# Towards a supporting system for amplifying reflective thinking of program creators

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**Abstract:** The social concern with designing some kind of contents has been growing for the last several years in multimedia society. In current Broadcasting industry, an important topic has been focused on how to design contents. The Ministry of Public Management in Japan announced that Analog broadcasting will be terminated and completely replaced to Digital broadcasting in 2011. Generally speaking, most broadcasting stations in Japan were worried about the shortage of contents, funds and manpower. However, the effective methodology for contents production is not established in many cases. On the other hand, various studies have been conducted on designing contents in a number of academic fields. These studies have produced important achievements. We focus on designing radio contents. Besides, we consider the method of competitive contents in all its aspects. First, we explored the relationship between the process of radio production and structure of the scenario of radio program. We, then, observed Creators' working style. Understanding the relationship between the process of radio production and structure of the scenario of radio program is important for a number of theoretical and practical reasons. The purpose of this study is extraction of structured knowledge and development of a contents support tool in radio program works. This paper describes an application of the radio program components by applying the methodology of "Knowledge Nebula Crystallizer for Knowledge Liquidization and Crystallization". In this paper, as a case model of the "Knowledge Creation" in modern society, we propose a radio production and its contents generation methodology.

***Key words*:** *Program production, Design process, Creative contents, Knowledge Liquidization and Crystallization*

## 1. Introduction

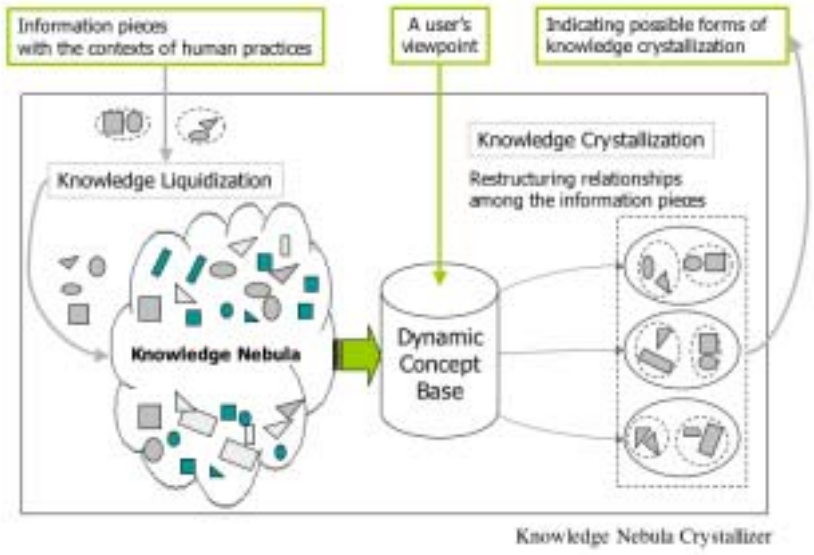
Especially the issue of "Design of contents in broadcasting program" has been eagerly shown in a number of academic fields [1,2]. Some of the most innovative studies have focused on a relationship between computer usage and the user. In short, it has been proposed that the computer performs a mission instead of the user. Research for "contents-handling techniques" --- automatic

computational generation and processing of contents --- has become more important [3]. It repeatedly appears in their papers. In addition, it has been recognized by various researcher that the digital contents industry reflects the cultural beliefs and practices. Several studies pay close attention to the movements of relation between broadcasting and various media as well as designing contents. The methodologies used in the studies are also helpful to us in conducting our study. There are three kinds of issues. First, the issue of supply in a soft side has arisen to the hard side that quickly progresses. Second, considering the ways and means to describe information intelligibly when we use a computer, the problem that we have to consider next is what can be done to view the computer as equipment that supports the user. Until recently, however, most of the study models used in this area have a tendency to ignore a potentially important option in designing contents. In addition, such methods have limited value because these studies consider little about creative contents. Current studies are extending the approach of a technical side. For instance, it is a technology such DAM (digital asset management) and CMS (content management system). However, they are only applications of the management of information and knowledge as pointed out by Nonaka [4]. We catch contents with “knowledge asset” and propose contents recycle for creators. It is difficult for creator to design contents. Creators must make an association of logical thinking between nose for news and organizing ability. Our study revolves around the attempt to find the effectiveness of this issue. To shed light on these issues, we suggest that development of the system supports the contents creation. Consequently, we take notice of support for thinking on the occasion of creating contents and take radio contents design as an example. The purpose of this study is extraction of structured knowledge and development of a contents creation support tool in Radio production by applying “Knowledge Nebula Crystallizer for Knowledge Liquidization and Crystallization [5,6] ”. First, we studied the pattern of the scenario of radio program. We, then, observed Creators’ working style. By researching a scenario of radio program, we are trying to capture an elementary fact of creativity and possible design of contents. This study takes a different approach from precedence studies towards designing contents by using computer, but our model retains the basic feature that is the simplest. A key distinguishing feature of our model is that it focuses on the interactions between the user and computer. There is one central concept at the heart our model. It is capable of generating contents, which are followed by anyone. Therefore it is useful to consider “Knowledge Creation” from such many-sided approach. This paper describes a radio contents design by computer and an application of the radio program components for creators. Our goal is to establish “a methodology for creators of radio program production” and to construct “a knowledge reconstruction system” an effective and attractive contents design.

**2. Methodology**

Hori proposed the methodology of “Knowledge Nebula Crystallizer for Knowledge Liquidization and Crystallization [5] ”. Although there are several theories about knowledge creation [4,7,8] and

many companies have recognized the importance of the methodology, most of them face to difficulty of applying them to their real workflows. This is because they have not mentioned how companies should apply them to their workflows. Though traditional knowledge management methods have tried to capture and accumulate “knowledge” itself, it is impossible to do that, because knowledge is not something clear-shaped but is embedded in a “context” where a person interacts with an artifact. What can be captured is data or information that describes knowledge and that can be used to generate new knowledge. This process is what we call “Knowledge Liquidization”. Liquidization means “dissolving information into elements and adding them to KNC”. KNC is a container of Liquidized information. This is an external representation of what we call Knowledge Nebula that is a repository of elementary information. In this repository, any pieces of information in text format can be stored. Crystallization means, “restructuring information in accordance with various possible contexts”. KNC outputs external representations of crystallized knowledge as stimuli to knowledge Crystallization in creators' mental space [Fig.1].




**[Fig.1] Knowledge Nebula Crystallizer for Knowledge Liquidization and Crystallization [Amitani 2003]**

### 3. Approach to Radio program design

It may be helpful to begin with description of the physical setting of Radio production that we have in mind. This will enable us to motivate our methods that follow in the next subsection. We will begin our discussion by considering the process of Radio production. The Radio production is usually made by from three to four persons' community such as Director, Broadcasting writer, Narrator. Unlike television or a web, a time module and a human module exist there. For example, they are the sentence which a narrator uses, sound data, CM, etc. It is necessary for Radio producers to make a scenario quickly on the spot and the format of a basic scenario required for them. Resources being shared among Radio producers are most important. In this research, the topic of the program is especially paid to attention by text data.

Our methods of this study are as follows:

(1) Understanding the know-how of radio production.
(2) Collecting and analyzing various scenario data in Radio program.
(3) Extracting the composition element of a basic scenario.
(4) Extracting and analyzing the story or news items in various radio scenarios.
(5) Conducting a basic study of the Discourse analysis.
(6) Analyzing a thinking process of Creators by using the protocol analysis.

This study builds on scenarios of broadcast radio program data. Samples were taken from broadcast radio program, most of which were taken from radio station in Tokyo. Currently, we have about 10 years' data.

**4. Results and Discussions**

First, We examined the data taken from a wide scenario by using the Discourse analysis [9,10]. It may be divided into two sides. One is Form that is common concept to all those who produce.

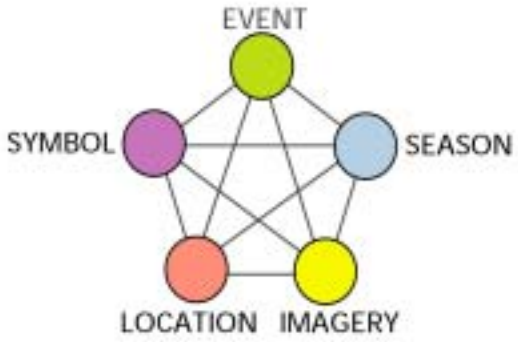
The following results were obtained:

1. Title of program
2. Air time
3. Narrator's name
4. Credit line
5. Each Frame configuration
6. Frame's title of topic

Another one is content. We took particular note of the topic item written to scenarios. We paid attention to the formation of each frame of one topic. We will be concerned in our research with the issue of how we can sort out the relevant factors in this issue. The scenario is being written at various levels. On these grounds, we have come to the conclusion that the level of word is very important for topic formation. Therefore, we studied the following scenarios to discover the main characteristics of topic formation.

The following shows remarkable results [Fig.2]:

1. Season {Summer / December / yesterday .etc}
2. Event {bridal / bargain/ dinner .etc}
3. Location {Tokyo / Zoo / Mt.Fuji .etc}
4. Symbol (Object) {student / man / SONY .etc}
5. Mental imagery {green / happiness / anathermal .etc}




**[Fig.2] Semantic attribute classification of word**

Moreover, we had the above-mentioned attribute correspond to "Word" used with each frame. Several observations in the last few frames have shown that one frame is made up of three

attribute.

Next, we conducted a qualitative observation experiment by professional Creators. Two professionals participated in the experiment. Our purpose is as follows:

- What is a professional idea process?
- What factor decides the content?
- How many attributes do they make?
- What is the production condition?

We used the following procedures in this experiment.

1. We gave informants to the project book on the radio program in the beginning. This project was broadcast by AM station in the first week of May. The broadcasting time was two hours in the morning. The narrator was an announcer, and the main listeners were housewives.
2. Our requests were as follows:
    - Please write keywords on paper when you came uppermost for this production. In that case, please make remarks as much as possible.
    - Please enclose the part of the topic with the square.
    - Please clearly describe the attribute of the keyword.
    - Please classify the attribute.

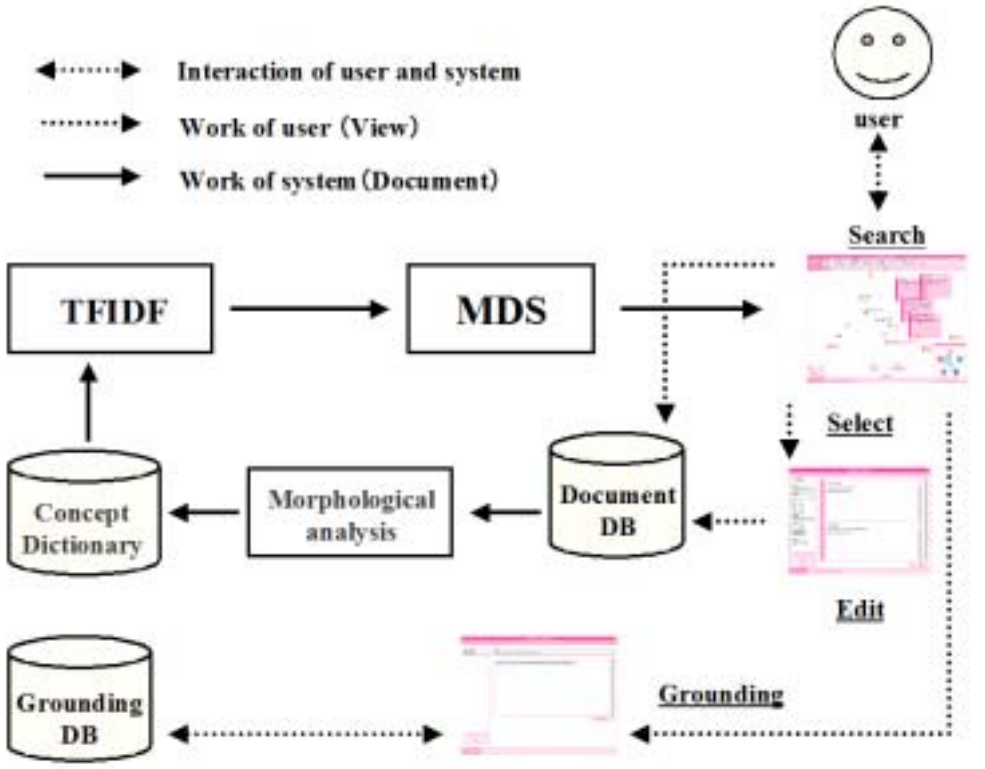
As a result, the opinion similar to the result of the discourse analysis on the scenario was obtained. This data was analyzed by using the protocol analysis [11]. We can employ the results shown in this study to support for designing contents. The information derived from such investigation is considered to have a value to contents generation support. In other words, we propose an interactive system that can describe contents of Radio program. It means a support for thinking on the occasion of creating contents.


**[Fig.3] "miwa radio" (Multimedia Information Wizard Application for Radio program design by Knowledge Nebula Crystallizer)**

**5. Outline of our system**

We call our system "miwa radio" (Multimedia Information Wizard Application for Radio program design by Knowledge Nebula Crystallizer) [Fig.3]. This

system is a creation support system for the professional creators. The spiral of creator's knowledge is smoothly supported by our system [Fig.4].




**[Fig.4] Component Structure**

Cooperation between each component is shown as follows:

1. Document database

Function to give scenario ID and frame ID to document data of scenario.

2. Semantic attribute classification of word

In the beginning, the morphological analysis [12] is performed to the document in the database. Next, the compound word processing is performed and a noun and unknown word are extracted. First of all, each word's meaning attribute is decided from the classification of the part of speech of the obtained noun. The semantic attribute is given by using Concept dictionary. The classification of the noun of Concept dictionary is manually associated beforehand with the five above-mentioned semantic attributes.

3. Selection of important word

The keyword that characterizes each frame is obtained. TFIDF (Term Frequency Inverse Document Frequency) is applied to filter all the nouns and unknown words. Generally, TFIDF is an index frequently used as a keyword extraction technique for evaluating the importance degree of the keyword under the retrieval condition in each document. Six high-ranking words of

each high-ranking attribute are extracted based on the TFIDF value. Next, the font size is expressed in proportion to this TFIDF value and the importance of the decision keyword is expressed.

4. Similar level calculation of word

The TFIDF value of each keyword is analyzed by MDS (multidimensional scaling), and the position on the space is calculated according to the relation of each keyword. As a result, the keyword with low similarity can be mutually set in the distance. Oppositely, the keyword with high similarity can be manually put closely.

5. Keywords pool


**[Fig.5] Keywords pool**

At the first visit to the system, those who produce a scenario look for the topic is “Keywords pool” [Fig.5]. So as not to destroy the environments of the user, he/she selects items of the broadcasting station, time zone, and the personality, etc. based on the form of the project book and the scenario. As a result, the system performs a narrow retrieval of the document based on the setting of the user. (3) And (4) are processed to the narrowed document, and the size and the position where the keyword is displayed is obtained. This helps intuitive understanding of the appearance frequency of the keyword and the relation between key words. In addition, the user can freely relocate the key word. Moreover, keywords in “Keywords pool” are displayed with the color corresponding to five semantic attributes described respectively in the preceding chapter. In the color attribute, yellow means “Event”, green means “Season”, blue means “Imagery”, red means “Symbol”, and purple means “Location”. For instance, green and yellow are displayed respectively as for the keyword with two semantic attributes like Christmas. As a result,

Creators can understand the semantic attribute of the keyword at a glance. Besides, creators can learn there are different meanings even for the same keyword. That is, this system suggests the usage of a word different from the past usage. Additionally, it is also possible to return to the previous state at any time because the function of the history is accompanied, and to present the change in the idea dynamically since a change in the concept space is in the system.

6. Function of Sticky

User can make one sticky by pushing the new frame button. The name of the frame can be input to the sticky. The keyword selected from the “Keywords pool” can be thrown in drag and drop. It is percolation so as not to obstruct the “Keywords pool”. It is also possible to only leave the frame name. It is possible to freely arrange it. The selected keyword synchronizes with “Diagram” and is made visible. All created corners are reflected in “Editor".

7. Diagram

Three or more semantic attributes are necessary for users creating the frame. Therefore, when the attributes of the keyword input to Sticky become three or more, the figure corresponding to in “Diagram” is drawn. Therefore, it can amplify reflective thinking of program creators.

8. Editor

“Editor” is a tool to actually bring the result of the idea together in shape of scenario according to a current process [Fig.6]. It synchronizes with “Function of Sticky”. Information recorded in “Function of Sticky” is sent to “Editor”. User can mold it in the document referring to it. The preserved document is stored in the document database. The scenario under production can be preserved and it is possible to take it out easily and bring it in to the studio by printing it out.

**[Fig.6] Editor**

9. Grounding

It is important for creators to know variety of information. The method of suggesting meaning was previously described applying the semantic attribute to the keyword, and making it visible with the color. However, the creator should instantaneously know information on the keyword. Such real world information is acquired here, and information to new contents generation that

can become a hint is offered and shebang is called “Grounding” [Fig.7]. Concretely, it is a function to take out and to present necessary information from “Grounding database”. Drag & drops or an arbitrary word is input to the “grounding” icon as a retrieval keyword with the keyword in the “Keywords pool” for this information retrieval. The construction of “Grounding database” assumes the user to do the task.

**[Fig.7] Grounding information**

## 6. Conclusions

Actually, this system is opened to the open campus in Research Center for Advanced Science and Technology (RCAST) the University of Tokyo. The evaluation experiment by professional creators will be necessary in the future. However, it could be confirmed that the system functioned according to the author's expectation. When explaining in guests, the program was actually produced with the system by guests. As a result, everyone enjoyed it and was able to produce radio programs in an improvisation. Moreover, the program was found to function as communications between guest and briefer production. In this research, we propose the framework that supports the creation of program production Creator's knowledge process to the spiral. The feature of the framework is described as follows.

- The environment that can support a spiral thought process in the production creator's intellectual creation activity through the interaction of the user and the system is offered.
- Stimulation with the effectiveness to a new program generation that becomes a chance is offered to the user.
- The expression to amplify a reflective thinking of program creators is achieved.
- A system close to the usual creation activity that excludes the production person's load is offered.

In this paper, the objective of study was a radio programs production. However, it is not likely to be limited to it. Information magazine and the variety of programs might have utility. For the time being, the evaluation experiment in the radio programs production by the professional creators is conducted and we certainly want to do the utility. In the future, we want to apply this system to an actual program. Furthermore, We are expecting that the narrator can turn out the program while taking the system and the interaction with the program.

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