

A Study of How to Generate the DC Metadata set for Digital TV Program

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Abstract:

According to future growth of communication infrastructures and digital broadcasting, TV programs will become to be handled in the same way as other many kinds of digital contents. Then the contents originally produced for broadcasting will be stored in digital libraries and distributed or circulated through the communication networks. In such a situation, it is required some descriptive information about contents, namely 'metadata'. For the TV programs, a set of metadata is defined, which is called "Service Information (SI)". In this paper, at first, we discuss about the similarity between SI and Dublin Core metadata set. Then we propose a new concept for production of digital TV programs, named "PLAYBOOK". The main purposes of PLAYBOOK are (1) reducing the cost for metadata adding, and (2) keeping the quality of metadata. At last, we applied this method to language education programs, and confirmed that it is effective for a specific type of TV programs.

Keywords:

Digital Broadcasting, Electronic Program Guide, Internet, Portal Service, Dublin Core Metadata Set, Digital Library, ARIB, ITU-T, PLAYBOOK

§ 1. Introduction

The internet is getting larger and more popular. But the expansion of the internet bother the internet users, because finding one's favorite site is difficult day by day. Then the importance of portal services is increasing rapidly.

On the other hands, digital broadcasting of TV programs will start in Japan soon. The digital broadcasting will bring various kinds of comfortable services, such as clear images, data distribution, hundreds of channels, TV anytime service [IBL], and so on. But same as today's Internet, the huge number of channels will bother the customer when they choose channels of their taste. As one of the advanced services on digital TV system, selecting your favorite channel from more than hundreds of channels is considered. Of course you can choose a scene(or segment) on your demand. To realize such a searching service, useful attribute set and selecting

system must need.

In Japan, the basic attributes set for the digital broadcasting system are now being generalized [ARIB]. It is called "Service Information (SI)". SI, which is introduced by DVB and modified by ARIB is an example of descriptive information on TV programs. SI is made from a lot of tables and each tables consists of many attributes. For example, event information table contains data concerning events or programs such as event name, start time, duration and so on, and Electronic Program Guide (EPG) can be constructed from the SI. The EPG services are useful in selection of TV programs. And there is another table for TV anytime services.

From another viewpoint, EPG service is defined as the portal service on digital TV system. Because when the digital broadcasting is widely carried out, we can consider broadcasting as one of the communication routes, and TV programs will be handled in the same way as other many digital contents. It means that the contents originally produced for TV broadcasting will be distributed or circulated through the communication networks, or stored in digital libraries. Then we take an interest in Dublin Core Metadata set (DC set) [DC] as a mediator between TV contents and Internet contents. Dublin Core metadata set has been studied as a basic attributes set for contents retrieving on the digital library system ordinary. But the DC set and the SI attributes set are made for the same purpose and they have something in common.

Though the TV programs which have metadata are useful, the cost for appending metadata to each program or each segment is not negligible on the point of today's TV program productions.

In this paper, we introduce our premises and discuss about similarity between DC and SI in the next section. The process of making a TV program, which is classified by focusing on the 'script' is also presented, and then a new concept for making a program, named 'PLAYBOOK', is proposed in section three. It consists of metadata, audio-visual segments, films, and all other related things. In the section four, it is applied to language education program and one of the advantages of using PLAYBOOK is shown.

§ 2. Premises and Metadata

In this section, we will describe our premises and classification of TV program, and relation between DC and SI.

(2-1) Assumed System.

Traditionally, the broadcasting system and the Internet are separated. Here, the broadcasting system is defined with the next characteristic, one way and simultaneous spreading. So Cable TV system is one of the broadcasting systems. On the contrast, the Internet is mutual communication system. After here we treat the TV station (TV production) is a kind of contents providers. And broadcast media, it means the air and the cable fiber, are considered only as the distributing pass.

In the digital broadcasting era, we assume the next system (fig.2-1).Roughly speaking, this system has four functions;

- (1)Authoring(Production),(2)Delivery,
- (3)Person(Consumer) ,(4)Library.

In this system, the internet provides the mutual communication path and the satellite provides the broadcasting path. The terminal units in the consumer's home must have the next functions;

- (1) receiving and decoding function like TV box,
- (2) communicating with the internet like Personal computer,
- (3) Browsing both the TV programs and internet contents,
- (4) Storing programs.

After here, we call the above terminal unit as "Set Top Box (STB)". Using STBs, we can access to the internet and receiving TV program seamlessly.

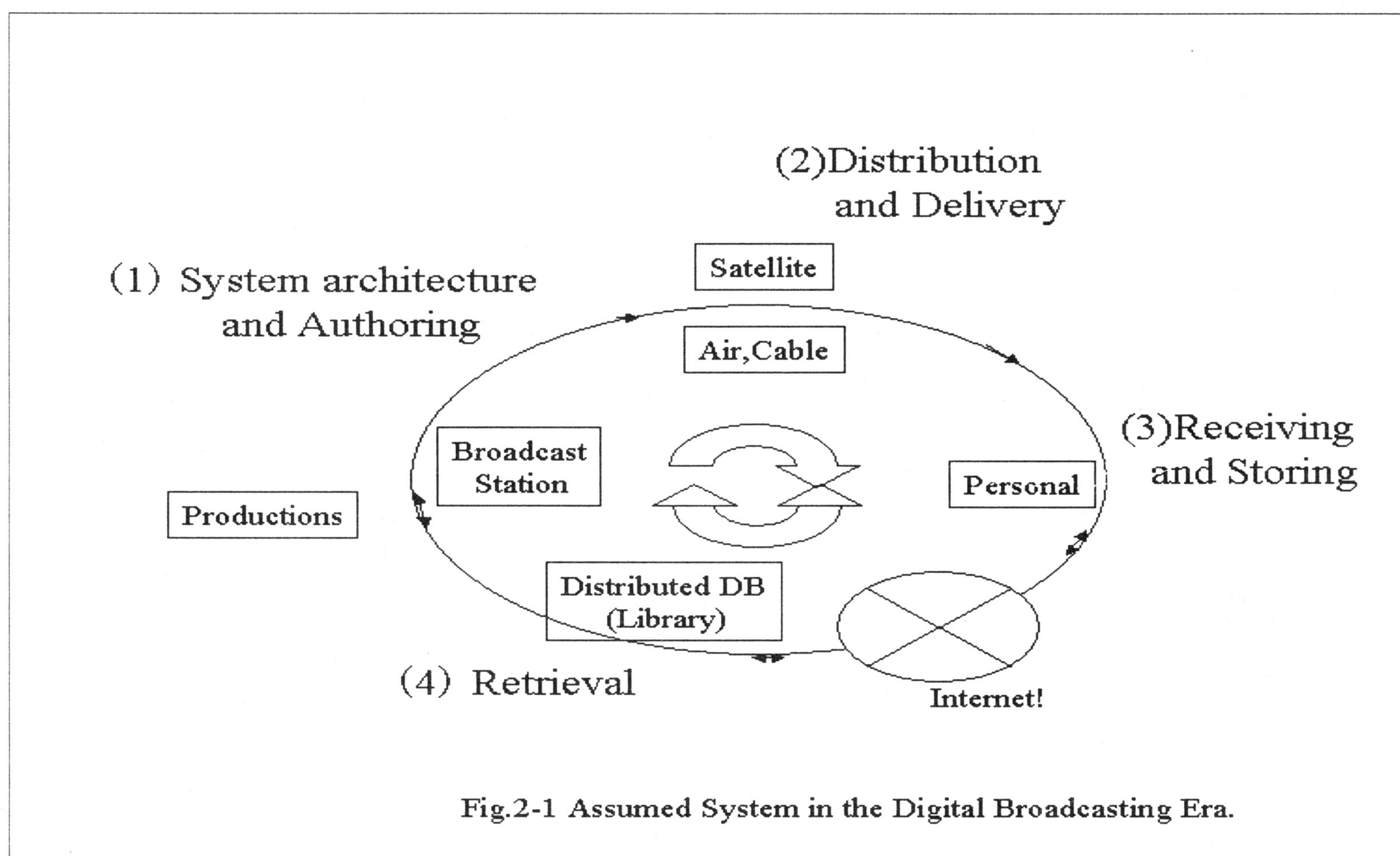


Fig.2-1 Assumed System in the Digital Broadcasting Era.

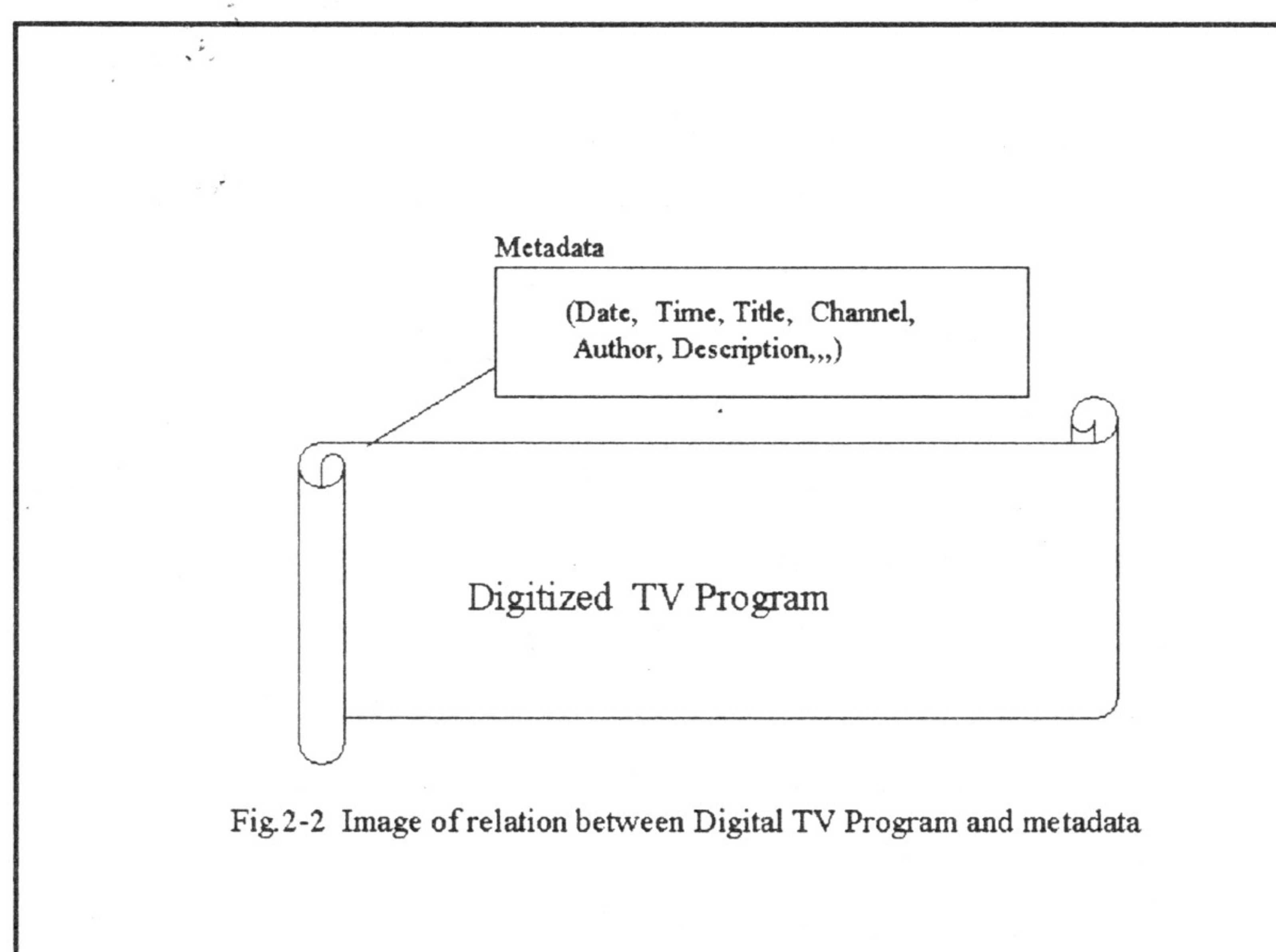


Fig.2-2 Image of relation between Digital TV Program and metadata

(2-2) Metadata in Digital Broadcasting System

Since metadata is appended on data to make assistance of using that data, their format and the substance(see fig.2-2) should be specific to users and applications. In the broadcasting area, metadata are used both on production side and on audience's side. Followings are examples on each side;

- (1) time schedule for scenes or components of a program
- (2) description about materialized data
 - in the production processes
- (3) information about stored contents
- (4) retrieval of previously used contents
 - for resource management

- (5) EPG and its expansion
 - on selection or filtering contents
- (6) retrieving program that have been broadcast before, digesting stored program
 - retrieval on storage systems.
- (1)–(4) : production side
- (5),(6) : audience's side

Though some are used only in user's side, like EPG, and some would be used on both sides. Because the productions of TV programs will make efforts to append or generate metadata which are used themselves, we should pay attentions to metadata which are used only on customers' side.

Though 'Program' is a basic unit in the EPG services, descriptions about more detailed segments, relations of those segments and semantic information about contents of the program are required in the near future to utilize specific applications such as personalized viewing or storing. Despite such needs for detailed descriptions, TV stations, as providers of TV programs, are not willing to deliver such metadata, because it costs much to append appropriate metadata to all detailed segments of the program.

(2-3) Metadata and Portal Service

Then we will consider the details of the compatible portal service.

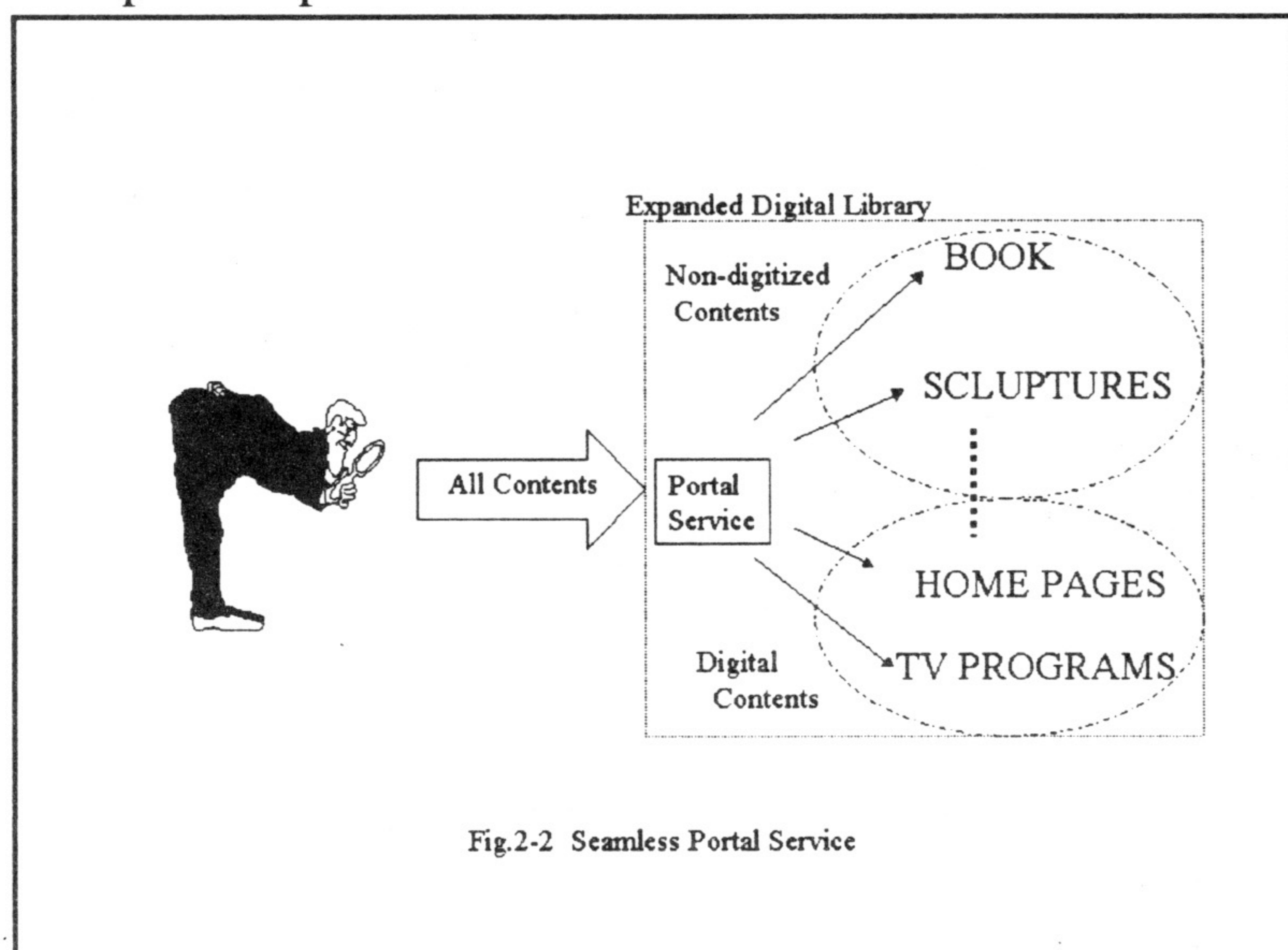


Fig.2-2 Seamless Portal Service

Traditionally, when you are at library, you may use book index card to retrieve the book you want. The case of Internet, you will take portal service site to find the URLs of your favorite homepages. Yahoo and Infoseek, AOL ... and so on ... are famous portal site. Then when you want to get information of TV program, using EPG service or newspaper is normally. And one more, when you are looking for your favorite scene in a TV program, you will use the TV Anytime services.

Originally, the digital library (DL) is a library for digital contents. But now it has been grown. The DL systems handle not only digital contents but also printed media, images, statues, figures, historical goods ... and all collected articles. And of course the

Internet content is one of the object for digital library. "Dublin Core metadata set" is developed as the book index card on the digital library system. All of the contents under the DL management have DC set as metadata. So we can reach at our object easily by using DC set. As we mentioned before, the Internet contents are a kind of the DL objects. And TV programs are also. Then the seamless portal service, see fig.2-3 may come true and the DC metadata set take a role of mediator among all sort of contents.

(2-4) EPG and Dublin Core metadata [KH99]

Then we will discuss about the Electronic Program Guide (EPG). The EPG is defined the digitized TV information on the newspaper. And it is also defined as metadata belonging to the TV programs. The EPG consists many attributes. We can find the title, date, channel, broadcasting station ...and other attributes from EPG metadata. Using the EPG, you can select the channel your taste. So EPG service is a kind of portal service. In Japan, basic attributes for EPG is authorized by Association of Radio Industries and Businesses (ARIB). The EPG attributes are described one of the Service Information (SI).

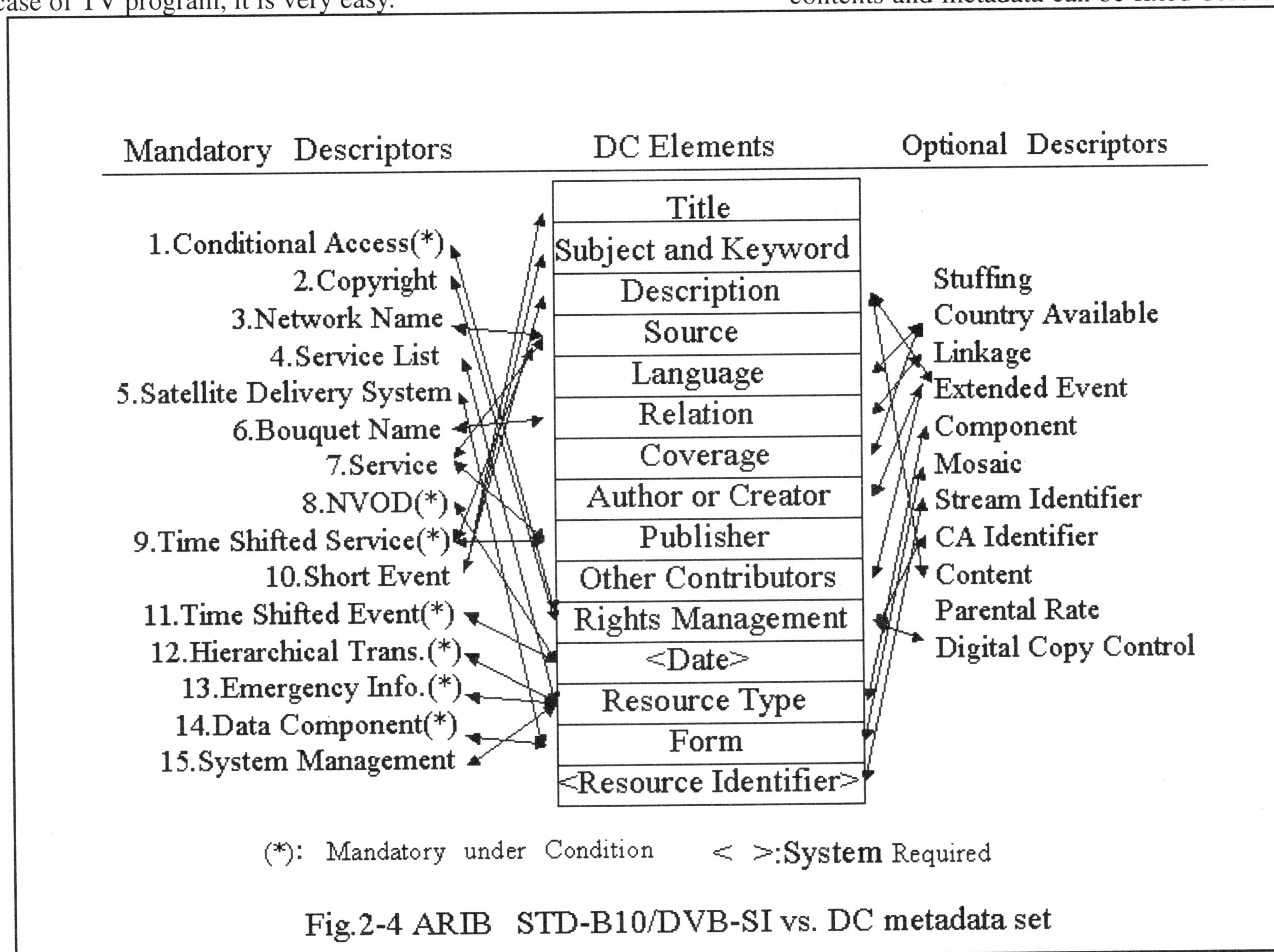
We point two typical differences between DL and EPG.

- (1) EPG set is broadcast (push service for all users), but DL metadata is only in the DL system (pull by a user).
- (2) DL contents are static on the system, but TV contents are not. It means the status of the information must be changed at the broadcasting time.

Of course, after broadcast, the TV contents may be handled as a general DL contents.

There are some differences between DC and EPG, but attributes are almost same (fig.2-3). Fig.2-3 shows the relation between ARIB-SI attributes and DC set. Here we use the "SI" as a expanded concept of EPG. The left side of fig.2-3 shows mandatory attributes of ARIB-SI and right side shows optional attributes. And middle low of fig.2-3 shows the DC elements. These two attributes set are good agreement. We will discuss detail in the next section.

At the last of this section, we propose that TV contents are able handled as a kind of digital contents and using DC set, we can get information of TV program seamlessly. Another word, the seamless portal service will come true. Note that conversion from EPG data to DC data is easily (see fig.2-4 again). And there is one more advantage. The EPG data (or SI) is written by broadcasting station. So, quality of the data is settled. The realization of good quality metadata is always difficult, but the



§ 3. “PLAYBOOK”

Now we propose our idea for adding the metadata for TV program ,named “PLAYBOOK”.

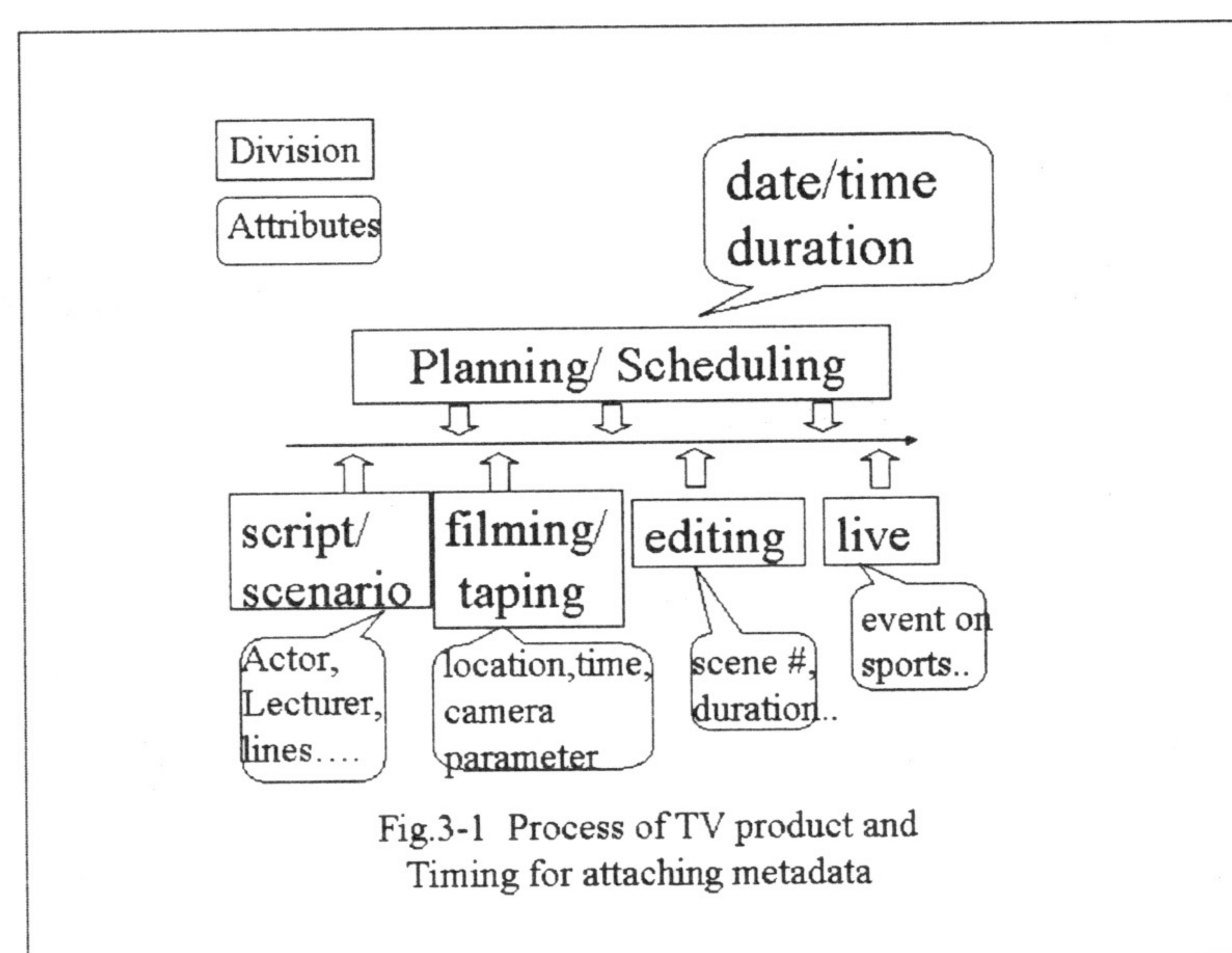
(3-1) Classification of the Production Processes

We made a consideration on the processes of TV program production focusing on the timings when metadata are added or generated.

Taking up the production of dramas as an example, broadcasting schedules, plot, cast, etc. are decided in planning, and a scenario will be written according to them. Lots of information, such as acts, scenes, actor and his lines, costumes, etc. are described in the scenario, and taping and editing must be proceeded on those information. Fig.3-1 shows the processes of TV program production and example of metadata generated in each process.

Focusing on scripts or scenarios as a mass of metadata, production of TV programs can be classified as follows;

- type1** - drama, cartoon, education program,...
scenario is written perfectly before taping
all words and their speakers are fixed
- type2** - variety show, cooking program, ... (taped)
scripts are written before taping. addition
and correction on editing is necessary



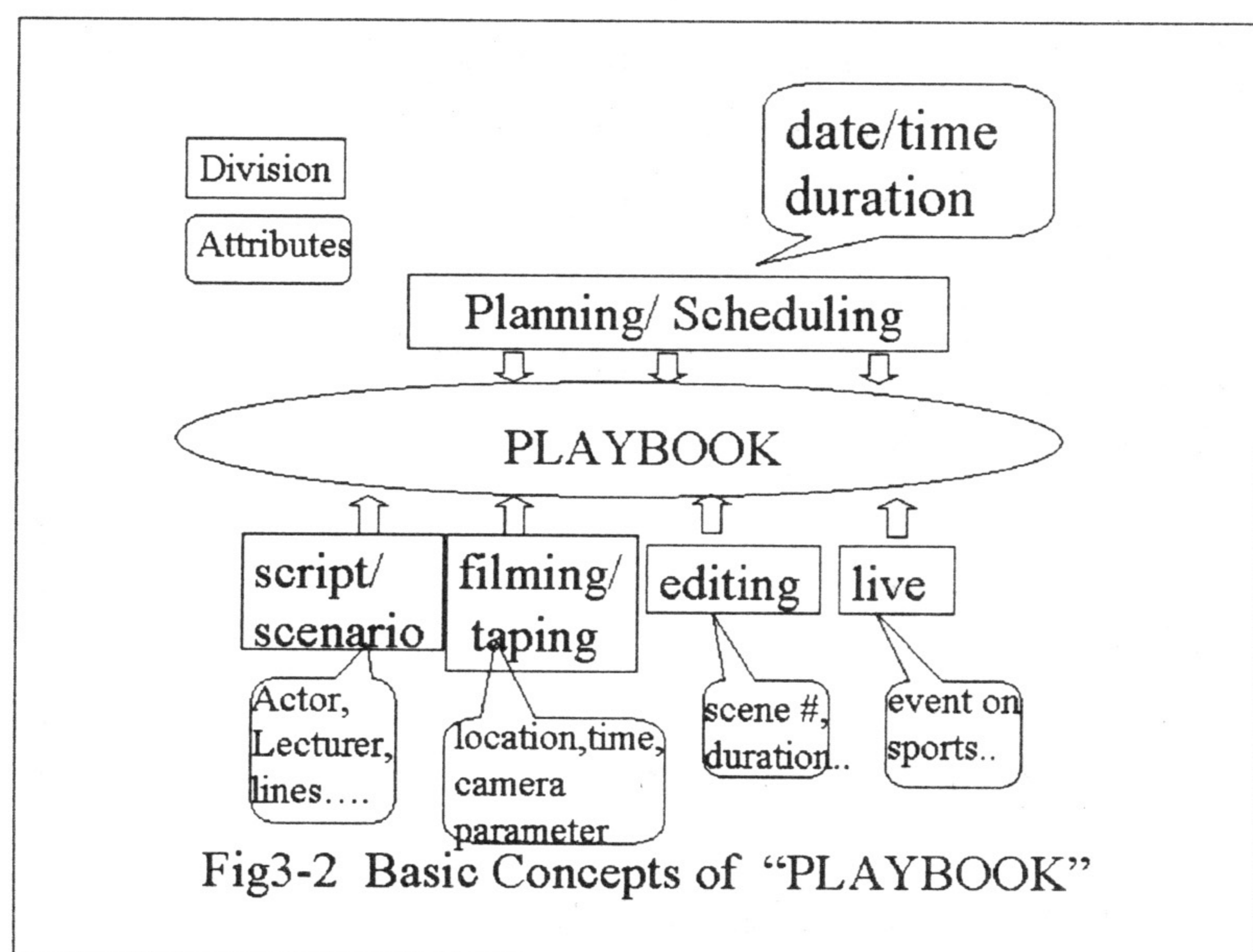
- type3** - newscast, sports,... (live)
cannot script the exact words, only
outlines are decided before starting
programs
- type4** - special live program
cannot predict what will happen

The proportion of metadata fixed before taping or broadcasting decreases from (1) in order to (4).

This kind of classification is important and there are some other reports [Komaki, NHK]. Our advantage is that we divide them by the viewpoint of script handling.

(3-2) 'PLAYBOOK' – Expansion of Scenario

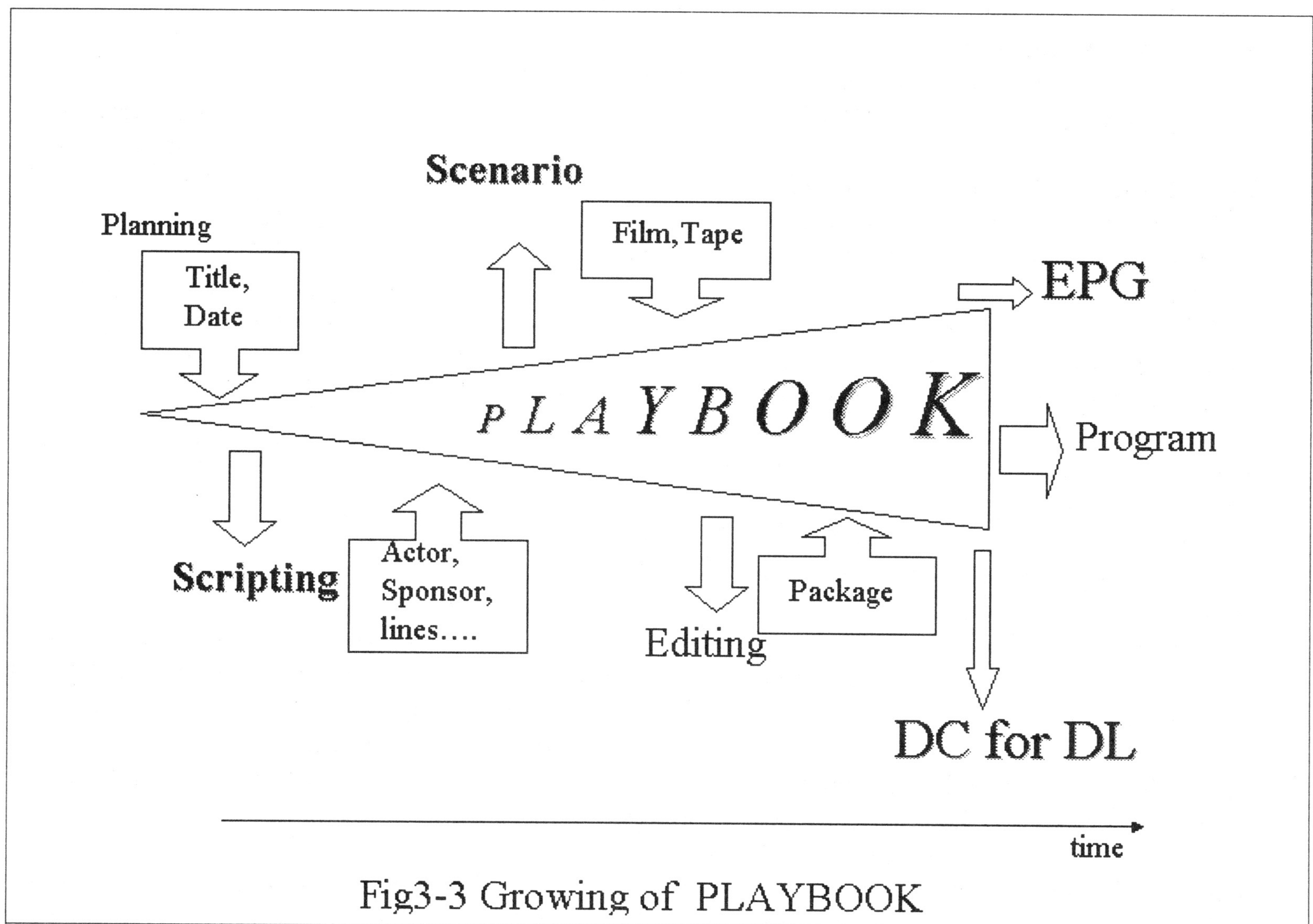
In case of programs classified in **type1** in section 3-1, scripts are perfectly prepared before their production. Script is drawn up in electronic data, and materialized audiovisual data for the program are taped/gathered in digital form. So, we attach importance to the aggregate of them and call it 'PLAYBOOK'.



In the PLAYBOOK, textual information such as player and his line, corresponding audiovisual data, and other metadata such as duration of each line are managed integrally. Not only the broadcasting program, but also other related contents such as publications, packaged video, internet Web contents, and data for digital libraries can be generated from PLAYBOOK by proper translations or filtering. Metadata delivered with program are not the exceptions. Fig. 3-2 illustrates the basic concept of 'PLAYBOOK'.

Note that the PLAYBOOK is growing while product process. There are many stages during product process. And the added metadata for each stage are different. Please look the Fig.3-3 carefully . At first, the planning stage, producer must decide the title of the program. This date, the title of the program, will be handled at all the stages. Today's TITLE of the program at each stage. But using PLAYBOOK, only the first time of the process, someone write it to PLAYBOOK. All other attributes, on air date, actor's name, channel of the program, ... all the attributes are written at the first time.

When an engineer at TV station makes SI, he can use a filter for SI and SI attributes will be selected from PLAYBOOK. When you want to make digest of the program, you will make a filter for digest and use it to PLAYBOOK, then you can get digest.



Please make filters for multi modal output, and you can get your demand type of content from PLAYBOOK.

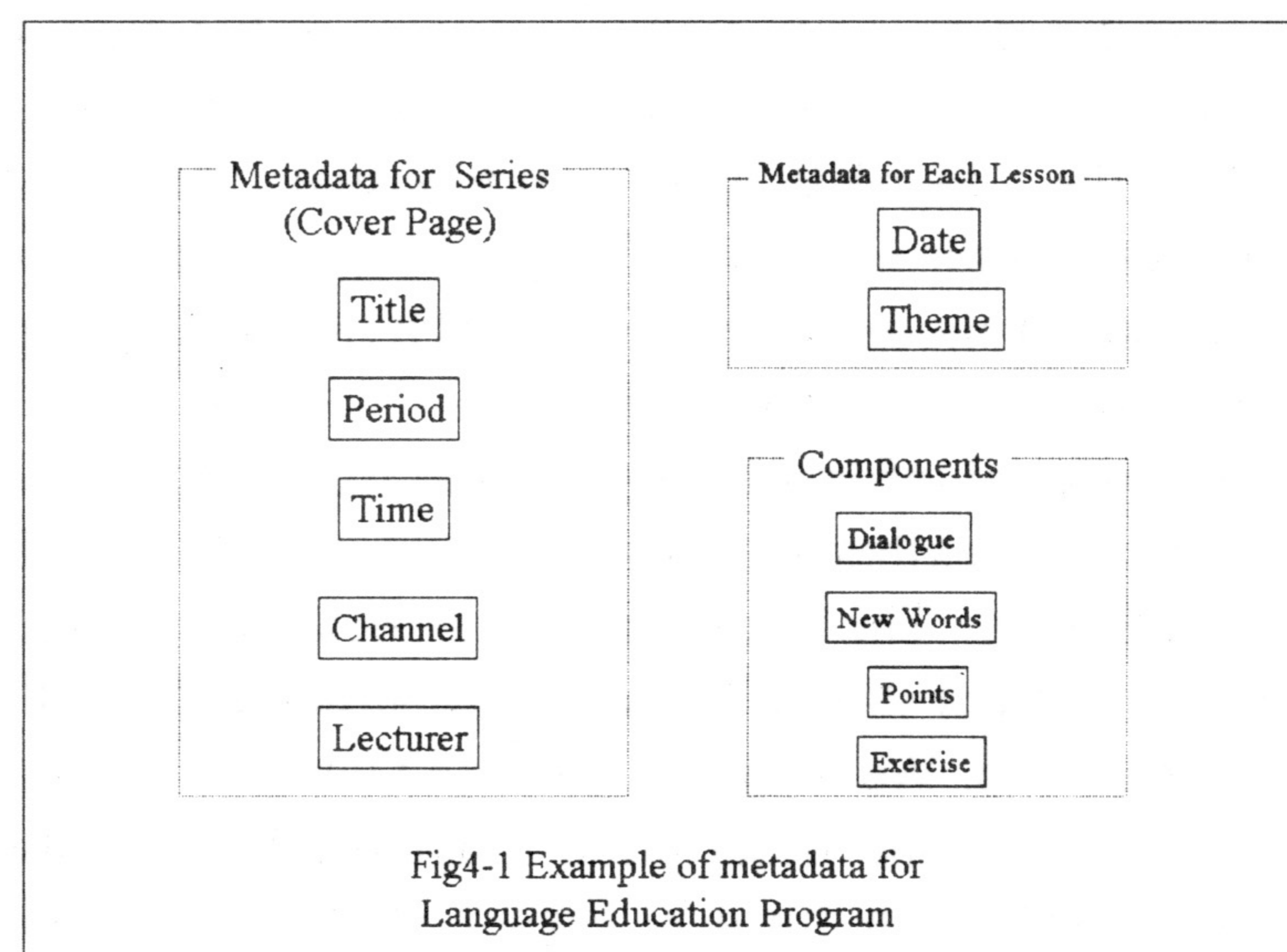
If you will make filter for Dublin Core, you can get DC attributes from PLAYBOOK.

§4 Example Applied to Language Education Program

In this section, an application example is described. We adopted a language education program as the first sample to apply concept of PLAYBOOK. Generally, language education programs have following features;

- (1) there are textbooks for each program on the market information contained in textbook is close to that of script for production,
- (2) they are broadcast in a series metadata describing semantics and structure of program are more useful for users because each program in a series is structured similarly,
- (3) there are tapes or CDs on the market as assistant materials they must be produced from the PLAYBOOK,
- (4) a large numbers of programs are broadcast in the area of language education.

A student of a language education program is required to get the textbook before he attend to the lesson. The textbook is considerable as a mass of metadata because it contains a lot of information related to the program such as title, broadcast date and time, components and its structure, etc. Those information contained in textbook are fixed prior to the production of the program. Fig. 4-1 shows typical metadata extracted from textbook.



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<?XML version="1.0" encoding='Shift_JIS'?>

<NHK-TEXT>
<cover>
<DC:Title> 基礎英語 1 </DC:Title>
<DC:Subject> 英語の基礎を楽しく学びましょう </DC:Subject>
<DC:Publisher>NHK/日本放送協会 </DC:Publisher> <!-- 出版社 -->
<DC:Publisher.channel> NHK第2放送 </DC:Publisher.channel>
<DC:Contributor.lecturer>木村松雄 </DC:Contributor.lecturer><!-- 講師-->
<DC:Contributor.co-lecturer>Kate Elwood </DC:Contributor.co-lecturer>
<!-- 外人ゲスト -->
<DC:Contributor.co-lecturer>Russ Veillard
</DC:Contributor.co-lecturer> <!-- 外人ゲスト -->
<DC>Date.year>1999 </DC>Date.year> <!-- 放送年 -->
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<DC>Date.date-total>1,27 </DC>Date.date-total> <!-- 放送日-->
</cover>
  
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Fig4-2 One of the Examples of PLAYBOOK (Text only,Cover Page)

Metadata which describe a series or each lesson (a program) may be used for program navigation, and that about contents such as dialogue, points, and exercise are concerned with the components and structure of the program. Each component could be segmented into smaller elements, like dialogue broken down into sentences of subjective language and their translations, and metadata would be attached for each segment/element. By broadcasting those metadata along with program, audience can utilize more convenient applications such as personalized viewer, storing system, a function of selecting components according to their preferences.

In the PLAYBOOK, audiovisual data are integrated with metadata. Figure 4.2 (previous page) illustrates a model of the PLAYBOOK for language education program[Hunter].

The textual information, arranged for production of script and textbook, forms the core data of the PLAYBOOK. The contents and associated metadata of the program should be described structurally in the core data file. We adopted XML (eXtensible Markup Language) as the description language for the core data as shown in fig 4-2. Fig4-2 shows the middle stage of the producing. There are no audio files and image files. Then after filming, each of the

audiovisual data is stored separately and only the description of its link information is added to the core data (fig.4-3) So, the textual information and audiovisual data can be managed dispersively on several storage systems which are connected through network. This model of PLAYBOOK is similar to the structures of common web contents which consist of textual data files in HTML and other multimedia resources in various format, and it is unquestionable that Web contents associated with the broadcasting could be produced easily by simple translation from this PLAYBOOK(Fig4-4). We made a filter with Perl. And further, other output such as publication, packaged video, and so on would be also produced from PLAYBOOK by appropriate filters or translators.

The essentials we would like to emphasize in the concept of PLAYBOOK are as follows;

- (1)it is applicable best to the programs classified into type1 (cf. Section 3.1)
- (2)core textual information could be generated with less additional work load in the processes of scripting and textbook production
- (3)metadata and materialized data should be managed integrally in the form of structural description.

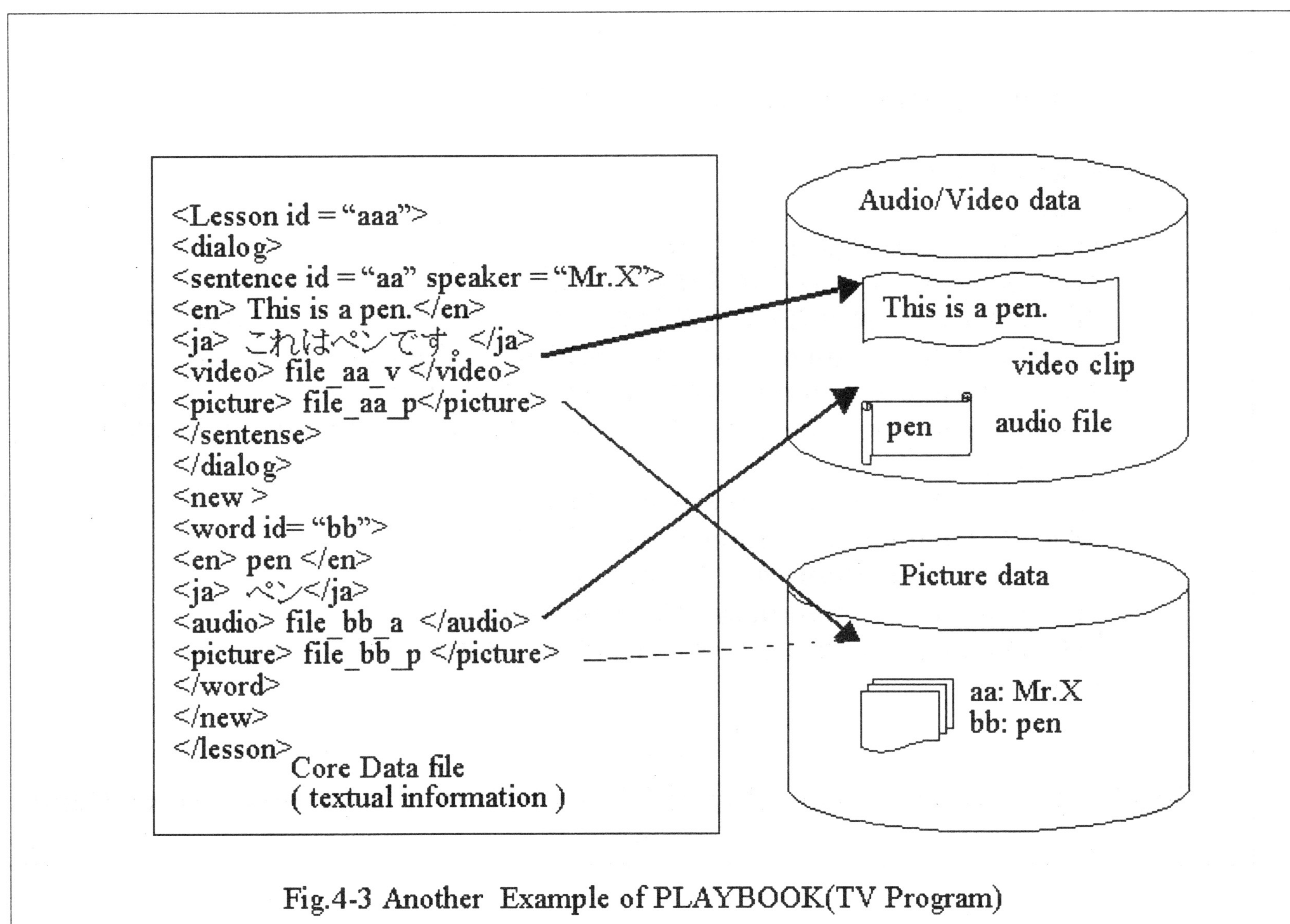


Fig.4-3 Another Example of PLAYBOOK(TV Program)

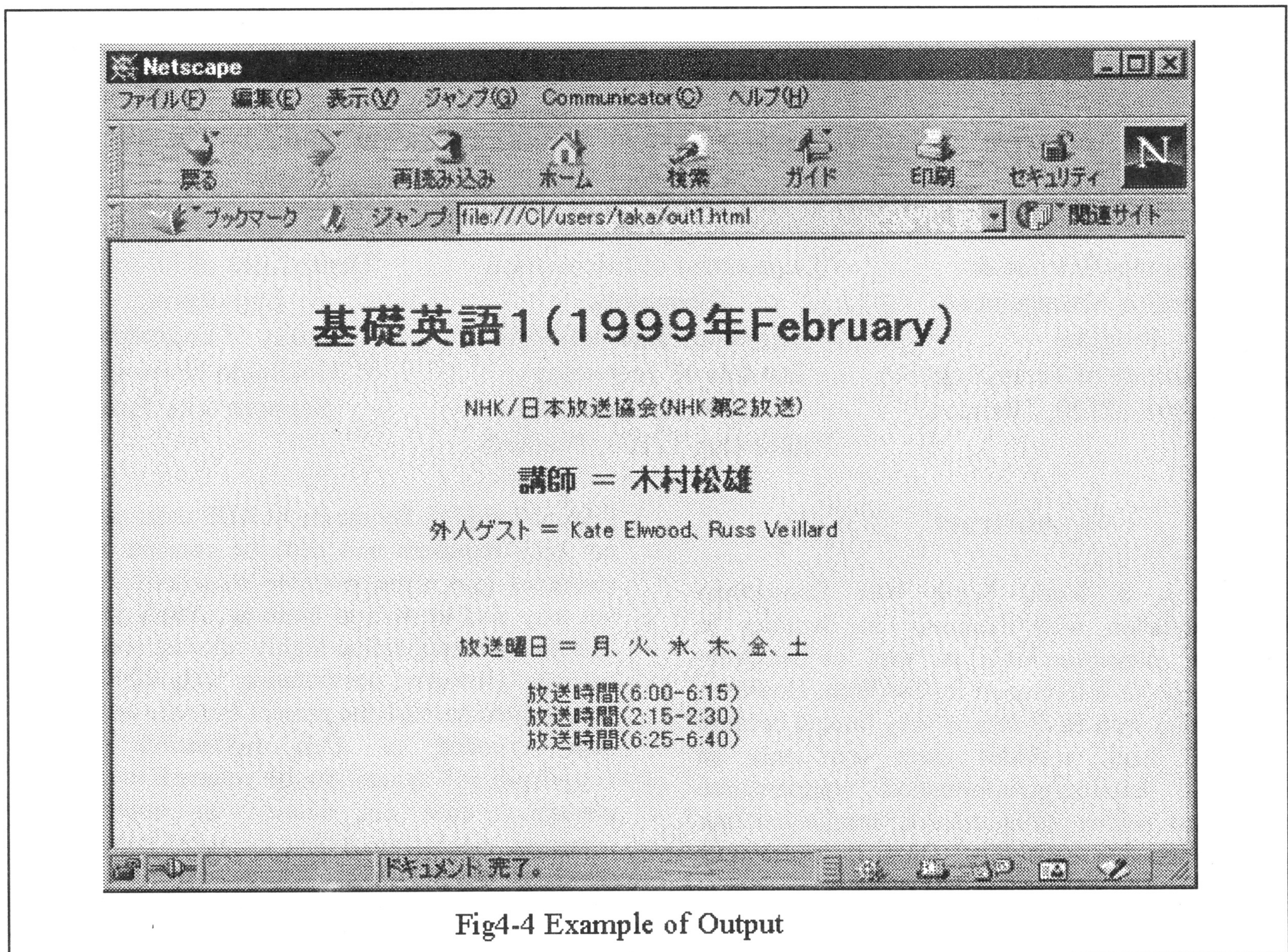


Fig4-4 Example of Output

§ 5 Conclusion and Further Study

In this paper, we discussed about similarity between the DC set and basic attributes set for EPG. Then, we confirmed the availability of DC set for EPG services. After that, we propose a new production concept, called PLAYBOOK. It will realize the easy way to adding the DC attributes to TV contents.

In the section four, we tried only textual documents. But our object is not only text but also all kind of digital contents. Now we are developing the proto-type of PLAYBOOK for radio (including audio file).

Acknowledgement

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