Proposal of the Structure of the WTSP Database System for the World TRIZ-related Sites Project (WTSP)

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Summary:

Our WTSP project has been working to survey useful and important TRIZ-related Web sites in the world and to accumulate the descriptions of individual sites. And we now expect several hundred of sites to be included in the World WTSP Catalogs and even more in various Country WTSP Catalogs together.

Thus we need to consider and design how widely we should include various TRIZ-related sites, what kind of criteria we should use in selecting and evaluating the sites, how we can classify and arrange such sites in our Catalogs, etc. Furthermore, our questions are: what are the desires of users who would use our WTSP Catalogs? and how can we provide our Catalogs in the form suitable for the users?

Considering these questions, we get the following findings:

(a) People want to find useful/reliable TRIZ-related Web sites from various aspects of their own interests.

(b) Such aspects may include: Location country, Description language, Type or role of the site, Application phase, Application fields, Methods, Importance and evaluation of sites, etc.

(c) Users sometimes want to have a limited number of recommended sites by their input of queries, while some other times to take a close look of Catalogs of many recommended sites arranged in some systematic manner.

(d) Categorization and ordering of sites need to be done in various ways as the users specify in their own ways of using multiple aspects. Thus the WTSP system should be flexible to output the sites in any specified and hierarchical ways of categorization and ordering.

(e) For responding such users' inquiries, individual sites need to have information concerning to such various aspects.

(f) And for making the site information consistent, the scheme of categorization in each aspect should be set beforehand, in a way systematic yet practical for actual use.

(g) For making the overall WTSP system flexible and easy to maintain, we assume a flat database of individual site descriptions and a flexible and powerful system for handling multiple categorization schemes to set up the indexes of sites as specified by the users.

(h) Thus, we should build the WTSP Database System, where the Database Indexing System serves at the core to handle multiple sets of Indexing Schemes for displaying the data of the WTSP sites according to the user's specification while keeping the database of the WTSP TRIZ-related sites stable.

(i) In this manner, once the WTSP Database System is built, the WTSP project may concentrate its efforts for surveying the sites, describing their introductions, registering them, and update them whenever necessary.

(j) According to this proposal, the WTSP Catalogs we originally planned turn into handy and powerful WTSP Database System of referring to the TRIZ-related Web sites (in a wider sense) in the world. It can be used on-line for referring sites and for generating customized WTSP Catalogs and also off-line for making standard sets of WTSP Catalogs at the World and Country levels.

The proposed structure of the WTSP Database System is illustrated in Fig. 1, and is explained in the text below.

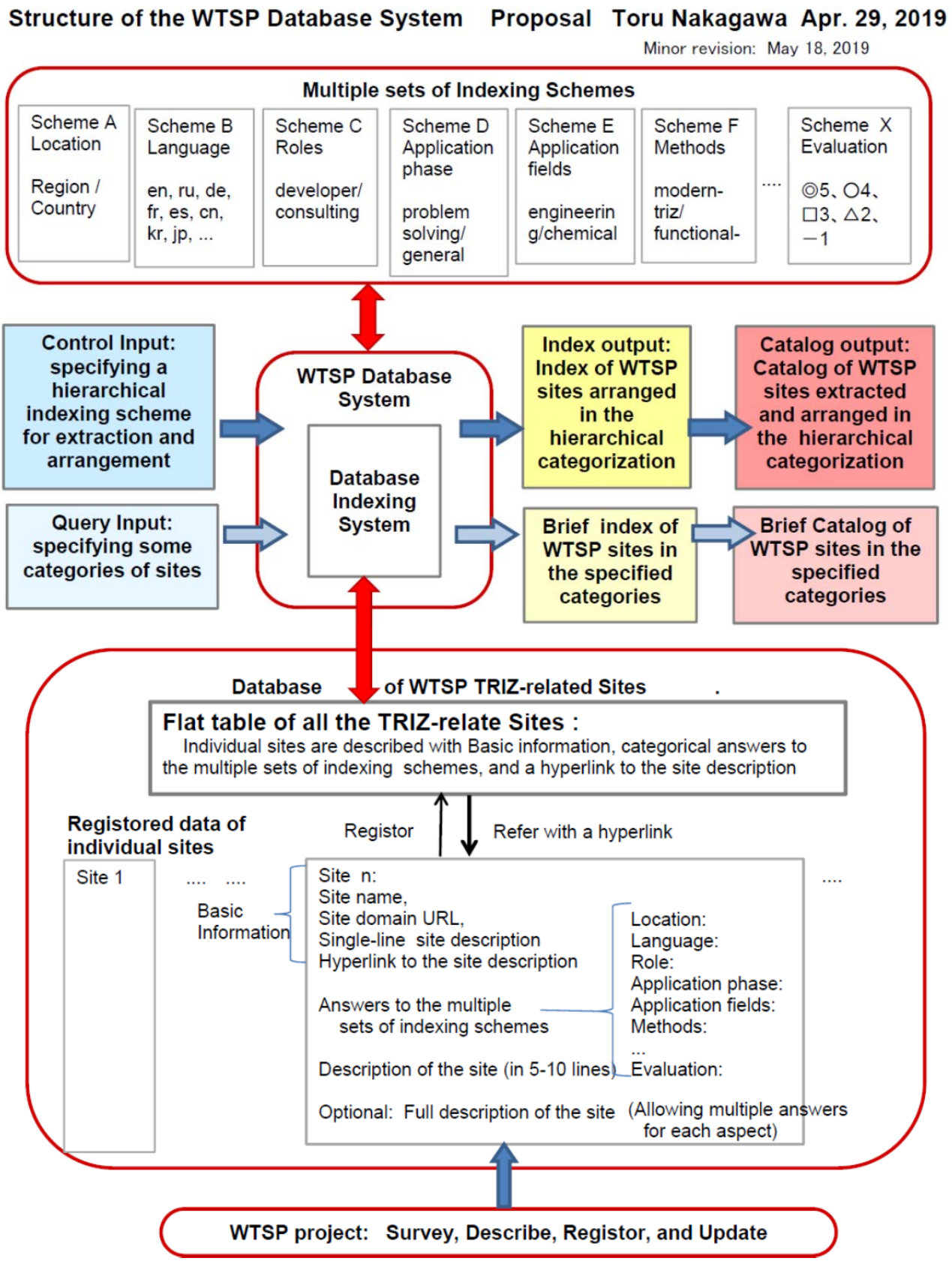
Table of Contents:

Note: Files attached

1. Overall Structure of the WTSP Database System

See Fig. 1 Structure of the WTSP Database System
(Proposal by Toru Nakagawa Apr. 29, 2019; Minor revision May 18, 2019)

Ref. eWTSP-WTSP DB System Structure-190518.pdf



2. Multiple Sets of Indexing Schemes

Indexing Scheme means a system of categories in one aspect of users' interest.

We should have multiple sets of Indexing Schemes corresponding to various aspects from which users want to see. We should set up such aspects independent from each other and covering most of users' needs as the whole.

In each aspect, we should have a system of categories (or answers to users' questions) in which we can characterize and classify the individual sites. Each category should be clear in the meaning, should be distinguishable from other categories, while all the categories as a whole can cover the full range of views in the aspect.

A flat system of categories, i.e., a single level of category system, is easier to handle. However, using sub-categories is often useful for practice, for characterizing the sites in some more detail or for grouping some sub-categories into a category. Two-level category system is often needed/used in practice.

Defining the aspects and defining the system of categories in each aspect appropriately are very important. If such definitions are poor or instable, it is difficult for us to characterize individual sites properly; any mistakes (due to misunderstanding) and any changes afterward would cause a lot of confusions in building the WTSP Database and in using the outputs of the WTSP DB System.

We should always be prepared for multiple answers by individual WTSP sites and also missing answer.
For example, the aspect of Location Country and aspect of Description Language for a site seem to be clear and unique, you may think. But various sites are operated in multiple countries and in multiple languages (e.g., Amazon sites in many countries and in different languages in each site, a consulting firm working in many countries, an international conference held at different countries year after year, etc.). The site location is sometimes not shown explicitly (e.g., domain names with .com and @google.com can be used by any site located at any country in the world.

Multiple answers of each aspect are more common in the cases of aspects of Roles of sites, Application phases, Application fields, and Methods. For example, a Web site is operated by a TRIZ developer company who develops software tools, develops new methods, gives seminars and consultations, delivers TRIZ information actively and publicly, teaches at universities, etc. Thus the Web site has multiple answers to the question of Roles of the site.

With all these understandings, the present proposal has defined the Multiple sets of Indexing Schemes. Their main concepts are shown in Table 1, while their full details in the .xlsx file attached :
eWTSP-IndexingSchemes-190518.xlsx **.**

Table 1. Concepts of Multiple sets of Indexing Schemes
See details in eWTSP-IndexingSchemes-190518.xlsx .

Scheme	Aspect	Note
Scheme A	Location	The 'Location' intends to locate the site in terms of countries, in the form of Region-Country. Use the Country code which are used to specify URL. Should be prepared for multiple answers and missing answer.
Scheme B	Language	Language(s) used in the site itself are to be shown here. Multiple answers should be expected in this scheme, because some sites are operated in multiple languages.
Scheme C	Roles	Roles of the sites (or roles of the site owners) are to be shown here. Multiple answers need to be expected both in the main categories and in the sub-categories.
Scheme D	Application phases	Along the process of problem solving (in a general sense), the phase(s) of interests are to be shown here. Answers may be generic or specific. Multiple answers need to be expected both in the main categories and in the sub-categories.
Scheme E	Application fields	Fields of application are categorized here. Answers may be generic or specific. Multiple answers need to be expected both in the main categories and in the sub-categories.

Scheme F	Methods	Various methods to be applied in each stage of problem solving. Methods are listed here in generic terms instead of names of individual methods. Answers may be generic or specific. Multiple answers need to be expected both in the main categories and in the sub-categories.
Scheme X	Evaluation	Final evaluation of individual sites are shown here in the 5 grades. The answer should be either one of the 5 grades shown in the 'Main-category column'.

All the details of these Indexing Schemes should be discussed further and revised as soon as possible, because they have to be used in the description of individual sites.

3. Description of Individual Sites

Description of individual sites is the source document for our WTSP Catalogs (or WTSP Database System), and the WTSP project members pay most of their efforts for surveying Web sites worthy/suitable to include in our system and for describing them appropriately.

Thus specifying how to describe individual sites is very important in our project.
We need to think about how to describe site during our early stages of survey/evaluation/description/editing process and during the later stages of registration/usage process in the WTSP Database System.

In the earlier stages, i.e., while surveying, evaluating, describing, and editing process, we would like to describe individual sites in an easy and relaxed way, adding information step by step as we understand the site and recognize the importance of the site in our WTSP Catalogs. We should note that at these stages many people are working in parallel, more or less separately, with multiple survey results. Thus using our Bitrix24 platform, i.e., a groupware system where many people can work in parallel on Cloud, must be a good choice.

On the other hand, at the final stages, i.e., registering and using the described sites in our WTSP System, we should have thorough information about the individual sites described in a fixed/standard format. For the integrity of the WTSP Database System, some WTSP members should construct/maintain and operate the database of the sites consistently.

3.1 Description of Individual Sites at the early stages

The information we need to have for each site is described in an informal way in Fig. 1. The contents of information about the sites we need in the earlier stages are explained in Table 2. of site description. Such information, however, may be written in a relaxed format (such as in the MS Word) and may be added/refined step by step.

Table 2. Contents of information to be described about Individual Sites in the earlier stages

Main items	**sub-items**	**explanation**
(1) Basic Information	Site name ##	Name or title of the site as given by the site owner
	Site domain URL ##	URL of the site domain, for accessing in the Internet
	Single-line site description #	Desirable to write for complementing the site name
(2) Answers to the Indexing Schemes	A. Location ##	Country of the site location. Sometimes multiple locations. Sometimes unknown.

(See details in eWTSP-IndexingSchemes-190518.xlsx)	B. Language ##	Language used in the site. Sometimes multiple languages.
	C. Role ##	Roles of the site/site owner. Maybe multiple answers. Desirable at the early stage.
	D. Application phase #	Phases of problem solving (in a general sense). May be filled later.
	E. Application fields #	Fields of application/work. May be filled later.
	F. Methods #	Methods applied in various phases. May be filled later.
	X. Evaluation ##	Desirable to evaluate in the early stage of surveying, because we want to make more efforts on highly- evaluated sites instead of poorly-evaluated ones. Some relaxed ways of writing uncertain/tentative/intermediate evaluation are acceptable in practice.
(3) Description of the site	#	Brief introduction of the site, in 5 - 10 lines, in a free format. Answers in (2) can support (3).
(4) Full description of the site	(#)	Optional. Desirable only for highly evaluated sites. Getting support by the site owner may be desirable.
(5) Information source	Tentative site code ##	For identifying the site in some survey report. May be written in any style.
	Author and date ##	The person responsible for this site description, and date of description
	Description note #	Write about the stage of description/revision, and any remarks for future work, etc.
	Source file #	Show the document (such as the file name) which contains this description.

Note: ##: Must describe this item, at the early stage of describing.
#: Must describe this item, possibly at some later stage of describing
(#): Optional. Desirable only for highly evaluated sites.

3.2 Description of Individual Sites at the Editing stage just before Registration in the WTSP DB System

For the purpose of reliable and consist site descriptions inside the WTSP Database System, we have to edit the description of individual sites in the standard format. This editing process must be done by WTSP members instead of the computer software. The manuscripts of site descriptions, sometimes written by different persons on the same site, should be edited into a final revised form for the registration. Thus the work need to be done by persons who would visit the site, can read the site sometimes written in languages other than English, and have enough background knowledge to evaluate the usefulness and importance of the site. This means the necessity of collaboration by many people in the WTSP project.

The Site Registration Form to be filled in at this stage is shown in the PDF file attached, even though the original file is Excel. Since the contents and the style of the Form are essentially the same with those of Table 2, the Form is not shown here.

This process of filling in the Site Registration Form should be supported by an Input assistant system which may help coding the data (such as the Answers to Indexing Schemes) correctly. For example, when the editor select an Answer to Indexing Scheme, the Input Assistant system copies the code in its full style (e.g., A-at-Austria for Country Austria, and de-German for Language German) and set in the Form, for the purpose to avoid any careless mistakes and confusion. making the later checking certain.

4. Structure of the WTSP Database of TRIZ-related Sites

4.1 Registration of Data of Individual Sites

The information describing individual sites in the Site Registration Form is now registered into the WTSP Database System. The Form is read by the WTSP Database System and is stored in the System automatically.

At the time of registration, the DB System checks the input data from several points.
First it checks whether the data are written without apparent mistakes. Whether all necessary information is provided in the correct format, whether the answers to Indexing Schemes are correctly coded (without inconsistency with the coding rule stored in the Database System), etc.

It also check if the site to be registered is new or not in the Data base. If there is a registered site with the same site domain URL, it checks the site name for confirming the same site, and revise the site data with the new information, while keeping the old data for the purpose of version control and informing the System user about the revision of the site data.
If the Site is found new, the System registers the new site in the Database System by giving a new Site Registration No., Hyperlink to the site description inside the database, and (optionally) Hyperlink to the full description file. At the same time, the Answers to Indexing Schemes are made into short code (e.g., A-at for Country Austria, and de for Language German) in order to save the memory space and to make the later handling easier.

4.2 Flat Table of all the TRIZ-related Sites Stored in the Database

Using such information of individual sites, the WTSP DB System maintains a (conceptually) Flat Table of all the TRIZ-related sites registered in the DB System. The table holds the information of individual sites, as shown below briefly. This Flat Table plays the central role for generating WTSP Indexes and Catalogs in the way of categorization and arrangement as specified by the users.

Table 3. Contents of Flat Table of all the TRIZ-related Sites Stored in the Database

Group of items	Items	cell type	Note
Information for DB management	Site Registration No.	string (or Integer)	$$: Given by the System
	Hyperlink to the site description	string (Hyperlink)	
	Hyperlink to the full description file	string (Hyperlink)	
Basic Site Information	Site name	string	##: Taken from Site Registration Form
	Site domain URL	string (URL)	
	Single-line site description	string	
Answers to Indexing Schemes	A. Location	string (multiple answers in a cell)	## Taken from Site Registration Form and
	B. Language	string (multiple answers in a cell)	

	C. Role	string (multiple answers in a cell)	re-written in the standard form
	D. Application phase	string (multiple answers in a cell)	
	E. Application fields	string (multiple answers in a cell)	
	F. Methods	string (multiple answers in a cell)	
	X. Evaluation	string	

Note that the Description of site (in 5-10 line) and the Full description of site are not included in this flat table.

5. Usage of the WTSP Database System: Site Search and Building WTSP Catalogs

Before discussing about the functions and mechanisms of our WTSP Database System, we should better discuss about the users' needs and then the specifications of usage of the WTSP Data Base System.

5.1 Users' Needs to use the WTSP Catalogs and the WTSP Database System

Basic interests for users to use (or refer) the WTSP Catalogs either on-line or off-line are considered here first. Such interests are supposed to be essentially the same when users use the new WTSP Database System mostly on-line.

Users want to find a number of TRIZ-related Web sites in the world having the characteristics as specified by the user's query and recommended by the WTSP project.

Basic interests of users for using the WTSP Database System (mostly on-line) are essentially the same with the interests for browsing (or reading) the WTSP Catalogs (already built in a desirable manner) either on-line or off-line.

Users want to find a number of TRIZ-related Web sites in the world having the characteristics as specified by the user's query and recommended by the WTSP project. Typical queries by the users may be:

(1) I am a new comer in TRIZ. Can you recommend me some TRIZ Web sites reliable and easy to follow?

(2) I am an engineer and have much interest in the TRIZ ways of problem solving. Can you recommend me some Web sites which describe them in a systematic manner?

(3) I learned the TRIZ method to some extent, and am now eager to read actual case studies in industries. In which Web sites can we read TRIZ case studies?

(4) I am told that TRIZ has unique strength in understanding the future trends and problems in technologies. In which Web sites can we learn about it?

(5) I am interested in creativity and creative problem solving in general. What kinds of new and old approaches are there? And how TRIZ can be positioned in such a general perspective? Which Web sites, TRIZ or not, do you recommend?

(6) Many people talk about Innovation. But it is a very difficult process. Can you recommend us some good Web sites?

(7) Extension of TRIZ application out of engineering is interesting to me. Are there Web sites which discuss about application of TRIZ to the areas of business, economy, human-relationship, social problems, etc.?

(8) TRIZ was originally developed in Russia. What are the advanced/unique TRIZ approaches in Russia nowadays? Application of TRIZ to children education and to university education? Which Web sites are available in Russian and in English?

(9) I learned Malaysia is very successful in proliferating TRIZ in the country. Where can we learn their approaches?

(10) P.R. China is also very active in promoting TRIZ recently. What kind of activities and TRIZ methods do they have? In which Web sites can we learn them, in Chinese and in English?

(11) We know USA has many active TRIZ consultants. But how about the activities and approaches by industries and universities in USA? In which Web sites can we follow their activities and approaches?

(12) We are an industrial company in country XX and thinking to introduce TRIZ training/consulting. Are there any good professionals and opportunities in our country or nearby? We would like to learn their approaches beforehand in their Web sites. Could you recommend us some?

....

There can be much more questions. It is not easy to answer these questions and recommend suitable Web sites matching their specific interests. But our WTSP Catalogs/DB System can answer them much better than any internet searches. We are prepared for answering such queries by using various mechanisms.

Our fundamental mechanism is having surveyed relevant Web sites widely in the world and having the storage of good Web sites with evaluations and categorization in many aspects.

On the basis of such a repository of selected TRIZ-related Websites, we provide the WTSP Database System with two basic types of usage. They are shown at the middle row in Fig. 1. I.e.,

Usage A: Usage as a WTSP Query System:
With the input of some categories, users obtain some brief Index or brief Catalog of WTSP sites recommended in the specified categories.

Usage B: Usage as a WTSP Catalog Generator.
For generating various types of WTSP Indexes and WTSP Catalogs of recommended TRIZ-related sites which are selected, categorized, and ordered just as specified by the users' control input.

Usage of these two types are discussed further below for clarifying the needs and possible ways of services.

5.2 Usage of WTSP Database System as a WTSP Query System

(1) A typical approach for answering users' queries is to carry out the keyword search inside the WTSP Database.

Since WTSP Database System has accumulated many selected Web sites in much condensed fom of expression, the keyword search should work quite effectively. Various information in Basic information of site (especially site name), Answers to Indexing Schemes in multiple aspects, and Descriptions of site will serve to give us some specific and characteristic keywords close to the user's interest. Since the range of data to be searched is limited inside the WTSP Database, the keyword search may be quick if installed appropriately.

Even though this approach has not been investigated much yet, we would like to pursue it later in the WTSP Project.

(2) Another approach in our main interest for answering the queries is to make a full use of the categorizations of individual Web sites in multiple aspects.

For this mechanism, we ask the users to formulate their queries in the form of specifying various categories of interests. Then the WTSP DB System extracts recommendable Web sites which match the specified categories and have high evaluation.

Our Instruction on the Query Specification may be: E.g., in case (1) mentioned above

Specify explicitly the categories of sites you want to extract:
E.g., C. Roles: (a) Information sending site, (g) Information sharing
E. Application fields: (a) General/universal, (c) Engineering
X. Evaluation: (5) ◎Most important, (4) ○ Important in the World WTSP Catalogs
Output specification (Yes) With site description

Use default values for the categories implicit for your query:
E.g., A. Site Location: Not specified (i.e., in the whole world)
B. Site Language: Not specified (i.e., in English)

Max number of output sites: Not specified (i.e., 30)
Ordering of sites Not specified (i.e., In the order of Evaluation, and then Site Registration No.)

Our WTSP Database System is expected to have the function to check all the Web sites stored in our Database, to select the sites which match with these categories (exactly or with some tolerance), and to list them up in the arrangement as expected by the user. This mechanism will be discussed later in Section 6.

5.3 Usage of WTSP Database System as the WTSP Catalog Generator

The second type of usage of the WTSP Database System is to generate various WTSP Indexes (and Catalogs) of TRIZ-related Web sites. WTSP Indexes show the sites with their Basic Site Information (i.e., Site name, Site domain URL, and Single-line description) and Site Evaluation only, while WTSP Catalogs show the sites with their full information stored in the WTSP Database (i.e., Basic Site Information, Answers to Index Schemes in multiple aspects, and Site description).

This way of usage is carried out primarily by the WTSP project. The project wants to make several types of WTSP Indexes and WTSP Catalogs, as the outputs to be shown publicly.

We originally planned to make Country WTSP Catalogs for individual countries, first in their own language and then in English, and then to make World WTSP Catalogs in English first and then in various languages by translation. We should note the situation that over 50 countries actually use TRIZ, and several hundred of Web sites we are going to include in our World WTSP Catalogs. We would like to build many and various types of WTSP Catalogs smoothly on the basis of our WTSP Database.

Let's consider what types of World WTSP Catalogs are wanted by various users. For showing our several hundred of recommendable TRIZ-related sites, what kinds of classification and arrangement are suitable? Here are some ideas:

(1) Classify with Evaluation first and then with alphabetical order of the Site name:
I.e., List the Most important sites first (◎, probably a few tens of sites) in the alphabetical order of Site name, and then Important sites (○, probably several tens), and finally the sites Worthy in World WTSP (□, probably a few hundred). Show the sites only written in English.

(2) Classify with the Language (of the site) and show the highly evaluated sites only:
I.e., List the sites in English first (◎and○, in the alphabetical order), then in Russian, in German, in French, in Spanish, in Japanese, in Korean, in Chinese, ... Show the site name in the original language and then in English translation.

(3) Classify with the Location of the site:
I.e., List the sites in individual countries (au-Austria, be-Belgium, etc.) in A-Europe Region first, then those in B-Russia Region, C-Mid East, D-Asia, and so on. In each country, the sites may be arranged according to Evaluation and then Site name.

(4) Classify with the Roles of the site:
I.e., List the (TRIZ-related) Information sending sites first, then Promoter organizations, Public organizations, Academia, Developer organizations, ... and so on. In each Role, the sites may be arranged according to Evaluation and then Location.

(5) Classify with the Application fields:
I.e., General/universal first, then Science, Engineering (and its sub-categories), Biological and medical, .. and so on. In this classification, many sites may appear in multiple categories (or sub-categories).

(6) Classify with the Methods:
I.e., Methods for Team Formation (and its sub-categories) first; then Needs and problem finding; Statistical, logical, and systematic thinking; Creative thinking; systems analysis; Use of knowledge; and so on. In this classification, many sites may appear in multiple categories (or sub-categories).

All these types of classifications correspond to some kinds of interest by users. Some types of classification of the sites are much better than a simple list of sites in the alphabetical order of Site name. It is clear that no single way of classification/arrangement works to satisfy various users' needs and that there are various needs of different types of classifications, especially with hierarchical combinations of classifications.

Hence our solution proposal is to install a mechanism for accepting various classification of sites in hierarchical combination of multiple aspects as requested by the users (either WTSP Editors or general users outside WTSP project). This is quite a challenge for us, and its construction is discussed in the following section.

We should consider first what kind of control input we need to prepare for specifying the WTSP Catalogs we want to obtain:

Specification of control input:

Specify the aspect of classification at the first priority level:
The aspect of classification
The range of categories to be selected (specify at the category level, not at the sub-category level)
The way of arranging the categories: usually in the default way. Either category or sub-category level.

Specify the aspect of classification at the second priority level:
The aspect of classification
The range of categories to be selected (specify at the category level)
The way of arranging the categories: usually in the default way. Category level only.

Specify the aspect of classification at the third priority level:
The aspect of classification
The range of categories to be selected (specify at the category level)
The way of arranging the categories: usually in the default way. Category level only.

Similarly to the maximal (lowest) priority level (Max is 4th level ?)

Example of control input for the Case (4) mentioned above:

First priority level: Aspect: Roles; Selection range: All; Arranging: Sub-category level
Second priority level: Aspect: Evaluation; Selection: All (i.e., ◎○□); Arranging: Category level
Third priority level: Aspect: Location; Selection: All; Arranging: Category level (i.e., Region level)
Lowest level (default): Aspect Site Registration No., Selection: All; Arranging: (default) increasing order

For building Country WTSP Catalogs for each counry, this type of mechanism is also necessary and should work well. For such a purpose, only the Web sites located in the country (as specified by the Aspect of Location) are selected, while the Evaluation aspect should be specified as ◎○□ and △.

This way of using the WTSP Database System is usually carried out by the WTSP project administrators for building several standard sets of World WTSP Catalogs of TRIZ-related Web sites.

Such usage should be made open to all WTSP Members for making some custom World WTSP Catalogs and Country WTSP Catalogs. It means that any user can use WTSP Database System in this manner if the user joins the WTSP project as a voluntary member.

6. Database Indexing System: The Core Mechanism of the WTSP Database System

As shown in Fig. 1, our WTSP Database System works to get Query or Control Input from the user and generates Indexes or Catalogs of TRIZ-related Web sites by using Database of WTSP web sites as the source data and using Multiple sets of Indexing Schemes for the support of various types of categorization.
Thus the Database Indexing System is the core mechanism for generating variously-categorized WTSP Indexes/Catalogs.

The Database Indexing System has been designed recently in the WTSP project. But it is conceptually designed for general use without limited to the WTSP Database System.

The main components that the Database Indexing System handles are:
Flat Table of all the TRIZ-related Sites (see Section 4.2) and
Multiple sets of Indexing Schemes. (see Section 2.)

We now assume we have a reliable WTSP Site Database and the summary of information of each site is copied correctly in the Flat Table of WTSP TRIZ-related Sites.

6.1 Use of the Database Indexing System for Answering to Queries

Now we should think how we can answer to user's queries by using our Database Indexing System.

As we discussed in Section 5.2, we should formulate our queries in a set of query specifications. An example of Query Specification is reproduced here:

Specify explicitly the categories of sites you want to extract:
E.g., C. Roles: (a) Information sending site, (g) Information sharing
E. Application fields: (a) General/universal, (c) Engineering
X. Evaluation: (5) ◎Most important, (4) ○ Important in the World WTSP Catalogs
Output specification (Y) With site description

Use default values for the categories implicit for your query:
E.g., A. Site Location: Not specified (i.e., in the whole world)
B. Site Language: Not specified (i.e., in English)
Max number of output sites: Not specified (i.e., 30)
Ordering of sites Not specified (i.e., In the order of Evaluation, and then Site Registration No.)

For the Query System, users want to have recommendations of a limited number of sites as requested in various ways. Thus selecting sites which match with the explicit and implicit requests should be the most important process. We may copy the data of only the selected sites into the Temporary Flat Table of WTSP sites. Then the selected sites are to be rearranged in some appropriate order for output. Thus our process may be:

(1) Make sure about the selection requests for all the aspects in the user' query.

(2) Check each site if it matches the selection requests for all the aspects (e.g., (in the case of above example) Roles, Application fields, Evaluation, and Site Language), and copy the site data of only the selected site into the Temporary Flat Table. For the cells allowing multiple answers, if any one of the multiple answers matches the request, then the site passes the selection.

(3) Sort the selected sites in the Temporary Flat Table in the requested way (in the default way in this example, in the order of Evaluation and then Site Registration Number).

(4) Output the sites in the Temporary Flat Table in the Index style.

(5) By adding the Site description, output Brief WTSP Catalog of recommended sites in an appropriate layout.

6.2 Mechanism of Hierarchically-classifying Indexing System

Let's consider how to perform rearranging the data in a flat table in accordance to the user's specification concerning to some of their column data.

A well-known tool for this kind of operation is the data sorting in MS Excel file. In such a data sorting, Excel allows to specify the control in a way:

Primary level of sorting with the value of column i1 cell in the increasing/decreasing order,
Secondary level of sorting with the value of column i2 cell in the increasing/decreasing order,
Third level of sorting with the value of column i3 cell in the increasing/decreasing order,
... and so on.

In this sorting system, the cells in columns i1, i2, i3, etc. have simple data which can be sorted in either increasing or decreasing order. The cells may have numbers or strings (which allow to be sorte in the alphabetical order).

When we consider to apply this hierarchical sorting mechanism to our Flat Table of WTSP Sites, there are three difficulties we need to solve:

(a) In the cells of Answers to Indexing Schemes there can be multiple answers. We would like to handle all the

multiple answers are correct answers
(b) The Answers to Indexing Schemes are actually two-levels, i.e., Category level and Sub-category level.
(c) We would like to add the function of selecting data in the specified range.

Our current solution to these problems are:

The problem (a) means that multiple data in a cell need to be expanded into multiple set of data. Since this expansion makes the data set large quickly, we are going to limit such expansion only at the primary level of sorting. At the second, third, or later levels of sorting, we are going to handle the multiple answers in a cell as if a single answer with a lengthy word.

In this manner of handling, the problem (b) is relevant only at the primary level of sorting. The answer (after expansion) is expressed by two digits code, representing the category and the sub-category, and may be sorted naturally at once.

The selection function needed in problem (c) can be implemented by copying only the selected data into a temporary flat table.

Thus our solution can be a modification of the algorithm developed in the previous section 6.1. Check the sites to be selected and put a temporary selection mark in the Flat Table. Then copy the data of the site to be selected one by one into the Temporary Flat Table with necessary expansion of the multiple data in the first-priority sorting aspect. And then sort the data in the Temporary Flat Table in the requested way of hierarchical sorting, to get the sites classified and arranged in the order just to be output as the WTSP Index/Catalog. The algorithm can be described in some more detail as:

(1) Make sure about the selection requests for all the aspects in the user' query.

(2) Check each site if it matches the selection requests for all the aspects. For the cells allowing multiple answers, if any one of the multiple answers matches the request, then the cell passes the selection. For the sites which have passed the selection check, put a mark of Selection Pass in a temporary additional column of the Flat Table.

(3) Copy the site data of the selected sites only in the Flat Table into the Temporary Flat Table with the special care of Expansion of the multiple data for the first-priority sorting aspect. The Expansion process is necessary only if the aspect for the first-priority sorting allows multiple answers. Check the cell of the specified aspect, and if it has multiple answers to be selected, then copy the site data into the Temporary Flat Table multiple times while specially putting the multiple answers individually at the cells of the multiple rows in the Temporary Flat Table.

(4) Sort all the sites in the Temporary Flat Table in the requested (hierarchical) way. An the result, the Temporary Flat Table has the data of the sites to be output exactly in the requested order, with the detailed classification and selection.

(5) Output the sites in the Temporary Flat Table in the WTSP Index style.

(6) By adding the Site description, output the WTSP Catalog in the appropriate layout.

7. Implementation of the Present Proposal and Possible Effects

As is presented so far, this document proposes a new software system called the WTSP Database System for handling many Web site data accumulated by the WTSP project, generating various WTSP Catalogs easily, and for serving to reply users' queries. The structure, mechanism, and usage of the software are described well conceptually in detail. And its merit for the WTSP project and for the users of WTSP Catalogs/Database System are expected to be large.

7.1 Implementation of the Present Proposal

Hence we should consider to make this proposal into reality, by implementing the software. We need to discuss several points:

(1) It is of course desirable to build the WTSP Database System as quickly as possible, for completing the First Edition of World WTSP Catalogs before the ETRIA TFC2019 to be held on Oct. 9-11, 2019. But I am not sure whether such a goal is practical or not.

(2) The WTSP Database Software should be built as an independent application tool. Software itself and the data to be handled are expected to be too large to build/operate/store inside our WTSP platform under the Bitrix24 groupware system.

(3) For implementing the software, professional capability in software development is necessary. I am not sure how many man-months and how many months are required for the implementation.

(4) A number of WTSP Members and their companies have such capability, I suppose. So it should be nice if some of them would volunteer to build the WTSP Database System and to operate it in the WTSP project in future.

(5) Our WTSP project has been operated on the voluntary basis. Thus it is desirable that the Members and their companies working for the implementation/operation of the WTSP Database System can find some merit or can get some voluntary support for their work and costs. This is an issue we need to find solutions in future.

(6) Once the WTSP Data base System is implemented, the WTSP project and concentrate its efforts for surveying and describing many good Web sites, while various WTSP Catalogs can be built semi-automatically with the System. Users either read (or browse) such Catalogs or use the Database System as an on-line Query System.

(7) One possible merit of building/operating the WTSP Database System exists in the general capability of the software. Namely, the software can be built in a way to be used various purposes in various application field by adapting some of the modules and preparing various indexing schemes and data formats. WTSP Database System may serve as a useful prototype for developing Catalog Generation/Inquiry Systems in various fields.

7. 2 Possible Effects of the Present Proposal

We now consider possible effects of the present proposal when it is actually implemented.

(1) When the WTSP Database System is implemented successfully, Web sites described properly in the WTSP Registration Form can be reflected smoothly in various World/Country WTSP Catalogs and also in the on-line WTSP Query System.

(2) Thus the WTSP project can/should work mostly in surveying/describing/registering/updating the TRIZ-related Web sites. This part of work should be done by persons who actually visited the site, read a number of important pages (sometimes written in languages other than English), have enough background knowledge to evaluate site, and are fair in describing the introductions. The quality of the WTSP Catalogs depends on the quality of survey and quality of the site descriptions.

(3) The WTSP Catalogs will be used for reading (or browsing) various sites somewhat systematically. Many users will also use the WTSP Database System on-line as a Query System and for making custom-made brief WTSP Catalogs. The results from the WTSP Database System will be much higher in quality than ordinary Internet searches in the field of TRIZ and relevant methods.

(4) Once the WTSP Database System obtain good reputation in its usefulness and quality, owners of TRIZ-related sites would find the merits of their sites being registered in the WTSP System and demerits of being missed in it. Thus it is important for the success of WTSP project to obtain good reputations concerning to its First Edition.

(5) The WTSP Database System will make good effects on the proliferation of useful and good Web sites in TRIZ (and related methodologies) and the proliferation of the TRIZ and relevant methodologies.

(6) Collaboration of many TRIZ colleagues in the world on the voluntary basis is the most important aims of this WTSP project. We wish this also come true!

Let’s work Together ! Connected !!

Note: Files attached:

(1) Structure of the WTSP Database System Proposal by Toru Nakagawa

eWTSP-WTSP DB System Structure-190518.pdf

(2) Multiple Sets of Indexing Schemes for the WTSP DB System

eWTSP-IndexingSchemes-190518

(3) WTSP Site Registration Form

eWTSP-SiteRegistrationForm-190522.pdf