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WTSP Report (5) Catalogs of TRIZ and Around-TRIZ Sites in the World: We Can Learn Full Scope of TRIZ-related Works in the World

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Abstract. World TRIZ-related Site Project (WTSP) is a volunteer-based international project working to build Catalogs of TRIZ and Around-TRIZ Websites in the World. It aims at creating a reliable information resource in the field of Creative Problem Solving Methodologies in general. We collect good websites widely and list the selected ones with brief or close annotations in categories. Starting in Dec. 2017, we built the Beta Edition of World WTSP Catalogs in 2020, which have good maintainable and extendible structure. We select websites using multi-aspect criteria, and grade them in 5 levels as: ◎ top about 30 sites, ○ next about 100, □ worthy in World Catalogs, △ worthy in Country Catalogs, and — not listed. We have recently re-visited the Around-TRIZ websites obtained by Internet surveys in 2019, and revised the Basic Catalog (with 30 ◎ sites and 143 ○ sites) and newly built the Extended Catalog (with 244 □ sites). On the other hand, WTSP World Catalogs of TRIZ Sites have been updated very little from the Beta Edition (with 23 ◎ sites and 39 ○ sites), while waiting for contributions of manuscripts from individual countries. We carried out Internet surveys of TRIZ sites in 52 individual countries, and detected 1200+ sites. For 40 (less active) countries of them, we selected 103 □ sites and 43 △ sites. For 12 other countries (including 6 TRIZ-active major countries) we detected 480 sites but not investigated them yet while knowing there must be many good TRIZ websites. Anyway, WTSP World Catalogs already have abundant reliable information of selected websites, and are certainly helpful for many professionals and users to study and apply TRIZ and Creative Problem Solving Methodologies in general.

Keywords: WTSP Project, World Catalogs of TRIZ Sites, World Catalogs of Around-TRIZ Sites, Guide to Good Websites

1 Introduction

1.1 Vision and Goals of the WTSP Project

This is the fifth report of the World TRIZ-related Sites Project (WTSP), which started in Dec. 2017 as a volunteer-based international project. (We operate, inside the website “TRIZ Home Page in Japan” [1], our Project base site [2] and our product platform [3] .) Its goal is to build Catalogs of TRIZ-related Websites in the World [3] as a reliable and useful information resource. The WTSP Catalogs are expected to be used openly and widely for learning, spreading, and promoting various methodologies which help people in the world to solve numerous difficult problems creatively or innovatively.

Scope of our WTSP Catalogs is ‘Creative Problem Solving Methodologies’ in general. We know that in the world there are various types and numerous numbers of documents concerning to such methods and their actual cases. However, the flood of information with large diversity and quantity ironically hides really useful information resources. So we want to collect good information/documents widely and show the selected ones in “Catalogs” with annotations.

We started the project in the community of TRIZ (Theory of Inventive Problem Solving) [4]. Besides TRIZ there exist many method such as Brainstorming, Lateral thinking, Value engineering, Six sigma, Lean and agile engineering, Project management, Design thinking, etc. etc. Since all of them have a common purpose to provide methods to solve difficult problems creatively, WTSP handles them together. WTSP Catalogs have two pillars: one is Catalogs of TRIZ Sites, and the other is Catalogs of Around-TRIZ Sites (Note this naming is tentative; we wish to change it when the wide field of our scope get some proper naming).

As the unit of information source, we have chosen Websites instead of webpages. Websites are units larger than webpages, papers, articles, patents, etc. while smaller than books, conference proceedings, journal volumes, paper repositories, etc. Websites usually represent a group of people with a common academic/business approach, and post a series of articles more or less in a systematic manner for many years, actively keeping them up-to-date. They are mostly free of charge and open access. In addition to typical documents of works, we want to include information about organizations, activities, information resources, etc. Websites are flexible to convey these various types of information and play important roles for the site owners to promote their business/job purposes.

Catalogs (of any topic) should fulfill the following three basic requirements:

- Req. 1: Collect good items (i.e. websites) widely, select them with evaluation, and show them in categories.
- Req. 2: Individual items should be introduced in a proper/fair manner briefly or closely and guide the readers/users to good items.
- Req. 3: It should be easy for users to find one or many items which match their current interest/needs inside the Catalog.

In each country people want to learn about websites operated and written (especially in their own national language) in their country before visiting many other websites

in the world. Thus it is natural to build Country WTSP Catalogs first and to integrate them into World WTSP Catalogs. The World Catalogs are useful to learn excellent works and websites of higher quality and wider scope.

1.2 Brief History of Building the World WTSP Catalogs

- (Dec. 2017) Nakagawa proposed WTSP as a volunteer-based international project, and got support by many TRIZ colleagues. [4]
- (2018) Five TRIZ leaders were invited as Global Co-editors and Nakagawa served as the Project Leader [5]. WTSP Catalogs in Japan was built as a pilot model. 80 members from 30 countries joined (or signed to join) WTSP at TFC2018. [6]
- (2019) Preliminary Edition of World WTSP Catalogs was quickly built [3]: TRIZ Sites (of ◎○ levels) having contributions of 4 countries (Japan, Malaysia, China, and Russian language region) and 2 internet surveys (World in English, USA). Around-TRIZ Sites (of ◎○ levels) having the results of 5 cases of internet surveys. Difficulty has become clear in forming country WTSP Teams to build Country Part of WTSP Catalogs. [7]
- (2020) Beta Edition was publicized [3]: World WTSP Catalogs for Print were also made in PDF to be downloaded and used in user's PC. WTSP was presented online at 4 International Conferences (MATRIZ, ETRIA, AI, and ICSI) and 1 domestic conference (Japan). [8]
- (2021) Nakagawa made Internet surveys of TRIZ-related sites in 52 countries individually [9]. Focus of the WTSP activities has been shifted from building Catalogs to promoting usage of Catalogs. [10][11][]
- (2022) Results of internet surveys of Around-TRIZ sites were refined to build the Catalogs of sites of ◎○□ levels[12]. Survey results of TRIZ-related sites in individual countries are checked and reported [9].

2 Structure, Function, and Usage of the World WTSP Catalogs

2.1 Evaluation and Description of Individual Sites in the WTSP Catalogs [13]

Evaluation of websites is a delicate-but-necessary step to decide whether to include them in the WTSP Catalogs (and at what level). We use the following multiple criteria, with the stance of finding strong positive aspects of individual sites.

- Quality (reliable, correct, novel, original, comprehensive, up-to-date, ...)
- Usefulness (resourceful, reference, handy, practical, ...)
- Attractiveness (interesting, easy-to-understand, illustrative, ...)
- Accessibility (open access, free/low charge, used by many, ...)
- Scope (scope of the theme/field, scope of activities, ...)

We grade the sites into the following 5 Levels, representing with the symbol marks. We must evaluate at least tentatively and should refine them later in some public reviewing.

- ◎ Most important (about top 30) in World Catalogs
- Important (about next top 100) in World Catalogs
- Worthy in World Catalogs,
- △ Worthy in Country Catalogs,
- Insignificant / irrelevant, not included in the WTSP Catalogs

Descriptions of individual sites are written in 4 levels of formats as follows:

- (0) Basic information for Indexing: Site Code, Site name, URL of site domain, Location (Country) of site (main office), Language(s) of site, Single-line description, and Roles of site. – Need to be written first by a surveyor/recommender and revised later by the site owner. To be used in categorizing and arranging the sites, shown in the Index table, and shown as the heading part of site descriptions.
- (a) (0) + Brief introduction in free format (about 3-15 lines). -- To be written by a surveyor/recommender, using excerpts of top pages, 'About us' pages, and some more main pages. To be used in the Site description part of the WTSP Catalogs.
- (b) Standard Site Description written in the WTSP Standard Form (in 1 page in A4). (0) + Application phases, Application fields, Methods, Description of introductions (in free format about 5-10 lines), (optional) Link to (c). – Should be written by the site owners. Mandatory for the ◎○ sites, desirable for the □ sites. Most of the items are to be answered with (ordered) multiple choices using the codes set in our Guidelines [13]. To be placed just below (a) and forms the main body of site introduction, to be used for users to understand the site. Users often scan some of the columns of their interest quickly to find good websites which match with their current interest.
- (c) (0) + Optional close site introduction in free format (2-10 pages or more in A4). – To be stored as a separate file inside the WTSP Catalog folder and accessed with a hyperlink from (b). Site owners are encouraged to write this introduction Useful and Attractive for users by using figures, photos, tables, etc.

Samples of these site descriptions exist a lot in the WTSP Catalogs. It is clear that main body of site introductions, i.e., mandatory (b) and optional (c), can be written not by surveyors but by the site owners themselves. Site owners would think them worthy of writing for promoting their thoughts and businesses. [14]

2.2 Structure of WTSP Catalogs at the Base Levels [13]

The structure of WTSP Catalogs, at the lowest level, is shown in Fig. 1.

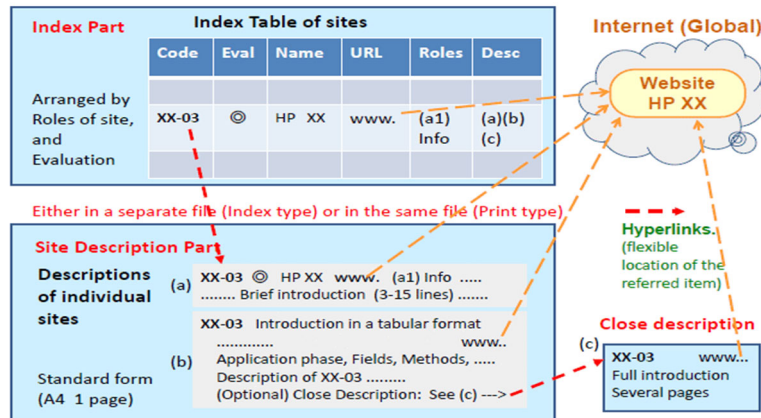


Fig. 1. Structure of a WTSP Catalog sample page from the viewpoint of a website.

The structure of WTSP Catalogs to be built by a Country Team or an Internet Survey is show in Fig. 2. By virtue of the flexibility of hyperlinks, the websites in the Index page can be arranged (and re-arranged) in various ways of categorization and ordering without any readjustment in the Site Description page. This structure is useful for making the WTSP Catalogs updatable, maintainable, and extendible.

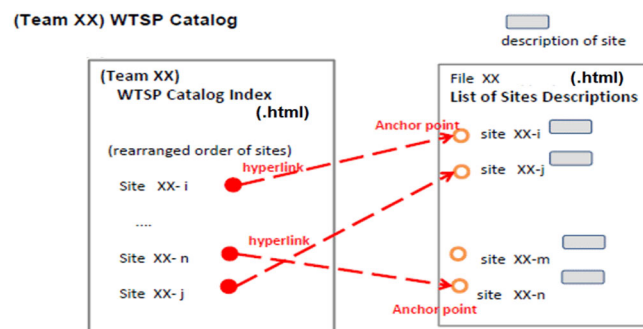


Fig. 2. Structure of a Country Part of the WTSP World Catalogs

2.3 Overall Structure of the WTSP World Catalogs [15]

Overall structure of the whole WTSP World Catalogs are shown in Fig. 3 from the view points of users. In the top page of the WTSP World Catalogs [3], various sets of Catalog Indexes can be accessed. Source Data Catalogs, shown in the left part, are composed of Index pages contributed by Country Teams and Surveyors and have hyperlinks for accessing to their corresponding Site description pages. In the middle and right parts of the figure, we have World Indexes and Catalogs in integrated forms.

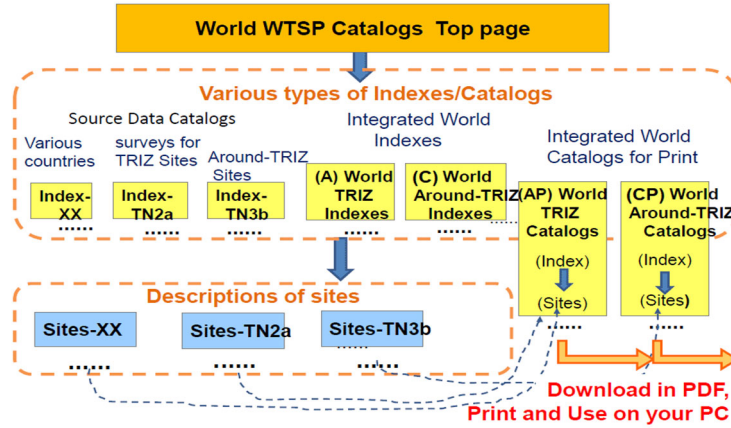


Fig. 3. Overall Structure of the WTSP Catalogs from Users' Viewpoints.

We have built a set of World Indexes and World Catalogs for Print, as shown in Table 1. The WTSP Catalogs [3] have two pillars: (A) Catalogs of TRIZ Sites and (C) Catalogs of Around-TRIZ Sites which cover a wider field of Creative Problem Solving Methodologies in general. For the sake of handiness, each pillar has 3 Catalogs containing specified level(s) of sites: Top Catalog (⊙), Basic Catalog (⊙○), and Extended Catalog (□). Each Catalog serves in two types: Index Type, where the site descriptions are stored separately and accessed interactively, and Catalog for Print type, which has the same Index part but the site descriptions are included in the Catalog file (in .html and .pdf) so that the Catalog may be downloaded, printed, and used interactively on user's PC.

Table 1. Full Set of WTSP World Indexes/Catalogs for Print.

Contents	Catalog name	Levels of Contents	Code name	
			Index type	Catalog for Print
(A) TRIZ sites	Top Catalog	⊙	(A1)	(A1P)
	Basic Catalog	⊙ ○	(A2)	(A2P) [16]
	Extended Catalog	□	(A3)	(A3P)
(C) Around-TRIZ sites	Top Catalog	⊙	(C1)	(C1P)
	Basic Catalog	⊙ ○	(C2)	(C2P) [17]
	Extended Catalog	□	(C3)	(C3P)

For building the Index part of World WTSP Catalogs, the Index parts of all the manuscript Catalogs are first merged into a large Index table (in Excel) with minor adjustment of the hyperlinks so as to reflect the change in folders. After checking and suppressing the duplications of sites, all the sites are sorted with respect to the Evaluation and the (main) Roles of sites (as shown later in Fig. 5).

The World Indexes thus obtained can be used smoothly in the interactive way of referring the site descriptions by clicking hyperlinks. Catalogs for Print [16][17], on the other hand, are convenient to browse/read the whole Catalog quickly to find sites of one's current interest. Catalogs for Print may be downloaded in PDF (while keeping the hyperlinks active), printed, stored, and used interactively on user's own PC, just as in the way of operating in the WTSP website. All these usage may be done freely without registration nor charge, while its copyrights are reserved by the WTSP Project.

3 Recent Revisions/Enhancement of World WTSP Catalogs

3.1 WTSP World Catalogs of TRIZ Sites: TRIZ Sites in Individual Countries

Since publicizing the Beta Edition (Nov. 2020), we received and posted the site descriptions of only several ☉ sites. Activities of WTSP Teams have not been reported from any country so far, to our pity.

In this situation, Nakagawa carried out Internet surveys of TRIZ sites in individual countries during May to Nov. 2021. Yahoo!Japan search engine was used with the option of limiting the target sites located in the specified country and the option of outputting only one webpage from any site. Key words of 'TRIZ OR "Systematic Innovation"' were typically used, while adjusting them to match the language of the country. Language in the target site was specified to be 'any'.

The Results of the surveys [9] are summarized in a tabular form in Fig. 4. Countries are shown in groups of regions and arranged alphabetically. 1200+ sites in total were detected in 52 individual countries in the world. For 40 countries among them, their 700+ sites were visited one by one to understand the sites and write brief introductions in the form (a). This work is often hard especially because of the language barriers even with the help of machine translation by Google Translator or later by DeepL. For each country, the number of detected sites is shown first. Then we list the number of TRIZ sites at the levels of \triangle (and higher). Next is the number of Around-TRIZ sites, which are detected with the keyword of TRIZ but are found to have very little description about TRIZ while much more about Creative Problem Solving in general. Note that in these two numbers, websites located in the country but operated globally are excluded (e.g., Wikipedia, Google Scholars, LinkedIn, YouTube, etc.). We found 103 TRIZ sites at the levels \square (and higher), but they are not included in the World Catalogs yet due to the missing of Roles of site information.

Reg	Country	Det.	TRIZ	Around TRIZ
A-Europe				
	Austria	26	4	0
	Belgium	22	Not Selected yet	
	Czech Republ	24	5	0
	Denmark	14	0	0
	Finland	21	5	0
	France	55	Not Selected; Many good.	
	Germany	68	Not Selected; Many good.	
	Greece	8	1	1
	Hungary	13	2	2
	Iceland	11	1	6
	Italy	50	Not Selected; Many good.	
	Netherlands	33	5	0
	Norway	4	2	0
	Poland	50	Not Selected yet	
	Portugal	15	4	1
	Romania	9	4	2
	Spain	27	7	8
	Sweden	19	Not Selected yet	
	Switzerland	21	6	4
	UK	39	Not Selected; Many good.	
B-Russian				
	Russia	Already shown.		
C-MidEast				
	Iran	64	6	0
	Israel	24	4	3
	Turkey	27	9	1
D-Asia				
	Bangladesh	3	0	0
	China	Already shown.		
	Hong Kong	16	5	8
	India	45	5	10
	Indonesia	37	9	1
	Japan	Already shown.		
	Korea	72	Not Selected; Many good.	
	Malaysia	Already shown.		
	Pakistan	11	3	4
	Philippines	11	0	2
	Singapore	15	7	3
	Sri Lanka	6	Not Selected yet	
	Taiwan	45	Not Selected; Many good.	
	Thailand	31	Not Selected yet	
	Vietnam	24	11	1
E-Oceania				
	Australia	23	Not Selected yet	
	New Zealand	7	3	1
F-N America				
	Canada	30	1	3
	USA	Already shown.		
G-CS America				
	Argentina	10	1	4
	Bolivia	6	0	3
	Brazil	41	6	1
	Chile	12	1	5
	Colombia	19	2	7
	Costa Rica	12	3	3
	Mexico	23	4	0
	Nicaragua	6	0	1
	Peru	13	2	2
	Uruguay	7	1	1
H-Africa				
	Egypt	8	2	0
	Kenya	6	2	0
	Morocco	13	7	1
	South Africa	9	6	0
Total		725	146	89
Total (Not Sel.)		480		

Fig. 4. Numbers of TRIZ and Around-TRIZ Sites found by the Internet Surveys in Individual Countries in the World.

The survey results of 12 other countries are posted as raw data without further studies and selection yet. The countries include most active TRIZ players (e.g., France, Germany, Italy, UK, Korea, and Taiwan), where many good websites are known in operation. We believe the TRIZ community in such a country can build its Country WTSP Catalogs of TRIZ Sites (as an extension of this survey) much better than any foreign surveyors.

We should also note that 5 other countries (i.e., Japan, Malaysia, China, Russian language countries, and USA) posted their data in Sept. 2019 and it is the time we should update and enhance them.

3.2 WTSP World Catalogs of Around-TRIZ Sites : Extended Catalog (□)

Internet surveys of Around-TRIZ sites were carried out by Nakagawa in 2019 [7]. In the 5 cases of survey, following sets of keywords were used.

- Creative Think Method
- (Creative / innovative / Systematic) Problem Solve (Method / Process / Technique)
- Innovation (Process / Strategy / Method / Management / Technology)
- (Quality / Value / Cost / Productivity) (Deploy / Engineering / Management / Control / Analysis) (Method / Technique / Theory / Process / "Case Study")
- (Patent / IP / "Intellectual Property") (Analysis / Protect / Circumvent / Mapping / Strategy)

He detected nearly 1000 sites, visited them one by one, wrote brief introductions in the form (a) with categorization and evaluation, integrated them into the World Catalogs, and finally publicized the WTSP Catalogs of Around-TRIZ Sites in the World (©○) in 2019.

During Mar.-Jun. 2022, Nakagawa re-visited all these Around-TRIZ websites again to revise the brief introductions, especially in Roles of site and in Evaluation, and newly built and publicized the Extended Catalog (□) of World Around-TRIZ Sites [12]. The results are summarized in a tabular form in Fig. 5.

(Main) Role of site	WTSP World Catalogs (A) TRIZ Sites (2020)			WTSP World Catalogs (C) Around-TRIZ Sites (2022)		
	◎ Most Important	○ Important	□ World Worthy	◎ Most Important	○ Important	□ World Worthy
	(a) Information sending sites	9	4		8	19
(b) Promotor organizations	5	4		3	8	6
(c) Public organizations	1	1		3	10	24
(d) Academia	0	0		2	20	33
(e) Developer organizations	5	8		5	36	84
-- (e5) Training organizations	2	7		0	9	19
(f) Publisshing organizations	0	6		4	17	13
(g) Information sharing	1	7		5	12	21
(h) User organizations	0	2		0	12	27
(i) Personal	0	0		0	0	5
(Total number of sites)	23	39		30	143	244

Fig. 5. Numbers of TRIZ and Around-TRIZ Websites in the Current WTSP World Catalogs

The numbers of websites included in the current WTSP World Catalogs [3] are listed in Fig. 5, classified with their Roles of sites and Evaluation. The right side part shows Around TRIZ sites, newly publicized according to the present paper. The left side part, on the other hand, shows TRIZ sites which are posted currently, reflecting very minor updates of the Beta Edition (Nov. 2020). While the sites of Around-TRIZ are listed thoroughly, those of TRIZ are apparently fewer at the ◎○ levels and missing at the □ level. This reflects the lack of manuscript contributions from many TRIZ active countries as mentioned above.

4 What We Can Learn with the WTSP Project/Catalogs

4.1 What We Can Learn with the WTSP World Catalogs

In our WTSP website [2] inside “TRIZ Home Page in Japan” [1], you now can see/use the following Catalogs of the World WTSP Catalogs [3]:

- TRIZ sites: (A1) Top Catalog (◎), (A2) Basic Catalog (◎○), and (A1P)(A2P)

- Around-TRIZ Sites: (C1) Top Catalog (◎), (C2) Basic Catalog (◎○), and (C3) Extended Catalog (□), and (C1P)(C2P)

The sites listed at the ◎○ levels are essentially the same as those in the Beta Edition; we omit showing them here again. Some of the points we can learn with these TRIZ and Around-TRIZ Catalogs are:

- There are a large variety of websites in their Roles of sites and in their methods/approaches. Inside TRIZ, for example, we have Classical TRIZ approaches (mostly technological, some pedagogical, etc.), extended TRIZ approaches (for applications to business/management, software/IT, bio-engineering, future predictions, etc.), modernized TRIZ approaches (reforming the framework and proposing new ones, adopting and integrating with some other methodologies, etc.). These different approaches are developed by consulting firms and academia, presented in conferences/journals/websites, posted in the websites for dedicated for information sending (mostly by consulting firms and academia groups), and taught/trained in open/closed lectures/seminars/webinars, etc. We all (professionals/practitioners/ users in TRIZ) can learn essence of these different approaches and adopt and use some suitable ones while keeping our knowledge up-to-date as much as possible.
- The fields of Around-TRIZ are much wider than TRIZ. There are a larger variety of methodologies, having complex history of development, intended to use in different application areas/application phases, sometimes overlapping and some other times competing, etc. Under such diversity, however, there seem some representative website(s) exist in each methodology/approach; and our WTSP Catalogs of Around-TRIZ Sites hopefully have listed such representative websites with evaluation ◎○. (We should, of course, improve much the WTSP Catalogs by getting collaboration of many people in the communities of such wide fields.)
- Large number and diversity of websites in the Catalogs have one serious demerit, i.e., being hard for ordinary users/beginners to learn good and easy websites. We should be careful in evaluating websites from multiple criteria including this point, and in introducing various websites with such criteria. Short articles for introducing/recommending good and attractive websites in the WTSP Catalogs may be useful in various specific viewpoints.
- There are a lot of posting about methodologies and their application procedures in the websites, in the forms of papers, articles, lectures, movies, (free or paid) online courses, etc. Thus people in any country/company/school (even in countries with little TRIZ activities yet) have good chances to learn TRIZ and related methodologies through various websites recommended in the WTSP Catalogs.

4.2 What We Learn with the WTSP Project

Our WTSP Project has been working step by step on a volunteer basis for building the WTSP Catalogs to fulfill the basic 3 requirements for Catalogs (see 1.1). Here we note what we learned and what we wish to do with the WTSP Project.

- First we should review our current WTSP Catalogs with respect to the Basic 3 Requirements:
 - Req. 1: Collecting/evaluating/showing the sites: The scheme, process, and actual practice for these work have been developed at a reasonably high level, but they lack the real activities of such a practice in many (including most active) countries.
 - Req. 2: Introduction of individual sites: Four forms of introduction are specified: (0)(a)(b)(c). All the sites in the Catalogs have introductions (0)(a). Form (b) is mandatory, but is written only for a few tens of sites. Form (c) is optional, and is written only for several sites. Forms (b)(c) need to be written by the site owners, especially (b) for usefulness and (c) for attractiveness.
 - Req. 3: Searchability: Evaluation and Roles of site are used for categorizing and arranging the sites, and helps for better searchability. For improving further, inputs of single-line introduction in Form (0) and full description in Form (b) are desirable. Besides, some search mechanism for finding sites by using Site name and many other keys in Form (0) and (b) is necessary to be installed.
- The review results show the necessity of collaborative work for collecting good websites in various countries (by forming Country WTSP Teams) and individual yet collaborative work for site owners to write the introductions (b)(c) of their own sites. [14]
- We have been reporting and posting our WTSP activities [3] and sending communication letters to our about 200 supporters to ask for their collaborative work. However, the problem “many people support and join the WTSP Project, but few of them actually work for it” still remains even now from the start of the Project. Our measures have been (1) showing our vision clearly and making good prototypes, examples, and guidelines, and (2) dividing the jobs into small easy tasks which are capable for individual persons to achieve in parallel. We have been concretizing these measures steadily, and we now wish a number of people in the TRIZ (and related) community to voluntarily work together with us. [11]
- The history of WTSP pushes us to recognize the insufficiency of collaboration in the TRIZ community not only in the global scale but also in the domestic scale in a number of active countries.

4.3 Discussion on Referee’s Comments

Aren’t there others’ works to refer?. -- There are various types of websites/webpages/books which list a (large) number of items (e.g., products, papers, organizations, websites, etc.) with/without annotations. But they are not good prototypes for us. For example:

- List of Links (or URLs) to relevant websites (of organizations) -- often a limited scale, without annotation

- Catalogs of books/papers in a library/repository -- a large number of items, usually without evaluation
- Websites of e-Commerce of various items – different items coming from many sellers, with possible evaluation through the customers’ feedbacks
- Catalogs of selected restaurants – often in a limited type and location of restaurants,
- List of Best 100 websites in the world – ranked with the number of visits/visitors
- Handbook of (100) methods/tools for creative problem solving – articles written by each professional, without further evaluation

What we wanted to find is:

- Catalogs of websites in some (academic/industrial) area in the world – not limited to a narrow area, not limited to a small number of countries, selected with clear evaluation criteria, containing various types of websites (in respect to theories/applications, papers/patents/books, (academic/industrial/public/user) organizations, activities, etc.).

But we have never met such an example in our internet surveys (in the scope of WTSP Catalogs and much wider) nor in the response from many followers/readers of the WTSP project. Hence we made self-citation only, with no reference to other prototypical works.

What is the basis of your websites evaluation criteria (Section 2.1)? -- We started with the more-or-less standardized criteria for reviewing academic papers, and adjusted them for evaluating websites in our project. We recently recognize Google’s Webmaster Guidelines for rating websites [18]. Its rating criteria are, in short:

- Needs met -- taking account of different needs of different users and also different purposes of websites
- Page quality, especially E (Expertise) – A (Authoritativeness) - T (Trustworthiness) of the page authors and website organization – these are mostly evaluated with meta-data of the page,
- Usability – including usability in mobile devices and for handicapped persons

Since Google deals with a huge variety of websites used by numerous people in the world, their criteria are rather vague. Here are some points of our Criteria:

- Needs met: Our purpose is reflected in the Scope (scope of the theme/field, theories/applications/activities, etc.)
- Page quality: Our criteria in this regard (Quality) are clearer and more academic, because we deal with methodologies and their applications. Reflecting practical sides of websites, we put more weights on Usefulness and Attractiveness in comparison with the academic review criteria.
- Usability: Our criteria include Accessibility (open access, free/low charge) and Attractiveness. In this context, we prefer open access websites/webpages

to (costly) books, and prefer open free webpages to consultants' hidden documents/stories of methods/tools/case studies. At moment we do not include the usability in small-screen mobile devices nor usability for handicapped persons, while assuming the ordinary use in PCs and tablets.

How do you actually grade websites with the criteria?. -- We use the multiple criteria so as to find strong points of the website depending on their nature/purposes. For example, a webpage describing a new approach in TRIZ method is evaluated with the criteria suitable for academic papers, a web page reporting an application of TRIZ to a manufacturing problem with the criteria suitable for technical/practical documents, an introduction of TRIZ way of thinking for children with the criteria adjusted for educational texts, and so forth.

Grading into 5 levels is done on the basis of experts' experiences. ◎ for top (about) 30 sites, and ○ for next (about) 100 sites. Once we have some examples of ◎○ sites, we may set other websites at the grade similar to them. Websites working in multiple countries or worthy of being known in the world (but not at the level of ○) are graded as □. Websites working in a country and not so unique in the world level are graded as △. All these grading is tentative and under possible revisions. We should have some mechanism of public review or users' feedback in future.

What is the basis of your description of Basic Requirements of Catalogs (Section 1.1)? – The 3 Requirements were obtained through observation and discussion in our WTSP Project. You may think of any Catalog, for instance Michelin Catalog of Restaurants. You may easily guess what would happen if an excellent restaurant is missed, if a poor restaurant is included at a high rating, if introductions of restaurants are described in an unfair manner due to bribe or not, if you want to find a good Japanese sushi restaurant among 200 restaurant in the Catalog without proper categorization, etc. We think the 3 Basic Requirements of Catalogs are now well defined.

Categorization of Catalogs seems too detail (especially in the Abstract). – As you see in Fig. 5, we now have 400+ websites listed in the WTSP World Catalogs of Around-TRIZ sites, and we will probably have 300+ websites in the Catalogs of TRIZ sites. Listing so many websites together in each Catalog is not easy for users to read/handle and not easy for the developers to build and maintain. Thus we made Top Catalog listing about 30 ◎ Most important sites only. Basic Catalog having about 30 ◎ sites and about 100 ○ Important sites together is supposed to be most useful for users. Then, 200+ websites □ Worthy in the World Catalogs are listed separately in Extended Catalog in order to keep handy for users and easy to update for developers.

History of developing the WTSP Catalogs is described in the Abstract and in the text by using the numbers of websites in these categories/grades. Such numbers can vividly tell how far our WTSP project has come. It is clear that Catalogs of TRIZ sites are far behind those of Around-TRIZ sites.

Access Statistics available?. – Access counters to the WTSP Catalogs are not installed yet. We guess the accesses are less than we expected at the present stage. Please come and read/use the WTSP Catalogs! They already have abundant useful information!!

5 Concluding Remarks

The WTSP Project has built and publicized the WTSP Catalogs of TRIZ Sites and Around-TRIZ Sites in the World as a reliable information source in the field of TRIZ and Creative Problem Solving methodologies in general. The current status of the WTSP Catalogs is summarized in Fig. 5. The Catalogs of Around-TRIZ Sites are well developed by using the results of Internet surveys, but the Catalogs of TRIZ Sites are now only partially done, while missing many good websites from TRIZ-active countries and not yet containing websites in the □ level. We should overcome these weak points by some voluntary team work in the TRIZ community in individual countries and by the contributions of individual site owners in writing their own sites. Overcoming these difficulties, we hope to publicize the Third Edition of World WTSP Catalogs by the end of 2022.

The WTSP World Catalogs [3] already have abundant and selected information, and are publicly posted for ready to be read/used. Please use them fully for your jobs/works/studies.

One specific point Nakagawa noticed: In the TRIZ community there are a number of international associations/conferences and many good websites operated by individual consulting firms and academic groups, but there exists no ‘representative’ place where good TRIZ works are coming from various groups in the world to be published regularly. The TRIZ Journal served as the leading journal for promoting TRIZ in the early stage, but not in recent years. A new website, so to speak “Systematic Innovation Review”, is anticipated to be established and operated by some solid international collaboration in the global TRIZ(-related) community.

References

1. Nakagawa T. (editor), Website “TRIZ Home Page in Japan” (in English), (abbreviated here as *eTHPJ*), <https://www.osaka-gu.ac.jp/php/nakagawa/TRIZ/eTRIZ/>, established on Nov. 15, 1998.
2. Nakagawa, T. (editor), Website of World TRIZ-related Sites Project (WTSP), *eTHPJ/eWTSP/*, established in Dec. 2017.
3. Nakagawa, T., World WTSP Catalogs: Top Page, *eTHPJ/eWTSP/eWTSP-WorldCatalog/eWTSP-World%20Catalog-World/World-Catalog-TopPage.html*
4. Nakagawa T., World TRIZ Sites Project: Its Plan and Invitation: Volunteer Project for Connecting TRIZ Sites in the World, Dec.. 9, 2017, *eTHPJ/eforum/e2017Forum/ eNaka-WorldTRIZSitesProject2017/eNaka-WTSP-Invitation-171207.html*
5. Nakagawa T., Mann D., Orloff M., Dewulf S., Litvin S., Souchkov V., WTSP Appeal: An Appeal for Building Catalogs of TRIZ-related Sites in the World , Jun. 25, 2018, *eTHPJ/eWTSP/eWTSP-B2-News2018/eWTSP-News2018-Appeal-180625.html*

6. Nakagawa T., Mann D., Orloff M., Dewulf S., Litvin S., Souchkov V., World TRIZ Sites Project (WTSP) for Building and Maintaining Global Catalogs of TRIZ-related Web Sites, Summary slides of ETRIA TFC2018 presentation; Nov.11, 2018, *eTHPJ*/epapers/e2018Papers/eNaka-WTSP-TFC2018/eNaka-WTSP-TFC2018-Summary -4P-181023.pdf
7. Nakagawa T., Mann D., Orloff M., Dewulf S., Litvin S., Souchkov V., World TRIZ Sites Project (WTSP) (2): To Build Catalogs of TRIZ-related Web Sites in the World, Presented at ETRIA TFC 2019, held on Oct. 9-11, 2019, at Marrakech, Morocco; DOI: https://doi.org/10.1007/978-3-030-32497-1_40; *eTHPJ*/epapers/e2019Papers/eNaka-WTSP2-ETRIATFC2019/eNaka-WTSP2-ETRIATFC2019-191016.html
8. Nakagawa T., Mann D., Orloff M., Dewulf S., Litvin S., Souchkov V., World TRIZ-related Sites Project (WTSP)(3): World WTSP Catalogs of TRIZ and Around-TRIZ Sites: First Edition (2019) and Its Further Enhancement, ETRIA TRIZ Future Conf. 2020, held online at Cluj-Napoca, Romania, on Oct. 14-16, 2020: *eTHPJ*/eWTSP/eWTSP-B4-News2020/eWTSP-Presentations2020-WTSP3/eWTSP-Presen-ETRIA-TFC2020-WTSP3-201106.html
9. Nakagawa, T., Current Status of the Survey Results of WTSP World TRIZ Sites, and Overview of Deployment of TRIZ in the World, Nov. 20, 2021, *eTHPJ*/eWTSP/eWTSP-B5-News2021/eWTSP-News2021-Results-Surveys4th-211118.html
10. Nakagawa T., Mann D., Orloff M., Dewulf S., Litvin S., Souchkov V., World TRIZ-related Sites Project (WTSP) (4): World WTSP Catalogs of TRIZ Sites and Around-TRIZ Sites, Let's Make Them Attractive and Useful!, Presented at ETRIA TFC 2021, held on Sept. 22-24, 2021, at Free-Universitstiy of Bozen-Bolzano, Italy, Online; DOI: ; *eTHPJ*/eWTSP/eWTSP-B5-News2021/eWTSP-Appeal-ETRIATFC2021-210927.html
11. Nakagawa T., Mann D., Orloff M., Dewulf S., Litvin S., Souchkov V., WTSP Appeal 2021: World WTSP Catalogs of TRIZ Sites and Around-TRIZ Sites, Let's Make Them Attractive and Useful!, Sept. 24, 2021, *eTHPJ*/eWTSP/eWTSP-B5-News2021/eWTSP-Appeal2021-ETRIATFC-210924-Slides.pdf
12. Nakagawa, T., WTSP Catalogs of (C) Around-TRIZ Sites in the World are Revised and Extended, Jun. 3, 2022, *eTHPJ*/eWTSP/eWTSP-WorldCatalog/eWTSP-World%20Catalog-World/World-C-AroundTRIZSites-Catalogs.html
13. Nakagawa T., WTSP (A4) Guidelines for Building World WTSP Catalogs, Nov. 20, 2020, *eTHPJ*/eWTSP/eWTSP-A4-Guidelines.html
14. Nakagawa, T., Mission and Philosophy of WTSP (Aug. 2021), Aug. 16, 2021, *eTHPJ*/eWTSP/eWTSP-A1-Mission&Philosophy-2108.pdf
15. Nakagawa, T., Introduction to World WTSP Catalogs of TRIZ Sites and Around-TRIZ Sites, Jan. 24, 2022, *eTHPJ*/eWTSP/eWTSP-B6-News2022/eWTSP-WorldCatalogsIntroduction-220123.html
16. Nakagawa, T., (A2P) World TRIZ Sites Basic Catalog (©○) for Print, *eTHPJ*/eWTSP/eWTSP-WorldCatalog/eWTSP-World%20Catalog-World/World-A2P-TRIZBasic-Catalog-PDF.pdf
17. Nakagawa, T., (C2P) World Around-TRIZ Sites Basic Catalog (©○) for Print, *eTHPJ*/eWTSP/eWTSP-WorldCatalog/eWTSP-World%20Catalog-World/World-C2P-AroundTRIZBasic-Catalog.html
18. Google, Webmaster Guidelines, <https://developers.google.com/search/docs/advanced/guidelines/webmaster-guidelines>, last accessed 2022/7/5.