Par.12][Par.39][IP(s) : 17,26,34,10] -
IP.10. Preliminary Action (Pos.16)	IP. Str.	II / IV	[Par.3][Par.12][IP(s) : 1,8,10,29] - [Par.39][Par.12][IP(s) : 14,10,34,40] - [Par.12][Par.39][IP(s) : 17,26,34,10] -
IP.30. Simple Shapes/ Ways to Interact (Pos.17) ***	IP. Tac.	II /	[Par.18][Par.12][IP(s) : 32,30,0,0] -
IP.25. Self-service (Pos.18) ***	IP. Oper.	II / IV	[Par.18][Par.39][IP(s) : 2,25,16,0] -
IP.8. Anti-Weight/ Compensation (Pos.19) ***	IP. Tac.	II /	[Par.3][Par.12][IP(s) : 1,8,10,29] -
IP.28. Mechanics Substitution (Pos.20)	IP. Str.	II / IV	[Par.39][Par.3][IP(s) : 18,4,28,38] - [Par.3][Par.39][IP(s) : 14,4,28,29] -
IP.16. Partial or Excessive Actions (Pos.21) ***	IP. Oper.	II /	[Par.18][Par.3][IP(s) : 19,32,16,0] - [Par.18][Par.39][IP(s) : 2,25,16,0] -
IP.39. Inert Atmosphere / Environment (Pos.22)	IP. Oper.	II / III / IV	[Par.30][Par.3][IP(s) : 17,1,39,4] -
IP.24. Intermediary (Pos.23) ***	IP. Tac.	II / IV	[Par.3][Par.30][IP(s) : 1,15,17,24] - [Par.39][Par.30][IP(s) : 22,35,13,24] - [Par.30][Par.39][IP(s) : 22,35,13,24] -
IP.5. Merging/ Separating (Pos.24)	IP. Oper.	II / IV	[Par.12][Par.3][IP(s) : 29,34,5,4] -
IP.3. Local Quality (Pos.25)	IP. Str.	II / III / IV	[Par.30][Par.12][IP(s) : 22,1,3,35] -
IP.40. Composite Materials/ Conditions (Pos.26) ***	IP. Oper.	II /	[Par.39][Par.12][IP(s) : 14,10,34,40] -
IP.38. Strong or Quick Reactions (Pos.27) ***	IP. Oper.	II / IV	[Par.39][Par.3][IP(s) : 18,4,28,38] -

TABLE IX. RECOMMENDED SOLUTION ACCORDING TO THE MOST RELEVANT CONTRADICTIONS IDENTIFIED FOR THE EVALUATED OBJECT: EMITTER'S VOICE MESSAGE

CHALLENGE: Improve long-distance voice communication affected by environmental interference

This table displays the relevant contradictions identified by the algorithm, which are crucial for determining the direction and scope of the solution to the innovation challenge under evaluation. The specific solution will be obtained by applying the updated inventive principles detailed below.

It is essential to bear in mind that we are evaluating EMITTER'S VOICE MESSAGE when it interacts with RECIEVER and there is an affected function: long-distance voice communication affected by environmental interference, in a specific space and time. EMITTER'S VOICE MESSAGE may require changes in space, time, its physical composition, or its functional characteristic, as well as partial or total replacement with another object or other recommended changes. To emphasize this concept, we mark EMITTER'S VOICE MESSAGE with an asterisk. Do not read the name of the evaluated object literally; associate it with a possible solution for EMITTER'S VOICE MESSAGE*.

Each inventive principle described here may contain more than one innovation concept recommended by TRIZ, identified as a, b, c, ..., not all of which are applicable to a specific case under evaluation. The Innovation Team must select those innovation concepts that best relate to the evaluated innovation challenge, based on their own knowledge and the analysis of relational thinking that they must carry out.

Additionally, technological research may be necessary for its solution, as the specific solution recommended by the inventive principles described here likely already exists somewhere in the world. The interpretation of the inventive principles, to apply them specifically to the evaluated case, is a recursive process that generally ranges from strategic to tactical and operational levels. We recommend completing the reading of the inventive principles described below to envision a possible solution and then rereading the principles to reinforce the coherence of the emerging solution. As a result of the finally determined innovation solution, there will be a change in EMITTER'S VOICE MESSAGE, in a new context guided by the inventive principles, probably not previously imagined.

The Language of Nature's Innovation provides speed and focus for guided and systematic innovation thinking for individuals. The foundation for innovation is a profound understanding of the current situation.

IX.A BASE SOLUTION FOR INNOVATION CHALLENGE FOR THE EVALUATED OBJECT EMITTER'S VOICE MESSAGE NEED TO SATISFY: 39. Productivity

Strategic inventive principles: Str. IP

Tactical inventive principles: Tac. IP

Operative inventive principles: Oper. IP

Pos.n : Order of importance n of an inventive principle included in Table II.

ESSENTIAL CONTRADICTION

Contradiction order wt.1

Parameter to improve: (+) 39. Productivity

TO IMPROVE (DE): EMITTER'S VOICE MESSAGE has More Desired productivity to interact with S2

Parameter to attenuate or preserve: (-) 18. Emission intensity

TO ATTENUATE OR PRESERVE (UDE): EMITTER'S VOICE MESSAGE has Less Emission intensity interacting with S2

Inventive principles IP(s) : [26,17,19,1]

26. Copying/ Replicating, Str. IP (Pos.8):

- a. Instead of using EMITTER'S VOICE MESSAGE*, or any of its unavailable, expensive, fragile parts or properties, use simpler and inexpensive copies or replicates to perform the desired function and, if possible, do so with improved characteristics and properties, while disregarding the harmful, undesirable, or unnecessary ones.
- b. Imitate or replicate EMITTER'S VOICE MESSAGE*, or any of its parts or properties, leveraging the relevant available environment.
- c. If simple copies, or replicates are already being used, apply copies, or replicates of a higher level or technical complexity.

Separation principle for EMITTER'S VOICE MESSAGE* : Separation in space

Solution strategy for EMITTER'S VOICE MESSAGE* : Improving if a solution has not yet emerged

17. Another Dimension or Field, Tac. IP (Pos.4):

- a. Add or remove physical dimensions or fields of action of EMITTER'S VOICE MESSAGE*.
- b. Move EMITTER'S VOICE MESSAGE* to a new dimension in space or performance field.
- c. Use for EMITTER'S VOICE MESSAGE* multi-story arrangement of objects instead of a single-story arrangement.
- d. Tilt or re-orient EMITTER'S VOICE MESSAGE*; lay it on its side.
- e. Use another side of a given dimension or field of EMITTER'S VOICE MESSAGE*.

Separation principle for EMITTER'S VOICE MESSAGE* : Separation in space

Solution strategy for EMITTER'S VOICE MESSAGE* : Improving attributes; Improving performance; Improving 7 quality factors (Quality, Reliability, Maintainability, Supportability, Human Factors, Safety, Security); Improving if a solution has not yet emerged

19. Time-Varying Action/ Periodic or Pulsating, Str. IP (Pos.6):

- a. Instead of using continuous action in, or for, EMITTER'S VOICE MESSAGE* , use time-varying, periodic, or pulsating actions.
- b. If the action of EMITTER'S VOICE MESSAGE* is already periodic, change the periodic magnitude or frequency.
- c. Use pauses between impulses to perform a different action of EMITTER'S VOICE MESSAGE*.
- d. If the current action of EMITTER'S VOICE MESSAGE* is time-varying, and if necessary, change to an action higher or lesser time-varying.

Separation principle for EMITTER'S VOICE MESSAGE* : Separation in time

Solution strategy for EMITTER'S VOICE MESSAGE* : Improving performance

1. Segmenting/ Integrating, Str. IP (Pos.2):

- a. Divide EMITTER'S VOICE MESSAGE* into existing and/or new parts, shapes, phases, states, or conditions.
- b. Integrate different parts, shapes, phases, states, or existing or new conditions of a EMITTER'S VOICE MESSAGE* into a single entity..
- c. Make EMITTER'S VOICE MESSAGE* easy to disassemble or assemble.

d. Increase or reduce the degree of fragmentation or segmentation of EMITTER'S VOICE MESSAGE* :
Separation principle for EMITTER'S VOICE MESSAGE* : Separation in space / Separation in subsystem
Solution strategy for EMITTER'S VOICE MESSAGE* : Improving attributes; Improving performance;
Improving 7 quality factors (Quality, Reliability, Maintainability, Supportability, Human Factors, Safety, Security); Improving if a solution has not yet emerged

COMPLEMENTARY CONTRADICTION 1

Contradiction order wt.2

Parameter to improve: (+) 30. Object-affected harmful factors

TO IMPROVE (UDE): EMITTER'S VOICE MESSAGE has More Harmful factors affecting it by interacting with S2

Parameter to attenuate or preserve: (-) 18. Emission intensity

TO ATTENUATE OR PRESERVE (UDE): EMITTER'S VOICE MESSAGE has Less Emission intensity interacting with S2

Inventive principles IP(s) : [1,19,32,13]

1. Segmenting/ Integrating, Str. IP (Pos.2):

- a. Divide EMITTER'S VOICE MESSAGE* into existing and/or new parts, shapes, phases, states, or conditions.
- b. Integrate different parts, shapes, phases, states, or existing or new conditions of a EMITTER'S VOICE MESSAGE* into a single entity..
- c. Make EMITTER'S VOICE MESSAGE* easy to disassemble or assemble.
- d. Increase or reduce the degree of fragmentation or segmentation of EMITTER'S VOICE MESSAGE* :
Separation principle for EMITTER'S VOICE MESSAGE* : Separation in space / Separation in subsystem
Solution strategy for EMITTER'S VOICE MESSAGE* : Improving attributes; Improving performance;
Improving 7 quality factors (Quality, Reliability, Maintainability, Supportability, Human Factors, Safety, Security); Improving if a solution has not yet emerged

19. Time-Varying Action/ Periodic or Pulsating, Str. IP (Pos.6):

- a. Instead of using continuous action in, or for, EMITTER'S VOICE MESSAGE* , use time-varying, periodic, or pulsating actions.
- b. If the action of EMITTER'S VOICE MESSAGE* is already periodic, change the periodic magnitude or frequency.
- c. Use pauses between impulses to perform a different action of EMITTER'S VOICE MESSAGE*.
- d. If the current action of EMITTER'S VOICE MESSAGE* is time-varying, and if necessary, change to an action higher or lesser time-varying.

Separation principle for EMITTER'S VOICE MESSAGE* : Separation in time

Solution strategy for EMITTER'S VOICE MESSAGE* : Improving performance

32. Perception/ Appearance/ Color Changes, Str. IP (Pos.3):

- a. Change how is perceived, the appearance or shape of EMITTER'S VOICE MESSAGE* in relation to the object (S2) with which it interacts.
- b. Change the color, or appearance, of EMITTER'S VOICE MESSAGE* or its external environment.
- c. Change the transparency of EMITTER'S VOICE MESSAGE* or its external environment.

Separation principle for EMITTER'S VOICE MESSAGE* : Separation by condition

Solution strategy for EMITTER'S VOICE MESSAGE* : Improving if a solution has not yet emerged

13. Inverse or Indirect Action, Str. IP (Pos.9):

a. Inverse the applied action or apply an indirect action to perform the current function of EMITTER'S VOICE MESSAGE* to interact with object (S2)

It should be identified how EMITTER'S VOICE MESSAGE* currently performs an action with S2 Object and from there evaluate an inverse or indirect action.

b. Make moving parts of EMITTER'S VOICE MESSAGE* (or the external environment) fixed, and fixed parts moving.

c. Turn EMITTER'S VOICE MESSAGE* (or process) "upside down", "change the position", "change the condition".

Separation principle for EMITTER'S VOICE MESSAGE* : Separation in space / Separation inverse

Solution strategy for EMITTER'S VOICE MESSAGE* : Improving attributes; Improving performance; Improving 7 quality factors (Quality, Reliability, Maintainability, Supportability, Human Factors, Safety, Security); Improving if a solution has not yet emerged

COMPLEMENTARY CONTRADICTION 2

Contradiction order wt.4

Parameter to improve: (-) 12. Shape / composition / configuration

TO IMPROVE (UDE): EMITTER'S VOICE MESSAGE has Less Appropriate shape, composition, or configuration interacting with S2

Parameter to attenuate or preserve: (-) 18. Emission intensity

TO ATTENUATE OR PRESERVE (UDE): EMITTER'S VOICE MESSAGE has Less Emission intensity interacting with S2

Inventive principles IP(s) : [13,15,32,0]

13. Inverse or Indirect Action, Str. IP (Pos.9):

a. Inverse the applied action or apply an indirect action to perform the current function of EMITTER'S VOICE MESSAGE* to interact with object (S2)

It should be identified how EMITTER'S VOICE MESSAGE* currently performs an action with S2 Object and from there evaluate an inverse or indirect action.

b. Make moving parts of EMITTER'S VOICE MESSAGE* (or the external environment) fixed, and fixed parts moving.

c. Turn EMITTER'S VOICE MESSAGE* (or process) "upside down", "change the position", "change the condition".

Separation principle for EMITTER'S VOICE MESSAGE* : Separation in space / Separation inverse

Solution strategy for EMITTER'S VOICE MESSAGE* : Improving attributes; Improving performance; Improving 7 quality factors (Quality, Reliability, Maintainability, Supportability, Human Factors, Safety, Security); Improving if a solution has not yet emerged

15. Dynamics, Str. IP (Pos.7):

a. Allow (or design) the characteristics of EMITTER'S VOICE MESSAGE*, external environment, or process to change to an optimal, or to find an optimal, operating condition.

b. Divide EMITTER'S VOICE MESSAGE* into parts that are capable of relative movement between each other.

c. If EMITTER'S VOICE MESSAGE* (or process) is rigid or inflexible, make it flexible or adaptive.

d. To enhance the dynamics of EMITTER'S VOICE MESSAGE* or the process, use feature(s) or object(s) available in the nearby environment.

Separation principle for EMITTER'S VOICE MESSAGE* : Separation in time

Solution strategy for EMITTER'S VOICE MESSAGE* : Improving attributes; Improving performance; Improving 7 quality factors (Quality, Reliability, Maintainability, Supportability, Human Factors, Safety, Security); Improving if a solution has not yet emerged

32. Perception/ Appearance/ Color Changes, Str. IP (Pos.3):

- a. Change how is perceived, the appearance or shape of EMITTER'S VOICE MESSAGE* in relation to the object (S2) with which it interacts.
- b. Change the color, or appearance, of EMITTER'S VOICE MESSAGE* or its external environment.
- c. Change the transparency of EMITTER'S VOICE MESSAGE* or its external environment.

Separation principle for EMITTER'S VOICE MESSAGE* : Separation by condition

Solution strategy for EMITTER'S VOICE MESSAGE* : Improving if a solution has not yet emerged

COMPLEMENTARY CONTRADICTION 3

Contradiction order wt.6

Parameter to improve: (+) 30. Object-affected harmful factors

TO IMPROVE (UDE): EMITTER'S VOICE MESSAGE has More Harmful factors affecting it by interacting with S2

Parameter to attenuate or preserve: (-) 12. Shape / composition / configuration

TO ATTENUATE OR PRESERVE (UDE): EMITTER'S VOICE MESSAGE has Less Appropriate shape, composition, or configuration interacting with S2

Inventive principles IP(s) : [22,1,3,35]

22. Blessing in Disguise, Str. IP (Pos.1):

- a. Use harmful factors, or external effects related to harmful factors, for EMITTER'S VOICE MESSAGE* (particularly, effects of the environment or surroundings) to achieve a positive effect with EMITTER'S VOICE MESSAGE*.
- b. Eliminate a harmful primary action by adding another action to EMITTER'S VOICE MESSAGE*, which counteracts the harmful action to solve the problem.
- c. Amplify a harmful factor or a part of EMITTER'S VOICE MESSAGE*, to such a degree that it is no longer harmful.

Separation principle for EMITTER'S VOICE MESSAGE* : Integration in supersystem

Solution strategy for EMITTER'S VOICE MESSAGE* : Improving attributes; Improving performance; Improving 7 quality factors (Quality, Reliability, Maintainability, Supportability, Human Factors, Safety, Security); Improving if a solution has not yet emerged

1. Segmenting/ Integrating, Str. IP (Pos.2):

- a. Divide EMITTER'S VOICE MESSAGE* into existing and/or new parts, shapes, phases, states, or conditions.
- b. Integrate different parts, shapes, phases, states, or existing or new conditions of a EMITTER'S VOICE MESSAGE* into a single entity..
- c. Make EMITTER'S VOICE MESSAGE* easy to disassemble or assemble.
- d. Increase or reduce the degree of fragmentation or segmentation of EMITTER'S VOICE MESSAGE*.

Separation principle for EMITTER'S VOICE MESSAGE* : Separation in space / Separation in subsystem

Solution strategy for EMITTER'S VOICE MESSAGE* : Improving attributes; Improving performance; Improving 7 quality factors (Quality, Reliability, Maintainability, Supportability, Human Factors, Safety, Security); Improving if a solution has not yet emerged

3. Local quality, Str. IP (Pos.25):

- a. Improve quality in a localized way, for parts, components, or conditions of EMITTER'S VOICE MESSAGE*.
- b. Change the structure, action, or procedure of EMITTER'S VOICE MESSAGE* from uniform to non-uniform, or vice versa.
- c. Change the external environment (or external influence) of EMITTER'S VOICE MESSAGE* from uniform to non-uniform, or vice versa.
- d. Make each part of EMITTER'S VOICE MESSAGE* function in the conditions that are most suitable for its operation.
- e. Make each part of EMITTER'S VOICE MESSAGE* fulfill a different and useful function.

Separation principle for EMITTER'S VOICE MESSAGE* : Separation in space

Solution strategy for EMITTER'S VOICE MESSAGE* : Improving attributes; Improving performance; Improving 7 quality factors (Quality, Reliability, Maintainability, Supportability, Human Factors, Safety, Security); Improving if a solution has not yet emerged

35. Transformation/ Parameter Changes, Str. IP (Pos.13):

- a. Change EMITTER'S VOICE MESSAGE*'s physical or chemical state (e.g., in shape, in composition, to a gas, liquid, solid or plasma).
- b. Change the composition or condition of EMITTER'S VOICE MESSAGE* by adding or removing components.
- c. Change the concentration or consistency; change the degree of flexibility; change the temperature or the level of internal activity of EMITTER'S VOICE MESSAGE*.

Separation principle for EMITTER'S VOICE MESSAGE* : Separation by condition / Separation alternative

Solution strategy for EMITTER'S VOICE MESSAGE* : Improving attributes; Improving 7 quality factors (Quality, Reliability, Maintainability, Supportability, Human Factors, Safety, Security)

COMPLEMENTARY CONTRADICTION 4

Contradiction order wt.8

Parameter to improve: (+) 30. Object-affected harmful factors

TO IMPROVE (UDE): EMITTER'S VOICE MESSAGE has More Harmful factors affecting it by interacting with S2

Parameter to attenuate or preserve: (+) 3. Length of moving object

TO ATTENUATE OR PRESERVE (UDE): EMITTER'S VOICE MESSAGE has More Own length or relative distance, whether physical or figurative interacting with S2

Inventive principles IP(s) : [17,1,39,4]

17. Another Dimension or Field, Tac. IP (Pos.4):

- a. Add or remove physical dimensions or fields of action of EMITTER'S VOICE MESSAGE*.
- b. Move EMITTER'S VOICE MESSAGE* to a new dimension in space or performance field.
- c. Use for EMITTER'S VOICE MESSAGE* multi-story arrangement of objects instead of a single-story arrangement.
- d. Tilt or re-orient EMITTER'S VOICE MESSAGE*; lay it on its side.
- e. Use another side of a given dimension or field of EMITTER'S VOICE MESSAGE*.

Separation principle for EMITTER'S VOICE MESSAGE* : Separation in space

Solution strategy for EMITTER'S VOICE MESSAGE* : Improving attributes; Improving performance; Improving 7 quality factors (Quality, Reliability, Maintainability, Supportability, Human Factors, Safety, Security); Improving if a solution has not yet emerged

1. Segmenting/ Integrating, Str. IP (Pos.2):

- a. Divide EMITTER'S VOICE MESSAGE* into existing and/or new parts, shapes, phases, states, or conditions.
 - b. Integrate different parts, shapes, phases, states, or existing or new conditions of a EMITTER'S VOICE MESSAGE* into a single entity..
 - c. Make EMITTER'S VOICE MESSAGE* easy to disassemble or assemble.
 - d. Increase or reduce the degree of fragmentation or segmentation of EMITTER'S VOICE MESSAGE*.
- Separation principle for EMITTER'S VOICE MESSAGE* : Separation in space / Separation in subsystem
Solution strategy for EMITTER'S VOICE MESSAGE* : Improving attributes; Improving performance; Improving 7 quality factors (Quality, Reliability, Maintainability, Supportability, Human Factors, Safety, Security); Improving if a solution has not yet emerged

39. Inert Atmosphere/ Environment, Oper. IP (Pos.22):

- a. Replace a currently harmful or undesirable environment for EMITTER'S VOICE MESSAGE* with an inert one, either fully or partially.
- b. Add neutral parts, or inert additives to EMITTER'S VOICE MESSAGE* or its environment.
- c. Leave the harmful environment for EMITTER'S VOICE MESSAGE* towards another environment or dimension.

Separation principle for EMITTER'S VOICE MESSAGE* : Separation by condition

Solution strategy for EMITTER'S VOICE MESSAGE* : Improving if a solution has not yet emerged

4. Asymmetry/ Symmetry, Str. IP (Pos.14):

- a. Change the shape of EMITTER'S VOICE MESSAGE* from symmetrical to asymmetrical, permanent, or variable in time, or vice versa.
 - b. If EMITTER'S VOICE MESSAGE* is asymmetrical, increase its degree of asymmetry, or vice versa.
- Separation principle for EMITTER'S VOICE MESSAGE* : Separation in space
Solution strategy for EMITTER'S VOICE MESSAGE* : Improving attributes; Improving performance; Improving 7 quality factors (Quality, Reliability, Maintainability, Supportability, Human Factors, Safety, Security); Improving if a solution has not yet emerged

IX.B SOLUTION TO MORE RELEVANT CONTRADICTIONS BETWEEN NEEDS TO SATISFY (Cob.NS)

Included in each inventive principle described below is the incidence level or position number it occupies in Table II. If it is not shown, it means that it only appears in Table IV. and requires attention.

CONTRADICTION BETWEEN NEEDS TO SATISFY N° 1

Parameter to improve 39. Productivity

MEJORAR > EMITTER'S VOICE MESSAGE tiene More Desired productivity to interact with S2

Parameter to preserve 38. Extent of automation/ autonomy

PRESERVAR > EMITTER'S VOICE MESSAGE tiene más efecto deseable por párametro 38. Extent of automation/ autonomy

Inventive principles IP(s) : [5,12,35,26]

5. Merging/ Separating, Str. IP (Pos.24):

- a. Bring EMITTER'S VOICE MESSAGE* closer or merge with other objects with similar or identical operations or functions.
- b. Bring EMITTER'S VOICE MESSAGE* closer or merge with other objects with similar operations or functions so that they can act together at the same time.
- c. If there are objects fused to EMITTER'S VOICE MESSAGE*, and if necessary, apply a separation action.
- d. If objects are merged, and if necessary, apply a separation action.

Separation principle for EMITTER'S VOICE MESSAGE* : Integration in supersystem

Solution strategy for EMITTER'S VOICE MESSAGE* : Improving attributes

12.- Equipotentiality, Tac. IP (Pos.):

a. In a potential field, limit position changes or energy variations of EMITTER'S VOICE MESSAGE*.

b. Change operating conditions to eliminate the need to change the position or energy quality of EMITTER'S VOICE MESSAGE* in a potential field.

Separation principle for EMITTER'S VOICE MESSAGE* : Separation by condition to satisfy contradiction

Solution strategy for EMITTER'S VOICE MESSAGE* : Improving if a solution has not yet emerged

35. Transformation/ Parameter Changes, Str. IP (Pos.13):

a. Change EMITTER'S VOICE MESSAGE*'s physical or chemical state (e.g., in shape, in composition, to a gas, liquid, solid or plasma).

b. Change the composition or condition of EMITTER'S VOICE MESSAGE* by adding or removing components.

c. Change the concentration or consistency; change the degree of flexibility; change the temperature or the level of internal activity of EMITTER'S VOICE MESSAGE*.

Separation principle for EMITTER'S VOICE MESSAGE* : Separation by condition / Separation alternative

Solution strategy for EMITTER'S VOICE MESSAGE* : Improving attributes; Improving 7 quality factors (Quality, Reliability, Maintainability, Supportability, Human Factors, Safety, Security)

26. Copying/ Replicating, Str. IP (Pos.8):

a. Instead of using EMITTER'S VOICE MESSAGE*, or any of its unavailable, expensive, fragile parts or properties, use simpler and inexpensive copies or replicates to perform the desired function and, if possible, do so with improved characteristics and properties, while disregarding the harmful, undesirable, or unnecessary ones.

b. Imitate or replicate EMITTER'S VOICE MESSAGE*, or any of its parts or properties, leveraging the relevant available environment.

c. If simple copies, or replicates are already being used, apply copies, or replicates of a higher level or technical complexity.

Separation principle for EMITTER'S VOICE MESSAGE* : Separation in space

Solution strategy for EMITTER'S VOICE MESSAGE* : Improving if a solution has not yet emerged

CONTRADICTION BETWEEN NEEDS TO SATISFY N° 2

Parameter to improve 39. Productivity

MEJORAR > EMITTER'S VOICE MESSAGE tiene More Desired productivity to interact with S2

Parameter to preserve 33. Ease of operation

PRESERVAR > EMITTER'S VOICE MESSAGE tiene más efecto deseable por párametro 33. Ease of operation

Inventive principles IP(s) : [1,28,7,10]

1. Segmenting/ Integrating, Str. IP (Pos.2):

a. Divide EMITTER'S VOICE MESSAGE* into existing and/or new parts, shapes, phases, states, or conditions.

b. Integrate different parts, shapes, phases, states, or existing or new conditions of a EMITTER'S VOICE MESSAGE* into a single entity..

c. Make EMITTER'S VOICE MESSAGE* easy to disassemble or assemble.

d. Increase or reduce the degree of fragmentation or segmentation of EMITTER'S VOICE MESSAGE*.

Separation principle for EMITTER'S VOICE MESSAGE* : Separation in space / Separation in subsystem

Solution strategy for EMITTER'S VOICE MESSAGE* : Improving attributes; Improving performance; Improving 7 quality factors (Quality, Reliability, Maintainability, Supportability, Human Factors, Safety, Security); Improving if a solution has not yet emerged

28. Mechanics Substitution, Str. IP (Pos.20):

- a. Replace a direct or manual action in, or for, EMITTER'S VOICE MESSAGE*, with a mechanical action or a tool.
- b. Replace a mechanical means in, or for, EMITTER'S VOICE MESSAGE*, with sensory (optical, acoustic, vibration, taste, smell, feelings or other sensory fields) means.
- c. Use mechanical, pneumatic, hydraulic, electric, magnetic, and electromagnetic, chemical, biological, psychological or other fields to improve action of EMITTER'S VOICE MESSAGE*.
- d. Change from static fields in, or for, EMITTER'S VOICE MESSAGE* to moving fields, from unstructured fields to those with structure, or vice versa.
- e. Use fields in conjunction with field-activated parts, components, or particles (e.g., magnetic field and ferromagnetic particles) in, or for, EMITTER'S VOICE MESSAGE*.

Separation principle for EMITTER'S VOICE MESSAGE* : Separation by condition

Solution strategy for EMITTER'S VOICE MESSAGE* : Improving attributes

7. Nesting/ Dispersing, Tac. IP (Pos.):

- a. Place EMITTER'S VOICE MESSAGE* fully or partially inside another object; place each object, in turn, fully or partially inside the other.
- b. Make one part of EMITTER'S VOICE MESSAGE* pass through a cavity in the other, or vice versa.
- c. If EMITTER'S VOICE MESSAGE* is nested with another object, and if necessary, apply a dispersing action.

Separation principle for EMITTER'S VOICE MESSAGE* : Separation in space / Separation in subsystem

Solution strategy for EMITTER'S VOICE MESSAGE* : Improving attributes

10. Preliminary Action, Str. IP (Pos.16):

- a. Perform the required change in, or for, EMITTER'S VOICE MESSAGE*, before it is needed (either fully or partially).
- b. Pre-arrange EMITTER'S VOICE MESSAGE* and other objects, if necessary, in such a way that they can come into action from the most convenient place and without losing time for their delivery.

Separation principle for EMITTER'S VOICE MESSAGE* : Separation in time

Solution strategy for EMITTER'S VOICE MESSAGE* : Improving attributes; Improving performance

CONTRADICTION BETWEEN NEEDS TO SATISFY N° 3

Parameter to improve 39. Productivity

MEJORAR > EMITTER'S VOICE MESSAGE tiene More Desired productivity to interact with S2

Parameter to preserve 35. Adaptability or versatility

PRESERVAR > EMITTER'S VOICE MESSAGE tiene más efecto deseable por párametro 35. Adaptability or versatility

Inventive principles IP(s) : [1,35,28,37]

1. Segmenting/ Integrating, Str. IP (Pos.2):

- a. Divide EMITTER'S VOICE MESSAGE* into existing and/or new parts, shapes, phases, states, or conditions.
- b. Integrate different parts, shapes, phases, states, or existing or new conditions of a EMITTER'S VOICE MESSAGE* into a single entity..
- c. Make EMITTER'S VOICE MESSAGE* easy to disassemble or assemble.

d. Increase or reduce the degree of fragmentation or segmentation of EMITTER'S VOICE MESSAGE*.
 Separation principle for EMITTER'S VOICE MESSAGE* : Separation in space / Separation in subsystem
 Solution strategy for EMITTER'S VOICE MESSAGE* : Improving attributes; Improving performance;
 Improving 7 quality factors (Quality, Reliability, Maintainability, Supportability, Human Factors, Safety, Security); Improving if a solution has not yet emerged

35. Transformation/ Parameter Changes, Str. IP (Pos.13):

- a. Change EMITTER'S VOICE MESSAGE*'s physical or chemical state (e.g., in shape, in composition, to a gas, liquid, solid or plasma).
- b. Change the composition or condition of EMITTER'S VOICE MESSAGE* by adding or removing components.
- c. Change the concentration or consistency; change the degree of flexibility; change the temperature or the level of internal activity of EMITTER'S VOICE MESSAGE*.

Separation principle for EMITTER'S VOICE MESSAGE* : Separation by condition / Separation alternative
 Solution strategy for EMITTER'S VOICE MESSAGE* : Improving attributes; Improving 7 quality factors (Quality, Reliability, Maintainability, Supportability, Human Factors, Safety, Security)

28. Mechanics Substitution, Str. IP (Pos.20):

- a. Replace a direct or manual action in, or for, EMITTER'S VOICE MESSAGE*, with a mechanical action or a tool.
- b. Replace a mechanical means in, or for, EMITTER'S VOICE MESSAGE*, with sensory (optical, acoustic, vibration, taste, smell, feelings or other sensory fields) means.
- c. Use mechanical, pneumatic, hydraulic, electric, magnetic, and electromagnetic, chemical, biological, psychological or other fields to improve action of EMITTER'S VOICE MESSAGE*.
- d. Change from static fields in, or for, EMITTER'S VOICE MESSAGE* to moving fields, from unstructured fields to those with structure, or vice versa.
- e. Use fields in conjunction with field-activated parts, components, or particles (e.g., magnetic field and ferromagnetic particles) in, or for, EMITTER'S VOICE MESSAGE*.

Separation principle for EMITTER'S VOICE MESSAGE* : Separation by condition

Solution strategy for EMITTER'S VOICE MESSAGE* : Improving attributes

37. Useful Perceptible Change , Oper. IP (Pos.):

- a. Use state, dimension or condition changes occurring to EMITTER'S VOICE MESSAGE*, because of a modification or application of an external or self-generated field, which is perceptible by and can influence to object (S2) with which it interacts.

The change may be permanent or variable in time.

(e.g., use field emissions, thermal expansion (or contraction) of materials, signals, etc.).

Separation principle for EMITTER'S VOICE MESSAGE* : Separation in time

Solution strategy for EMITTER'S VOICE MESSAGE* : Improving attributes

Anexo

List of applicable Inventive Principles for Innovation Solutions

IP.1. Segmenting/ Integrating	IP.21. Skipping/ Avoiding
IP.2. Taking out/ Adding	IP.22. Convert harm in benefit
IP.3. Local Quality	IP.23. Feedback
IP.4. Asymmetry/ Symmetry	IP.24. Intermediary

IP.5. Merging/ Separating	IP.25. Self-service
IP.6. Universality	IP.26. Copying/ Replicating
IP.7. Nesting/ Dispersing	IP.27. Cheap Short-Living Objects
IP.8. Anti-Weight/ Compensation	IP.28. Mechanics Substitution
IP.9. Preliminary Anti-action	IP.29. Controllable Soft Variables
IP.10. Preliminary Action	IP.30. Simple Shapes/ Ways to Interact
IP.11. Beforehand Cushioning	IP.31. 31.Using/ Removing Unused Parts
IP.12. Equipotentiality	IP.32. Perception/ Appearance/ Color Changes
IP.13. Reverse or Indirect Action	IP.33. Homogeneity / Compatibility
IP.14. Spheroidality - Curvature - Angle	IP.34. Discarding and Recovering
IP.15. Dynamics	P.35. Transformation / Parameter Changes
IP.16. Partial or Excessive Actions	IP.36. Phase, State or Condition Transitions
IP.17. Another Dimension or Field	IP.37. Useful Perceptible Change
IP.18. Mechanical Vibrations/ Energy Variations	IP.38. Strong or Quick Reactions
IP.19. Time-Varying Action/ Periodic or Pulsating	IP.39. Inert Atmosphere / Environment
IP.20. Continuity of Useful Action	IP.40. Composite Materials/ Conditions

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