

# **A General Model of Presenting the Content of Science News Using XML**

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## **Abstract**

This study is focused on formulating a formal and general way of representing the content of news using XML for both readers and the press. But, in this first stage, owing to the limitation of resources, we select science news as the target object of our study, and consider general readers as the main class of users that the system will serve. Although the outcome of our study at the present stage could serve partial needs of the press, the main functions are expected to be helping readers to understand the content of science news.

In order to express the content of news, some theories and practice of news writing have been applied in this study, such as the 5w1h (who, when, what, where, why and how) elements, some writing structures including the lead, body and ending, and writing styles, etc.

TEI and Metadata studies are two highly related pioneer works of this study. So, we follow the TEI example to design a DTD and a set of tags for representing the content of news at first. In order to be compatible with other representation systems on Internet, the tag set is so designed as to be compatible with the major existing metadata sets published, such as the Dublin Core, NITF, etc. Then, 20 samples of science straight news were used to polish the designed system. So far, we found the system is acceptable at the first place, but we have not done a comprehensive test of our system yet. This test will be conducted in the near future hopefully with the database of the United Daily News in Taiwan.

Considering the preliminary outcomes based on this study as a kernel, we are optimistic to think that our system can be extended to address general news reporting, such as features, special reporting, columns, commentaries, etc. These are the future directions we will continue to pursuit.

## **Introduction**

Newspaper production has been automated for a long time since the printing machine improved. However, this was not so in the case of Chinese newspapers until the Chinese language typesetting and page layout capability has been developed for years. Less than 10 years ago, only a few newspaper companies started the so-called “fully automation” of newspaper production, including a shift from picking-up characters by hands to data-entry through a Chinese characters keyboard. Today, all newspapers in Taiwan have replaced their production systems or contracted their printing business to computerized printing company. This change took the press more than 10 years to realize the importance of information technology and computer applications gradually.

Although the press in Taiwan has learned a lesson from newspaper’s computerization, there are few newspaper people who realize the need for some standardized markup languages, e.g. SGML, XML for their newspaper database in the coming internet age. It is also true within the academic community in mass communication in Taiwan. Here, only a few experts in journalism know the importance of markup languages for information exchange and retrieval, yet no one has focused on systematic research on news content, news writing, news production and also related metadata.

This study is a beginning, focused on formulating a formal and general way of representing the content of news using XML for both readers and the press. But, in this first stage, owing to the limitation of resources, we selected science news as the target object of our study, and consider general readers as the main class of users that the system will serve. The main functions of the present study are expected to be helping readers to understand the content of science news. We would like to address the urgent need to develop a set of general metadata so that the content of news can be shared by all workers/users at every stage of the life cycle of news. Thus, we hope the metadata set we proposed can be applicable to news generation, production, application and any kinds of value-added further development of news, including reporting, writing, editing, printing, news retrieval and news database generation and so on. In the future, we also wish to share our experience with all the people who are interested in newspaper metadata, XML, TEI, especially using Chinese characters, -- also Kanji and Hangu.

## **A Brief Review of News Writing**

There are hundreds of books talking about “news” and “news writing.” No matter how old or how new those books are, no matter what philosophy and theories they stand for, all the authors share the same proposition of news as E. L. Shuman’s. According to Frank L.

Mott (1952:158), “perhaps it was Shuman” who included the “Rule of the Five W’s” in his treatise of 1903. These five W’s were “who?” “what?” “where?” “when?” and “why.” Then, “how” was added. In other words, each news includes “who, what, where, when, why and how” six elements. Indeed these six elements are the necessary & sufficient conditions of a news. The six elements are also so-called as “5W1H” as represented in Figure 1.

According to journalism, news must contain at least an event with “news values,” otherwise there is no “news.” Therefore, each news story should contain “a news event” with six news elements. This is a universal “standard” shared by or a consensus within the journalistic community.

**Figure 1: News Elements**

- **who—subject (*person, organization, dog, etc.*) of a news event**
- **what—happened, happening things**
- **where—place, location**
- **when—time thing(s) happened**
- **why—cause, consequence**
- **how—situation & process**

In other words, if any one of the six elements was missing in a news story, this would mean the story is incomplete or inaccurate. Besides, a news story could contain more than one event. According to the Dictionary of Communication and Media Studies, “the occurrence which gives rise to media coverage will have fulfilled one or more, or an amalgam of NEWS VALUES. In the analysis of media, different forms of event can be identified. Primarily there is the key event...” (1997: 78-79), and according to Hans Mathias Kepplinger and Johanna Habermeier, in “The impact of key events on the presentation of reality” in the European Journal of Communication, September 1995, they suggest useful typology of the causes and communicative functions of events (see diagram).

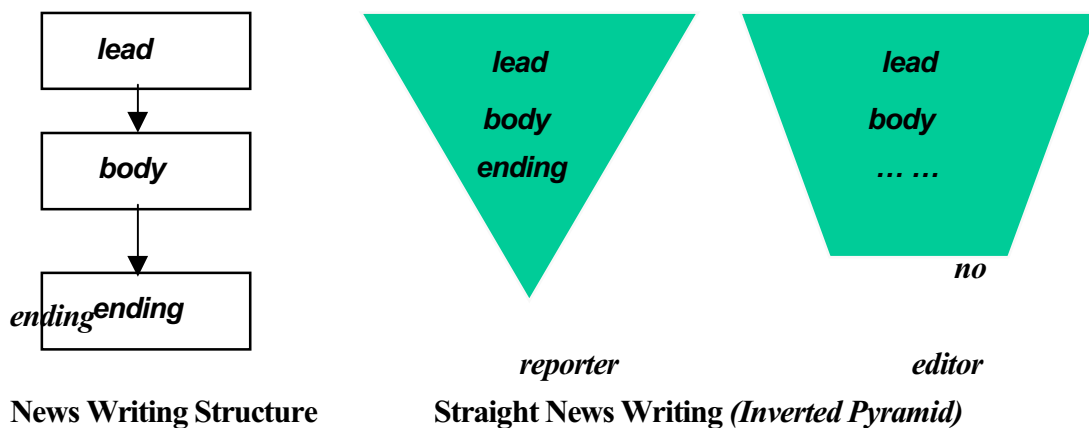
Communicative functions	Causes		
	Genuine (independent of the media)	Mediated (influenced by the media)	Staged (for the media)
Key events			
Similar events			
Thematically related events			

According to the IEEE Standard Computer Dictionary (1991: 82), an event means “an occurrence that causes a change of state in a simulation, also can be defined as the instant in time at which a change in some variable occurs.”

In this study, we mainly adopt the definition given by communication and media. We use the idea of “key event, similar event and thematically related event” as our working definition of events.

Shuman wrote the first American textbook in journalism in 1894, he pointed out that to put “the marrow of the whole story” in the first paragraph was almost a universal style used by newspaper offices. In short, the straight news writing has an underlying proposition, i.e., the first paragraph or the first sentence of a news story must be immediately attracted by readers, otherwise no one will pay any attention to the content. With this assertion, in order to give readers a quick look at the complete story, the following sentences in the first paragraph should also contain all the six elements of news event. This thumb rule for straight news writing is called as an “inverted pyramid” type. Although nowadays some scholars criticize the inverted pyramid writing is out-of-date and also recommend some different writing styles, there are still plenty of news from wire services, news agencies, newspapers and broadcasting systems using the idea of the inverted pyramid writing structure. Figure 2 shows the standard news writing structure and the inverted pyramid straight news writing.

**Figure 2: News Writing Structure**



Here, we have referred to a couple of books related to news, writing and news writing, which will not be mentioned in detail, but can be found in the references.

## Markup Language

In this study, we heavily rely on two experts' expertise on XML/SGML, and also on TEI for Chinese documents. Rick Jelliffe and Christian Wittern who both are working and living in Taipei. They are two members of our research group. Rich Jelliffe taught us about XML by five weeks' "XML Training Workshop" (see details in the Reference). Dr. Wittern helped us to know TEI for Chinese documents, also gave us a double check of the validation.

## Research Method — *20 examples of science news*

In order to develop a general system for newspapers, we choose 20 straight news of science news as the key object of our study. Among the 20 examples, 9 were intentionally selected from two Chinese textbooks of news writing<sup>1</sup>, the rest of 11 were carefully chosen from the two biggest nationwide newspapers, the United Daily News and China Times<sup>2</sup>. The 9 examples from textbooks were written in 1970-1971; the 11 from newspaper were printed in 1998-1999. In nearly 30 years, these science news writings have seen little change, they are still following the inverted pyramid (or a summary lead) writing structure. These 20 science news include: 7 items related to space science (space ship Apollo 8 & 9, space shuttle and telescope for space observatory), 4 items related to life science (bio-chemistry, cancer disease, AIDS, heart transplant), 2 items related to bio-technology (ethical issues), each one item of satellite technology (the application of telecommunication), civil engineering (the maintenance of dam), physics (about two Chinese female physicists), and science organization (NSC's annual report), and two items related to environmental protection and energy (national meeting) and one item of psychology news (IQ).

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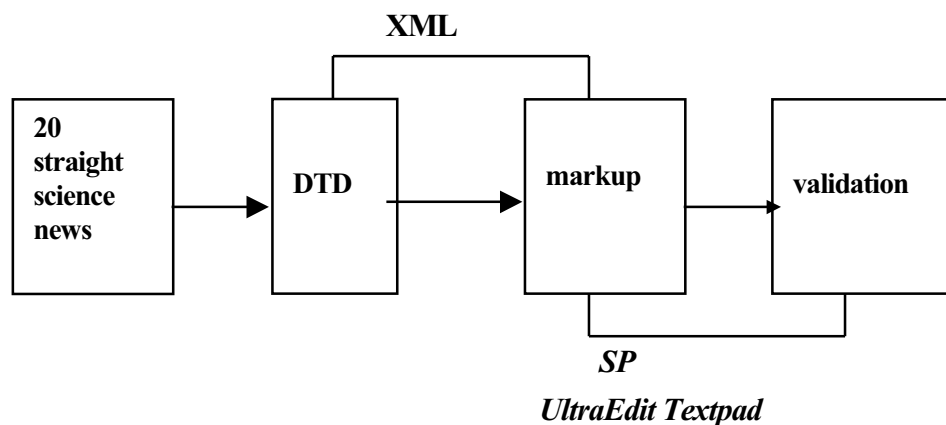
<sup>1</sup> 4 examples are from Chang & Yu (ed.), "A Practical Handbook of News Writing," Taipei: Ken Hsin Institute & Asia Foundation, 1971, p.6 & p.20 【張志宏、喻麗清編《新聞寫作實用手冊》台北, 耕莘文學院及亞洲基金會】; 5 examples are from Shi, Y.Q., "Science News Reporting," Taipei: The Union for Taipei's Reporters, 1972, pp.58-61, pp.66-67 & pp.71-73 【石永貴《科學新聞報導》台北, 台北市新聞記者公會】

<sup>2</sup> These two are the two biggest newspaper enterprises in Taiwan, also the only two have a long-term position for science news reporting. There is no formal, official audit system of newspaper circulation. These two always claim they are the biggest one in Taiwan. To some extent, it is really difficult to recognize which one is the biggest. So in academic community, we used to call them as "the two biggest."

## Working procedure

To sum up, our working procedure can be shown as follows.

**Figure 3: Working Procedure**



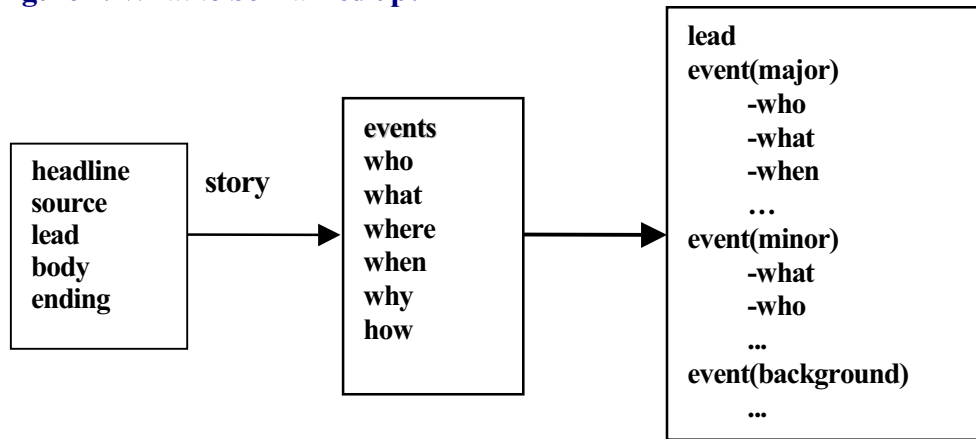
After 20 science news were selected, we analyze each news content through a trained journalistic view. First, we identified six elements of news and events' type (such as major, minor, other, background and detail). Second, we distinguished the statements type, e.g. fact, opinion and mixed up with fact and opinion, and also identified whether there are any relative event. Third, we judged what is news information and what is scientific information. Forth, we started to write DTDs, both in Chinese and English versions. (See detail in Appendix 1)

At the stage of writing DTD, we also started to develop tag sets. However, all tag sets were defined, revised and developed during the process of marking-up each news' content.

On the fifth stage, we marked-up news writing structure (e.g. lead, body and ending), six elements of news and events type. Figure 4 shows what to be marked-up. Besides, we also marked-up the news content by a semantic unit instead of a syntactic unit. This is a different approach from most linguistic analysis. After we tried to mark-up by syntactic units many times, we found in a news context the meaning of a word, a phrase, or a sentence is not enough to represent, sometimes it may be misleading the true meaning. The experience of try-and-error to mark-up by a syntactic way let us learn that the semantic unit for marking-up news' content make more sense to us. This can be found in Appendix 2: Tag Set and Appendix 3: An Example.

After we marked-up all the 20 science news using XML, this study were reaching the last stage (except for writing a report), the validation stage.

**Figure 4: What to be marked up?**



### **Validation**

Lacking sophisticated and achievable SGL/XML capable editors suitable for editing of East Asian texts, it is feasible and possible to set up an editing environment with popular and powerful shareware editors. These editors can be downloaded from the Internet and used for a limited period free of charge. Two editors are discussed here, UltraEdit Professional Text/Hex Editor Version 7.00a--(available from [www.ultraedit.com](http://www.ultraedit.com)) and TextPad 4.1 (see [www.textpad.com](http://www.textpad.com)), both are rich in features with no clear front-runner. UltraEdit most recent version is capable of reading Unicode text files and seems to use Unicode as its internal encoding. There are still problems with codepoints outside the current codepage, but this gives UltraEdit a slight advantage over TextPad, whose most recent version introduces support for double-byte encodings and ships a version with Japanese user interface. In this project, UltraEdit is used for validating the news markup using XML.

### **Conclusions**

This study shows that Chinese news content can be marked-up using XML. From this position, in a long run, we can see the newspaper retrieval will be more active, informative to readers, researcher, teachers and all other people. We also see a picture of the more exchange of information among organizations, individuals, and the more effective communication with different languages.

Based on this study, newsmen can develop a system to check news writing (e.g. six elements, events, writing structure.) And, teachers, professors and students can apply this to do teaching and learning news writing. Besides, researchers can apply to do content analysis on news supplied by all kinds of news media.

At present, the most important thing is: we can share our experience with XML or TEI groups, especially in Chinese documents.

Indeed, we don't have many experts who know about Chinese XML or TEI, we really had to learn the markup language by practice. In the future, we do need experts' comments, and more discussion and help from XML/TEI experts. The urgent help we need is people who know the semantic analysis of news content in Chinese.

We would like to share our research with news groups and academic community in journalism; not necessary only in Chinese language and in Taiwan, but also in other languages and other countries<sup>3</sup>.

## Further Studies

In the near future, this study will be extended to:

- test the system with the database of the United Daily News (enterprise) in Taipei.
- apply to other kinds of news content, such as features, special reporting, columns, commentaries, etc.
- study to political/economic/criminal news, etc.
- develop a mature recursive model to represent the relationship among events, who, what, where, when, why and how.

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<sup>3</sup> ECAI will set up a thematic group focused on newspaper content markup. Everyone who is interested in this issue is welcome to contact Y. C. Hsieh or Lewis Lancaster.



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## APPENDIX

### 1. DTD for the Content of Science News

#### *In English*

```
<?xml version="1.0" encoding="big5"?>
<!DOCTYPE Science_News [
  <!ELEMENT Science_News (#PCDATA | Science_Story)* >
  <!--          Writing Structure          -->
  <!ELEMENT Science_Story ( headline | source | lead | body | ending)*>
  <!ELEMENT headline (#PCDATA)>
  <!ELEMENT source (journalist_name | newspaper_name | news_agency_name |
    service_date
    | publishing_date | place | page)*>
  <!ELEMENT journalist_name (#PCDATA)>
  <!ELEMENT newspaper_name (#PCDATA)>
  <!ELEMENT news_agency_name (#PCDATA)>
  <!ELEMENT wired_service_date (#PCDATA)>
  <!ELEMENT publishing_date (#PCDATA)>
  <!ELEMENT place (#PCDATA)>
  <!ELEMENT page (#PCDATA)>
  <!ELEMENT lead (#PCDATA | event)*>
  <!ELEMENT event (#PCDATA | who | what | when | where | how | why)*>
  <!ELEMENT who (#PCDATA)>
  <!ELEMENT what (#PCDATA)>
  <!ELEMENT when (#PCDATA)>
  <!ELEMENT where (#PCDATA)>
  <!ELEMENT how (#PCDATA)>
  <!ELEMENT why (#PCDATA)>
  <!ELEMENT body (#PCDATA | event)*>
  <!ELEMENT ending (#PCDATA | event | who | what | when | where | how | why)*>
  <!ATTLIST Science_News id ID #REQUIRED>
  <!ATTLIST event id ID #REQUIRED
    classification (major | minor | other | background | detailed) "detailed"
    statement_type (fact | opinion | mixed) "fact"
    content_characteristic (news_information | scientific_information)
```

```

"news_information"
  relative_events CDATA #IMPLIED
  relation_types CDATA #IMPLIED >
<!ATTLIST who id ID #REQUIRED>
<!ATTLIST what id ID #REQUIRED>
<!ATTLIST when id ID #REQUIRED>
<!ATTLIST where id ID #REQUIRED>
<!ATTLIST how id ID #REQUIRED>
<!ATTLIST why id ID #REQUIRED>
<!--End of NEWS DTD-->
]>

```

### ***In Chinese***

```

<?xml version="1.0" encoding="big5"?>
<!--NEWS XML encoding date: 2000-1-4-->
<!DOCTYPE 科學新聞 [
<!ELEMENT 科學新聞 (#PCDATA |科學新聞內容)* >
<!-- 寫作結構 -->
<!ELEMENT 科學新聞內容 ( 標題 | 來源 | 導言 | 主體 | 結尾)*>
<!ELEMENT 標題 (#PCDATA)>
<!ELEMENT 來源 (#PCDATA |記者名|報紙名|通訊社名|外電日期|刊載日期|
發稿地點|
版面位置 )*>
<!ELEMENT 記者名 (#PCDATA)>
<!ELEMENT 報紙名 (#PCDATA)>
<!ELEMENT 通訊社名 (#PCDATA)>
<!ELEMENT 外電日期 (#PCDATA)>
<!ELEMENT 刊載日期 (#PCDATA)>
<!ELEMENT 發稿地點 (#PCDATA)>
<!ELEMENT 版面位置 (#PCDATA)>
<!ELEMENT 導言 (#PCDATA |事件)*>
<!ELEMENT 事件 (#PCDATA |人|事|時|地|如何|為何)*>
<!ELEMENT 人 (#PCDATA)>
<!ELEMENT 時 (#PCDATA)>
<!ELEMENT 地 (#PCDATA)>
<!ELEMENT 事 (#PCDATA |人|時|地|如何|為何)*>
<!ELEMENT 如何 (#PCDATA |人|事|時|地)*>
<!ELEMENT 為何 (#PCDATA |人|事|時|地)*>
<!ELEMENT 主體 (#PCDATA |事件)*>

```

```

<!ELEMENT 結尾          (#PCDATA|事件)*>
<!ATTLIST 科學新聞內容  id    ID    #REQUIRED>
<!ATTLIST 事件          id    ID    #REQUIRED
    類型          (主要|次要|其他|背景說明|細節) " 細節 "
    陳述方式      ( 事實|評論|夾敘夾議 ) "事實"
    內容性質      (新聞消息|科學消息 ) "新聞消息"
    相關事件      CDATA #IMPLIED
    關係類型      CDATA #IMPLIED>
<!ATTLIST 人          id    ID    #REQUIRED>
<!ATTLIST 事          id    ID    #REQUIRED>
<!ATTLIST 時          id    ID    #REQUIRED>
<!ATTLIST 地          id    ID    #REQUIRED>
<!ATTLIST 如何        id    ID    #REQUIRED>
<!ATTLIST 為何        id    ID    #REQUIRED>
<!--End of NEWS DTD-->
]>

```

## 2. Tag Set

Tag *<event>*

### \* Description

sentences at least with a subject and a verb, which are semantically independent

### \* Attribute

including classification, statement\_type, content\_characteristic, relative\_events , relation\_types, id, etc.

### \* Classification

- 1.major event (key event)
- 2.minor event
- 3.other event
- 4.background event
- 5.detailed event

### \* Statement\_type

1. fact
2. opinion
3. mixed

### \* Content\_characteristic

1. news\_information
2. scientific\_information

\* **relative\_event:** (CDATA #IMPLIED)

\* **relation\_types:** (CDATA #IMPLIED)

parallel, supplement, cause-effect, dialogue, etc.

\* **Id:** (CDATA #IMPLIED)

**Tag** <who>

A subject or an object in a sentence represents a key role in an event.

**Tag** <what>

A phrase, a sentence or an object represents something happened or happening.

**Tag** <where>

A location, place, building, country, etc. in an event.

**Tag** <when>

A date, year, period, duration, etc. of time in an event.

**Tag** <why>

A reason, cause, effect, or consequence of an event.

**Tag** <how>

An approach, mean, method, procedure, process, etc. of a happened or happening event.

### 3. An Example

```
<?xml version="1.0" encoding="big5" ?>
- <!-- NEWS XML encoding date: 2000-1-4-->
  <!DOCTYPE 科學新聞 (View Source for full doctype...)>
- <科學新聞>
- <科學新聞內容 id="SN2">
<標題 />
  - <來源>
    <報紙名>中央日報</報紙名> 【
    <發稿地點>中央豪士敦</發稿地點>
    <外電日期>五日</外電日期>
    <通訊社名>美聯</通訊社名>電】 </來源>
- <導言>
- <事件 id="M1" 類型="主要" 陳述方式="事實" 內容性質="新聞消息">
  <人 id="A1">第一位接受純粹人工心臟移植人</人>，
  <時 id="C1">今天</時>
  <事 id="B1">清醒著，情況令人滿意</事>。
  <人 id="A2">他的妻子</人>
  <事 id="B2">則淚汪汪的懇求有人捐贈人類心臟</事>。 </事件> </導言>
- <主體>
- <事件 id="De1" 相關事件="M1" 關係類型="補充" 類型="細節" 陳述方式="事實"
  內容性質="新聞消息">
  <人 id="A3">伊利諾州人卡普</人>，
  <時 id="C2">前天</時>
```

<事 id="B3">在三小時的手術中，接受移植一個實驗性的人工心臟</事>。

<事 id="B4">他的心室嚴重受損，修補無望</事>。</事件>

- <事件 id="De2" 相關事件="De1" 關係類型="補充" 類型="細節" 陳述方式="事實" 內容性質="新聞消息">

<人 id="A4">曾動過十八次心臟移植手術的聖洛克主教派教會醫院心臟移植小組主持人庫里醫生</人>

<事 id="B5">說，純粹機械的心臟，過去僅用於動物</事>，

- <為何 id="F1">而

<事 id="B6">這次手術，則僅用以維持病人活著</事>，

<事 id="B7">等待有人捐贈心臟</事>。</為何> </事件> </主體>

- <結尾>

- <事件 id="De3" 相關事件="M1" 關係類型="補充" 類型="細節" 陳述方式="事實" 內容性質="新聞消息">

<人 id="A5">醫院發言人</人>在

<人 id="A6">卡普的妻子雪莉</人>

<事 id="B8">懇求捐贈心臟後不久說</事>：「

<事 id="B9">目前我們最關心的是一個合適的捐贈人</事>。」</事件> </結尾>

</科學新聞內容>

</科學新聞>