

Study on Rational Application of eXtensible Business Reporting Language

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Abstract—Extensible Business Reporting Language (XBRL) has developed rapidly since its birth as one of accounting information processing standards and the latest technology. The governmental departments (including finance, taxation, business and other institutions), listed companies, famous software companies, academic institutions and other professions are paying more and more attention to the research in the finance information field by using XBRL. Related projects, academic conferences and discussion have been initiated to study its application and benefit. This has, in turn, lead to a new research applications upsurge in the field of accounting information management. However, the phenomenon that the advantages of XBRL were magnified is also apparent. In order to spread and apply XBRL, it is vital to objectively understand its advantages and limitations of XBRL, to constantly explore its applicable areas, and to have a good working knowledge of how it can be further developed. Being a business reporting language with many advantages, XBRL is not 100% perfect. There is still a huge distance between XBRL and the ideal network business reporting language. Based on system analysis on the research of XBRL in China and the research data samples selected from the Listed Companies in China Shanghai Stock Exchange from 2005 to 2006, the test demonstrated that the present enterprise does not obtain the superior earnings from the XBRL application, thus those enterprises cannot become the prime promoter of XBRL application. Currently, the shortcomings and performance bottlenecks in XBRL application are: Firstly, XBRL can only solve the problem in data performance format, but cannot fix the problem for the main reason for the existence of a multi-report form system and in the disclosure of information. Secondly, as there are many different systems and bodies of Taxonomy, the use of XBRL to compare and analyze accounting information in cross-regional or cross-country is not meaningful. Even in the same country, a number of organizations based on different Taxonomy will face the same problem when comparing financial and accounting information. Finally, there are inherent flaws of XBRL, such as large data storage capacity demand, inefficient implementation and excessive reliance on network security. It is bound to put enormous additional construction IT costs to companies, and may lead to 'IT investment black hole'. Based on the research above, this paper proposes some methods and direction to solve or alleviate the problems this study found and questioned. In the research developing process of XBRL, if the problem

questioned in this paper can obtain effective solutions, we can believe that this technology will bring significant changes to the accounting profession. XBRL will become the promotional power of convergence of international accounting standards. Finally, not only will it make the enterprises' accounting information reporting mechanized, standardized and transparent, but it will also reduce the risk of fraud in accounting to a certain extent.

Index Terms—Instruction , The rational cogitation of XBRL application , XBRL application and discussion in China , Discussion , Conclusion

I. INTRODUCTION

XBRL (eXtensible Business Reporting Language) is an application of XML (eXtensible Markup Language) on the commercial report information exchange. XBRL provides a kind of standardized method to create and publish financial reports and other information by increasing marks on the financial information content. As a result, collection, processing, and conversion of internal and external financial information have become relatively easy. Before the XML technology was used, the network financial report was mainly applied to HTML technology and PDF text format [1]. The HTML provides marks to hypertext original documents and directs browsers to show page information in order. The client depends on a browser to explain both HTML and transmit information to end-users. HTML is only a simple demonstrative language which defines styles, forms and contents in the same document. HTML merely pays attention to the related content on browser's demonstration. So it is unable to express and discriminate the concrete connotation of financial data. Searching network financial report based on the HTML language is often like looking for a needle in haystack [2]. The PDF format is similar to graphic file. Users can read it very clearly but cannot obtain the data automatically. Both the Stock Exchange and intermediary institutions have to re-processing the financial information published by Listed Companies. A lot of manual intervention not only increase the error rate in processing data, but also increases costs across the

board. Due to the lack of a uniform data standard, different accounting entities organize accounting data according to their own standards and formats. In return, data exchanging and sharing become more and more difficult [3].

Many countries and regions in the world, such as the United Kingdom, the United States of America, Canada and Australia, are actively involved in developing and applying XBRL. The rapidly development of XBRL leads to an upsurge of research applications, in the field of accounting information management [4]. However, a phenomenon that magnifies advantages and fuzzes application drives is also apparent. In order to spread and apply XBRL, it is vital to objectively understand its advantages and limitations of XBRL, to constantly explore its applicable areas, and to have a good working knowledge of how it can be further developed. This study makes a multi-angled analysis on a few prevalent views of XBRL in terms of standards, technology, management and application drive. Moreover, questions are raised and discussed, and then several conclusions are made for reference. The authors hope to bring a further and more profound reflection on XBRL application. Section 2 contains rational cogitation of XBRL application. In section 3 presents XBRL application in China by using the event study approach. Section 4 discusses several key questions on XBRL application. Finally, section 5 summarizes the most important results of the paper and presents some ideas for further research.

External financial reporting to external parties is, however, only one aspect of XBRL. The standard also has the potential to be used for tax filings or for other regulatory purposes, such as reports to the regulators of financial institutions. This would allow corporations to maximize their investment in producing financial information in XML format. One of the reasons that the companies that produce accounting software are heavily involved in XBRL is that they see XBRL being built directly into accounting and database software. XBRL may assist global corporations in the "rollup" of accounting data and reports between group members that report under disparate GAAPs and employ different computerized accounting systems. Closer to the transactional level, it may be that internal general ledger

journal entries will use XML and XBRL. Eventually, XBRL will move upstream to the point that internal-events reporting will be in XML and XBRL. One major problem that companies now have is pulling together information generated by disparate systems throughout their organizations. If all these disparate systems can map their internal outputs to XML and XBRL, then combining this information will be relatively routine, as compared to the complex tasks that global corporations must currently undertake in the internal reporting process.

Up to this point, the discussion has focused on expanding financial reporting. However, Fig. 1 illustrates expanding beyond financial reporting. The four blocks in the center of Fig. 1 can be viewed as four cells in a 2_2 matrix. Vertically, reporting can be divided into external and internal. Horizontally, the contents of the reports could be divided between financial and operational. The larger arrow in the background of Fig. 1 illustrates the evolutionary flow of the expanding XBRL domain. Initially, XBRL is focused on external financial reporting.

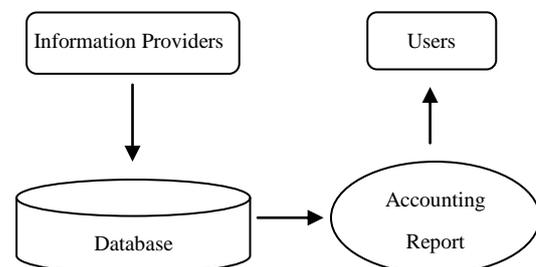


Figure 1: the basic principles of release XBRL accounting reports

As was also illustrated in Fig. 2, in the near future, XBRL will next move upstream and become an integral part of internal financial reporting. Then, XBRL will expand to include nonfinancial business operations reporting. Finally, over the next several years, XBRL will expand to include external business performance reporting. Eventually, companies who use XBRL for external business reporting will be easier for investors and analysts to compare in terms of business performance metrics, since the reporting syntax will be based on a standard specification, namely, XBRL [5].

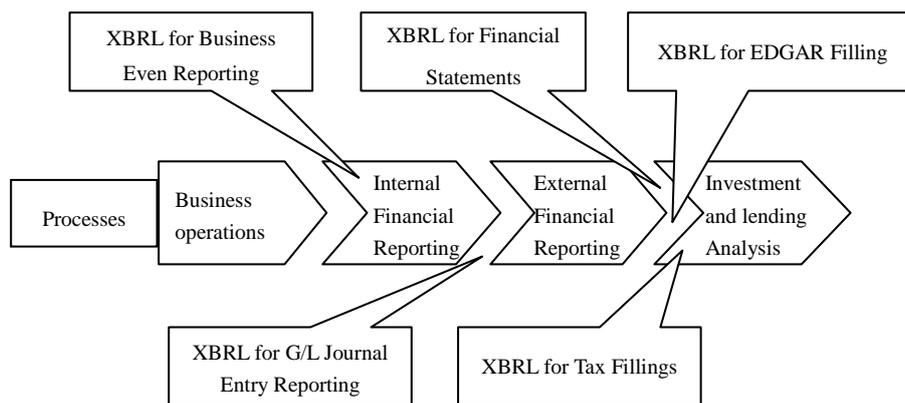


Figure2: Expansion of XBRL for different processes

II. THE RATIONAL COGITATION OF XBRL APPLICATION

If a company wants to apply XBRL to disclose their financial report, it needs to use the marks from the classified standard which is stipulated in advance, and places companies' financial data in corresponding label to compose instance documents.

After nearly 10 years' technical Specifications and Taxonomy upgrading and optimizing continuously, XBRL has been the favorite of many economic organizations in the world. Both in academia and real practice, a phenomenon that magnifies advantages and fuzzes application drive is also attendant at present. If we do not identify them carefully, these questionable points will affect the health development of XBRL.

A. XBRL can not eliminate the barriers of financial information-sharing completely

Currently, the reasons that different financial information users can not share business information disclosed by the same company are following:

- The problem of data manifestations (technology problem). It is inconvenient to extract and process the information in unstructured forms, such as Word, PDF, HTML, and so forth. And the information in structured forms, such as relational database in DBF format, cannot be used online directly [6].
- The difference of Index System (Taxonomy problem). Different index systems are regulated and restricted by guidelines of respective industries. For the same terms, such as profit, may have different understandings [7]. Thus it is difficult for different users to share the information released by companies.
- Motivation of Information release. Subjectively, companies do not hope to share the information completely with Government Departments. From the different motivation, companies may not disclose their complete information. Even more release false information to public [8].

XBRL can only solve the problem of data form, but cannot unify the different reporting systems which are long-existing. It is almost impossible to reduce the number of financial fraud by applying XBRL only. Although, from the technical point, we may select the metadata to save and release accounting information, the disclosed accounting information may contain all details of company's interior business systems. This will affect business security of companies.

B. It is impossible to enhance the transparency of financial information obviously by XBRL application

XBRL is a standard method not a new accounting system. It is not able to change the data in accounting system. XBRL concerns on methods of financial information processing. It is a classification data level of accounting system, rather than an acquisition data level. Since XBRL data released by accounting entities is not the original data, its effectiveness is distrustful [9].

If all companies in stock market adopt XBRL to disclose their financial information, perhaps speed and convenience of information transmission would enhance

as result of XBRL technical characteristic. But stock market's transparency and norms might not improve consequentially. In other words, there is no guarantee that XBRL can improve the quality of accounting information and avoid accounting information distortion effectively.

C. XBRL cannot eliminate contradictions between accounting international and localizable

There are different accounting criterions and various ways to name account. Current Taxonomies are draw up by the accounting authoritative organizations of different countries. Based on the technology infrastructure and application status quo of XBRL, even in the same country, the differences of professional judgments in details maybe have tremendous influence on the financial report which follows the same accounting criterions. The international XBRL organization proposed a FRTA (Financial Report Taxonomy Architecture) in April, 2005, and they hope raising the Taxonomy consistency between different countries. However, analyses of experts indicate that only Global GAAP can achieve the true unification of global Taxonomy.

It is unable to contrast the financial reports instance documents which based on the different Taxonomy in details. During Taxonomy development and application phases, its domain should be expanded as far as possible. So that information-sharing and information-using scope will be based on the same Taxonomy Architecture and follows the identical information disclosure standard (Erice, 2004). Therefore, XBRL application can only promote various accounting authoritative to be more similar with each other, but not eradicate the contradiction.

D. XBRL application needs huge investment

XBRL, as a form of XML, inherits the advantages and disadvantages of XML. Principal aspects which have been questioned are following:

- XBRL require larger storage space;
- The processing speed of XBRL information is not as quick as database system;
- The information processing systems based on XBRL are still not perfect enough;
- It is very difficult to develop its own XBRL system based on enterprise interior Taxonomy;
- It needs huge conversion costs to transform enterprise information system which based on relational database into XBRL-based one;
- Development of XBRL information system needs new methodology;
- The transformation of IT knowledge and ability;
- The software industry should promote new tools and platforms unceasingly to support fast development of enterprise XBRL Taxonomy and improve the efficiency of generation, storage and conversion of instance documents;
- Lacks of sufficient funds and successful experience for massive XBRL applications.
- Information system programme based on the relational database has been investing massive

construction expense and becoming mature. If a large numbers of working information systems need to convert to information systems which based on XBRL, it is bound to consider enormous additional IT construction costs, which may lead to 'IT investment black hole'.

A. XBRL puts new demands on the network

The XBRL service is Internet-based message processing and exchange methods. Yet, in nature, the Internet is insecure. XBRL services will not reach their full potential without good security. Access control techniques, based on user IDs and passwords, can protect files or data from unauthorized access, but cannot guarantee information integrity. Thus, alternative security approaches might compensate these limitations [10].

Additionally, dependence of network may affect XBRL processing speed [10]. As XBRL adopts XML technologies such as Schema and Xlink, therefore when XBRL documents being processing, Specification and Taxonomy need to be visited momentarily to verify the legitimacy and consistency of the information. Those Specifications and Taxonomies are stored on XBRL International organization website, W3C organization website as well as website of XBRL organization in various countries. So its processing speed is directly related to communication network quality. If the network service condition is inappropriate, the information processing efficiency could be reduced. Although there is no experimental study about data-processing speed difference between relational database system and XBRL system, we could assume that relational database system could be superior in information processing efficiency on the basis of their current storage methods and search tools. After long-term development, the relational database system has a range of advanced algorithms and SQL support, but XBRL system has not it yet.

F. Information provider is not the main driving power to promote XBRL

Due to XBRL characteristic and huge application investment, company is not willing to share their information with information users considering their security and benefit. Companies, XBRL information provider, have little intense motility in developing and applying XBRL. On the contrary, the greatest beneficiary of applying XBRL is information collectors and external users rather than the provider. Probing the companies' original impetus of XBRL application is the key of promoting XBRL.

It is not believed that company implements XBRL project led by the natural superiority of XBRL technology. Therefore, we should probe the reasons of the company to implement XBRL plan voluntarily. And we need to study what respective characteristics companies have on whether or not implemented XBRL? What signal will be transmitted to the capital market? Is it necessary that supervisory department impose a mandatory requirement on companies to implement XBRL projects, if the company does not implement XBRL voluntarily? And will the mandatory regulation of

applying XBRL increase the social welfare or waste of resources only?

III. XBRL APPLICATION AND DISCUSSION IN CHINA

<China Listed Companies Electronic Information Specification> is constituted according to <Accounting System for Business Enterprises> and International XBRL standard 2.1 FRTA (Financial Reporting Taxonomies Architecture). It prescribes general request and basic principle on publishing XBRL electronic documents. Shanghai Stock Exchange applied XBRL to publish the Annual Reports 2003, Summary Annual Report and the first quarter report 2004. Shenzhen Stock Exchange promoted the second edition of "Report Production System using XBRL" officially in January, 2005. China Shanghai Stock Exchange became the member of XBRL International organization in April, 2005. Investors can visit the official website to search the full XBRL data of annual report in May, 2005. A part of XBRL standard which obtained the authorization from International organization, has become the annual report standard for China listed companies on 20th October, 2005.

The existing researches show there are plus response from investment and application in information and technology stock market [11]. But Dos Santos et al. (1993) found that there is an uncertain relationship between market response and IT investment [12]. Application of XBRL belongs to a financial investment. The investment can be recognized in the financial statement. The market anticipation of the application expense is transitory. The anticipation cannot heavily impact on future cash flow. So the application of XBRL cannot influence the companies' value significantly. However, if these extra information releases to stock market, investors may pay more attention to future cash flow. The information will let the investors know the cost is durative and will affect cash flow after successful introduction.

A. Test model designs

Based on Efficient Market Hypothesis, investors will response after companies blaze non-financial information, for example they will apply XBRL standard. If investors believe XBRL application will benefit companies' future business performance, they may adjust their anticipation of the companies' cash flow, and response before companies' declaration. As a result, stock price will fluctuate and produce stock abnormal returns. Presently, in the information technology investment market, different researchers' empirical tests give different results. The proposal model following will apply event study approach which belongs to finance metrology, to test whether or not abnormal returns exist in Chinese stock market after companies' declaration of applying XBRL standard.

Different research object need to choose different event window. Relatively long event window setting may receive more influence information on the event, but this kind of setting may also easily receive influences of other factors on the stock price. To avoid other factors'

influence, in the information and technology research field, short event window is preferable. So, we define the day 0 when the Listed Companies apply XBRL to release their quarter finance report as the event day (when $t = 0$). We follow the short event window method and define the event window as before and after 3 days of day 0. ($t \in [-3, +3]$).

The samples of this study are selected randomly from the Listed Companies in China Shanghai Stock Exchange from 25th June, 2005 to 22nd May, 2007.

TABLE I.
TABLE 1: DESCRIPTIVE STATISTICS OF CAR (N = 50, N = 7)

	Mean	Std. Deviation	Minimum	Maximum
CAR $t \in [-3, +3]$	0.00059	0.00421716	-0.00385	0.00741

TABLE II.
FIFTY COMPANIES' AAR & CAR ON THE EVENT

t	AAR	CAR	The number of plus AAR	The number of minus AAR
-3	-0.00254	-0.00254	21	29
-2	-0.00131	-0.00385	24	26
-1	0.00243	-0.00142	30	20
0	0.00426	0.00284	32	18
+1	0.00457	0.00741	34	16
+2	-0.00329	0.00412	26	24
+3	-0.00655	-0.00243	29	21

About how to calculate normal returns in event study approach, several methods have been used frequently, such as Mean-adjusted Returns Model, Market-adjusted Returns Model and Risk-adjusted Returns Model. In this study, we apply constant mean return model which belongs to Mean-adjusted Returns Model. Although constant mean return model is a simple one, this model could get similar result to other complicated models [13]. On the other side, constant mean return model has its own advantages in China market. According to the characteristic of China stock market, Mean-adjusted method fits to the research which price response weak and hard to ascertain. By using mean-adjusted model, the changes of stock price can be checked easier from the event's influence. To avoid Annual Report's influence on Normal Return (NR) estimating, a relatively long estimate duration, Day -200 is used in this model.

Constant mean return model assume i^{th} company's NR is constant during the event window. Then we can define:

$$E[R_{it} | I_t] = \mu_i + \varepsilon_{it}, t \in [-3, +3] \quad (1)$$

$$E[\varepsilon_{it}] = 0, \quad (2)$$

$$\text{Var}[\varepsilon_{it}] = \sigma_{\varepsilon_i}^2 \quad (3)$$

And,

$$\mu_i = \frac{1}{-4 - (-203) + 1} \sum_{h=-203}^{-4} R_{ih}, h \in [-203, -4] \quad (4)$$

Where:

R_{it} is i^{th} company's real returns in time t ;

ε_{it} is disturbance term. Which mean is 0;

Std. Deviation is $\sigma_{\varepsilon_i}^2$.

Normal Return defines as real returns minus anticipation returns which are not influenced by the event. As follows show:

$$AR_{it} = R_{it} - E[R_{it} | I_t] = R_{it} - \mu_i, t \in [-3, +3] \quad (5)$$

$$AAR_t = \frac{1}{50} \sum_{i=1}^{50} AR_{it}, t \in [-3, +3] \quad (6)$$

$$CAR_t = \sum_{\tau=-3}^t AAR_{\tau}, t \in [-2, +3] \quad (7)$$

Statistics hypothesis test: in the t time point, the null hypothesis H_0 is:

$$H_0 : \overline{CAR_t} = 0 \quad (8)$$

Its T-test Statistic is:

$$T_{CAR} = \frac{CAR_t}{S(CAR_t) / \sqrt{n}} \quad (9)$$

$$S(CAR_t) = \sqrt{S^2(CAR_t)} = \frac{1}{n-1} \sum_{j=1}^n (CAR_{jt} - \overline{CAR_t})^2 \quad (10)$$

B. The test result and analysis

We use the model above to test samples' data, and depict the AAR & CAR in Table 1 and Table2:

Analysis of influence factors of mode. There are several influence factors we need to concern.

- Firstly, sometimes, especially when using small sample to study, the empirical test result may influent heavily by one or two companies.
- Secondly, based on above event study steps, we can see that during the research steps, we need to choose, such as the length of event window, samples, Returns Models of NR, Estimate Window span, Signification Test methods and so forth. These choices must bring some kind of uncertainty to the related results and explanations.
- Last but not least, Dec. 30th, 2005 is a special date. This date selection may influent the test results directly.

Based on the change regulation of the CAR curve and Wilcoxon Test, we analyze the influence of XBRL application on sample companies' share price during the event windows. Result shows, the AR value prone to small value. This means the event influence on companies' income is weak. If we eliminate the influence form other important event, such as last year's annual report and/or quarter report publishing, the influence on the stock market will be weaker.

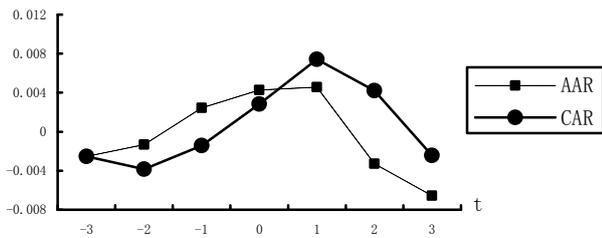


Figure 3: Multiple Lines of Fifty Companies' AAR & CAR on the Event

According to Figure 3, fifty companies' CAR increases slowly from Day -2. It means, in advance, stock market has small scope response on using XBRL to publish quarter finance report. CAR arrives its maximum, 0.00741, on Day 1. According to Equation 9, we can calculate TCAR ($TCAR = 0.3701$) which is smaller than critical value (2.4469) under 5% confidence interval. This shows the proclaiming influence on stock market is not significant. CAR starts decreasing on Day 2. And decrease to -0.00243 on Day 3. Though Wilcoxon Test, we find that in the fifty samples, 24 of 50 CAR are plus, 26 of 50 are minus. There is not huge difference. The event influence is not significant.

IV. DISCUSSION

A. The costs of XBRL application

Companies cannot take extra-benefit from the application of XBRL. On the contrary, companies may pay more money for applying XBRL to release their financial report.

- Information production cost. Companies need to pay much money for releasing the information during the data collection, processing and transferring processes. If the information needs investigation, investigation cost also need to be paid [14].
- Litigation cost. Latency Litigation cost is an immateriality cost of information release (AICPA, 1976). Deficient release and the misleading intent results in litigation cost.
- Competitive advantage loses. Information release may affect the competitive advantage of the companies [15]. It will be easy to lose its competitive advantage by releasing information. The releasing time, detailed degree and the receiver are key factors on this issue [14].
- Compliant cost and canvass cost. Companies may spend money on obeying the compulsion release regulation issued by related government sections. For the sake of convincing whether or not releasing some kinds of information, companies may face the canvass cost [15].

B. The requirements of XBRL's successful application

According to AICPA's programming, XBRL will not change accounting standards. XBRL aims to help professional or general information users obtain the information rapidly and easily from stock exchange by

more efficiency and more reliable methods. The basic characteristic of XBRL is the permission of catching and exchanging financial information from different software platform freely by the financial information users. The requirements of XBRL's successful application are:

- The Specification and Taxonomy should be suitable for most of companies. The XBRL specification specifies the format of XBRL documents and how to create a standard XBRL document. The Taxonomy defines the uniform labels of company's financial report. Each item has only one definition. Guide committee should in charge with the Specification and Taxonomy.
- Application program which accord with the Specification. The application program is similar to the accounting software which is nowadays widely used by companies. It can help the information providers to edit and release financial report based on XBRL standards. The application software should be provided by XBRL software suppliers [16].
- Transfer information to special or other different types of form. This is special software for coding the information in special or other different types of form. It will help accounting information users catch the information online from the financial report which following XBRL standard. At the same time, it could transfer the information format into what the users want. Those different types of form should be developed by different software companies.
- Excavate the initial drive of XBRL application. Surveillance department of government is the first beneficiary of XBRL application. So the research on this subject should be dominated by government. The initial drive ought to come from the cooperation of related government departments and organizations. Experiencing the stages from government predominating to academia, then to cooperative academic organization, finally to company application union, the substantial and successful application of XBRL will achieve. In other words, after sound and perfect research chain, application chain and industrial chain constructing, large scale XBRL applications will succeed.

V. CONCLUSION

XBRL is one of the business reporting languages which has many advantages. It will become a good choice for companies when they release their financial information, even as the interrelated standards of XBRL are been perfected gradually. However, XBRL is only a standard format of electronic document for financial reporting. Applying XBRL cannot replace nowadays expression of operational and financial circumstances of a company, nor substantially enhance the quality of financial reports.

It is difficult to unify different Taxonomies in different countries, which is the basis of using the XBRL Taxonomy as the construction. Data processing and

storing technologies are still not enough perfect currently. So there is a gap between the ideal XBRL and the real-life one. In the research developing process of XBRL, if the problem questioned in this paper can obtain effective solutions, we can believe that this technology will bring significant changes to the accounting profession. XBRL will become the promotional power of convergence of international accounting standards.

External information user, not the companies which apply it, will benefit most from XBRL technology. How to inspire the initial drive to apply XBRL is the key to pushing the technology further. In China, the government is the first beneficiary of applying XBRL, so the initial drive should come from the government. Experiencing the stages from the government predominating to academia, then to cooperative academic organization, finally to the company application union, the substantial and successful application of XBRL will come true.

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