

【International Conference on Buddhist Canons 2019_Keynote Speech】

Exploration of Buddhist Texts: Traditional Methods in a Digital World

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It is very exciting to be in this beautiful new structure dedicated to the preservation and study of the Buddhist canons. Grand Master Hsing Yun is always a generous host and we can see his vision fully expressed in the creative design of this meeting hall and the methods of display for maximum communication between speakers and audience. Our deepest appreciation to him and to Venerable Tsu Hui the head of the Education Department that sponsors this event. I know that I speak for the other participants when I express our wonder at the hospitality being shown to us by all the monastics, students, and volunteers here at Fo Guang Shan. It is far beyond what we academics expect at our conferences and we do appreciate the effort and care with which this event has been organized. Over the next few days, we are going to have an opportunity to hear from leaders in the field of Buddhist Studies who are involved in publishing, creating, and disseminating information about the Buddhist canon here in Taiwan as well as Japan, Korea, China, Europe and the United States. The reports that are scheduled will provide us with an up-to-date description of what is being done in

Buddhist canonic research around the world.

It is hard for me to realize that my participation in digital projects related to the Buddhist canon started more than four decades ago. When I tell the current generation that I set up an input project for the Goryeo canon at the Institute of Chemical Research in Shanghai in 1989, and they hear that it was because the Institute had a computer with “a”, that is one, megabyte of memory, they can’t help laughing. Today, I have a very modest cloud-based storage account that allows me to use three terabytes of memory, three million times the amount on the Shanghai computer. In those early days, desktops had 32 Bit Intel Chips that could miraculously do 5 million instructions in a second. Today, my laptop can process nearly 500 million instructions in the same time. Such growth in memory and speed leaves me somewhat dazed and hardly able to comprehend what has happened in a relatively short period of time. But then remember that I was once dazzled with the idea of working on a computer with one megabyte.

As an “immigrant” into the digital world, I have had to struggle with the implications and opportunities available through the so called “new” technology. It is thanks to a number of compassionate engineers who have been willing to patiently lead me through the maze of software, coding, and analytics, that I have been able to do anything at all with the computer aided research. Here in the audience are two of these extraordinary men: Howie Lan from University of California, Berkeley who started helping me in the mid-90s and more recently Alex Amies from Google. At Fo Guang Shan, I have received a great deal of support from computer literate monastics such as Venerables Youzai, Miao Guang, and Zhiyue. They have stood behind me as we attempt to make use of the great power given to us by digital

developments.

When the digital era came into being, our first task in the Humanities and Buddhist Studies was to input enough data for the computer to be of any use. Today with the ever-growing size of memory power and functionality of high speed, so called “super” computers, the need for data is even more critical than it was at the beginning of technological advances. One digitized Buddhist canon such as the Taisho version from the early 20th century, occupies a tiny segment in storage units with terabytes of space. Any limitation to our input and collection of information based on the capacity of available memory is unwarranted. The probability of creating enough Buddhist data to exceed the current limits of computer memory is so distant that it should not be a factor in our planning.

How much less likely is it that space will be a problem in the future. The new methods of storage, just emerging from computer research and development laboratories, hold promise of being able to work in a hand-held device with data the size of ten national libraries. Even such capacity, which looks imposing to us in the present, will undoubtedly bring a condescending smile from generations yet to be born. We are aware that the mere presence of data, no matter how large, will have significance only to the degree that there is a companion set of tools with which to explore, analyze, search, retrieve, and share. Work that involves the multiple canons of Buddhism, small as they may be in comparison with the data output of the collider in Switzerland, will have complexity that is beyond many of our existing tools. This complexity magnifies when our research involves texts appearing in a number of languages, scripts, formats, and relative developments that span a thousand years or more.

Our scholarship in the study of the Buddhist canons cannot be limited to quantity. It also involves interpretation and contextualization. Computers have no trouble doing numbers, but difficulties arise when our research involves qualitative approaches. How can we use this large memory, rapid quantification and analysis to study text structures, language features, meaning and interpretation? What purpose can the computer play when we deal with ideas that are embedded in a text and whose function and meaning can only be spotted through inference. The problems of textual work from our canons becomes even more difficult when there are metaphors, allusions, and similes contained in complex sentences. Computer programs have yet to fully rise to the level of the challenge created when segments of texts deal with causality, sequence, and comparison, and when all this is discussed as an event structured as a flashback in time.

The traditional methods of doing critical text study, seeking the original text that existed before multiple copying resulted in inadvertent errors, additions, and omissions, still are valuable and being widely used. Computer tools should be directed toward making these tasks easier and faster. At the same time, the digital capacity should also be used to analyze our methods as well as the data that results from such work. Do we need to revise our methodology? Or do we need to adopt a completely new approach based on the techniques that can be employed using applications that complete processes of inquiry in a few seconds?

I have had one experience which was both upsetting as well as thrilling. As mentioned, I am an “immigrant” to the digital world. When my research and writing for the doctoral degree was done more than fifty years ago, there was no computer, no digital canon, no way to do quantifying analysis in a

few seconds. Searching for word occurrence in seven Chinese translations of a Perfection of Wisdom text, took nearly two years to complete and quantify. After the first digital Chinese canon appeared from the input of the Goryeo version in Korea, I sought to imitate my two years of labor using the power of the computer. It took me 19 minutes to reach the same level of results. Now I have available to me analytic tools that can do many of the same tasks in two seconds. The expansion of speed from performing a task that took two years to two seconds is beyond any expectations that I had when tool building and computerization of the Canon began.

While speed and size of data has been spectacular over the last two decades, the question remains for scholars to decide what is it that we want to be done. Is it enough to ask the engineers to make sure that we can do our traditional tasks quicker and with greater accuracy? Can I be content with tools that can show me comparisons of texts over time so I can chart the history of how the document was created and used? Is it enough for the software to report on differences that have appeared in a text history over time so that I can within seconds be looking at a family tree or stemma of my text. What am I to do with the results of such constructions of data development, especially when it indicates that my Buddhist text seems not to have resulted from a single ancient source but a multitude of sources? If I can't find or reconstruct a beginning point for a text but am shown that it started with many traditions that over time become intertwined in a complex matrix, how will this affect my approach to the text?

Will the computer help me to deal with the unknown people who assembled some version of the document in front of me? Can I examine a Sanskrit manuscript and receive a report on how many scribes made the

copy based on handwriting analysis? What can I do with such information? What will it mean to search horizontally, that is to search multi versions at the same time, rather than searching source by source in silos that require me to leave one net page and go to another for what might be called vertical searching of one text at a time? How am I to use search results that are images rather than a listing of the data itself? This means: what do I do with graphs, maps, timelines, density imagery? And what do I do when the image introduces new complexities? Can I use an image to search for data, rather than words? What results when I use a picture of an architectural feature and look for all other pictures that have the same design?

As we determine the way in which our canonic research will develop, it is well to remember that one aspect will be the use that is made of our material in education. There has been a marked shift in education from knowledge acquisition to learning as a social discourse. In this regard, the Buddhist canons can be seen as a multitude of “voices.” These voices in languages, as distinct as Sanskrit, Pali, Tibetan, Tangut, or Khotanese, form a pattern of overlapping accounts of the Dharma. Our study of the variety of language canons must also include the understanding that they not only contain passages that are similar and thus overlapping, but in addition that they indicate interactions with one another. The Chinese canon contains translations from Indic texts, these represent various historical formations of the teachings of Buddhism. In the process of being translated, Chinese and Indian cultures and thoughts have interacted. That is why we can never merely study a Chinese text as purely cognitive utterances which have materialized from the inner experience of meditation and spiritual insight. This large collection of texts requires some form of study that recognizes the

glue holding them together, recognizes the “thread” that binds ideas into the completeness of a “text.” A significant part of the glue or the thread is the social and cultural features of history and human encounter with others.

The “voices” we find in Buddhist texts are echoes of the social discourse from centuries ago. Can the power and sophistication of our computers help us determine the structures of how a sutra in written form has come down to us in the 21st century? Can the computer make clear the cohesion of this “chain” of utterances and retrieve a vision of how this page in front of us reached the completeness we see, input, store, and search? In a more simple question: how did the unnamed ancient monastics and lay people make the copy of sutras we see in our received publications? Assuming that many of the expressions in the sutras extend back to the time just after the Nirvana of the Buddha when the First Council tried to remember what had been taught, how have these expressions been put together to make a cohesive document on palm leaves?

Our digital resources can certainly help us see the family tree of the expressions over time, in various languages, and in different cultural spheres. It is also possible to do automated part-of-speech tagging: is the expression a verb, noun, subject, object, modifier? With dictionaries, we are able to trace the words and their shifting formations over the whole of these multiple canons. Of greater difficulty is the coding algorithm for estimating relevance of a word in one or more canons. Can the computer “read between the lines” to capture inferred meanings that are put into figurative language and thus are hard to detect? Since many texts in the canon contain information that is abstract, intricate, and theoretical, what is a method for being able to state the meaning that is revealed in the totality of the text? Most reading on the

internet is done by looking at snippets that are listed for us. What we receive is based on the search words and the functionality of the search engine. This type of reading, while providing a great deal of information, often fails to provide the reader with the major theme of the complete text. Can software ever show us the ideas that dominate when a book is seen in its totality?

There is another realm in the computer that is opening up for scholars in the Humanities: the ability to “Augment Reality.” Using constructed visuals is still not widely done in our canonic research. With the help of Howie Lan, I have been exploring the use of “Blue Dots” to create a better method of seeing patterns of word occurrences. We changed the text of the Goryeo version so that in place of characters, we see only blue dots. It is deceptive because the “Blue Dot” links to a wealth of information. The software knows what character is being covered up, what line and sequence in the line is held by the character, the text title, translator, time of translation etc. Sarah Kenderdine placed our “Blue Dot” version into Virtual Reality at City University in Hong Kong. She made it possible to convert the dots back to the original characters for reading. Users can stroll among the characters of the texts and show search results with a red dot replacing the blue ones. One can set up multiple pages in the surround and can “turn” not just one page but one or two hundred pages at a time.

I don’t yet know how to make use of this application. There is a negative view of spending time on something that you are not sure is useful. However, there are times when we need to do critical inquiry without knowing the immediate usability of the results. This is often the only way to find new and helpful information. I think Buddhist scholars need to think more about critical inquiry, the basic science, and not simply be constrained

by the thought that “everything I do must have a discernable use.” My VR attempt may not lead me to a specific product or software but there is no question about the need for Buddhist Studies scholars to begin thinking about this technology.

In another project, I have been working on an Atlas of Maritime Buddhism. Thanks to the support of my partners Sarah Kenderdine now at the Polytechnic Institute in Lausanne and Jeffrey Shaw at City University of Hong Kong, we have constructed a VR form of the Atlas with 3-D images from nearly 70 sites. Venerable Ruchang the Director of the Buddha Museum here at Fo Guang Shan has been brave enough to schedule an installation of the Atlas. We are pioneering a new look at Buddhist history and that includes a different approach to the way in which the Buddhist canons moved from India to China. We will find out whether people find such an installation of value when compared to reading a book filled with static pictures.

As you can hear from this lecture, the study of the Buddhist canons reflects all the computer developments and social issues related to digital technology. We are challenged to find out the best use of our content as well as applications of it. What are the ways in which the traditional patterns of textual research can be enhanced, and what will result from the search for new methods and data use? Our content may not constitute the largest data banks in the world but the complexity of dealing with multiple canons in different languages with different lists of included texts, makes Buddhist Canon studies among the most complicated and challenging.

I hope that this conference can help to bring about an empirical revival

of text studies, in part by moving beyond the focus on our material texts and entering a computing environment that may allow us to better “see the past” and through our text criticism of the digital versions understand more completely how the canons were transmitted and transformed. This will require that we come to grips with the mechanism and data representations from which our received versions have been constructed. The tasks before us are difficult to define and hard to fulfill. It is our karma to be in this world at the beginning of the digital age, and we have a unique opportunity to perform pioneering feats in relation to critical inquiry, data representations, and proto-types for canonic study. Thank you for participating in this conference and I look forward to our discussions and believe through sharing we can find inspiration for the future. We look forward to hearing from all the distinguished scholars.

【2019 佛教藏經會議專稿_主題演說】

佛教藏經的探索與研究 ——數位世界中傳統研究方法的審思

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今天我非常高興能夠來到這個莊嚴的大會堂，參觀佛教藏經特展和參與佛教藏經研究學術研討會。星雲大師一直是一位樂於給予的主人，我們能夠從這座大會堂非常有創意的展示，以及因為這會堂的設計讓台上的發言者與台下的觀眾能夠達到最好的互動方式，充分看見大師的理念。在此我們要對大師以及負責佛光山教育事業的慈惠法師致上最深的敬意，感謝您們舉辦了這項活動。我相信我也表達了所有與會大眾的心聲：感謝所有佛光山的法師、同學及義工們，給予我們這麼好的接待與關照。以學者所知的學術會議型態來說，這個活動是超乎我們所預期的，因此，我們非常感謝主辦單位投注的心力與規劃。接下來的幾天裡，我們將會有機會聽到佛學界的諸位翹楚，分享在台灣、日本、韓國、中國大陸、歐洲及美國，從事有關佛教藏經的出版、編撰和傳播的資訊。這些研討會論文將提供我們有關世界上藏經研究進展的最新訊息，我們非常期待聆聽各位學者的發表。

很難想像我從最早開始參與藏經數位化，至今已經是四十多年前的事了。我有一次跟這一代的年輕人談起，我最早所執行的《高麗藏》數

位化計劃是 1989 年，而且地點是在上海化學研究院，主要是因為這間化學研究院有一台記憶體 1MB 的電腦時，大家聽到都忍不住笑了。時至今日，我的一個最基本的雲端帳號，就讓我可以使用 3TB 的記憶體空間，這是當年上海的那部電腦記憶體的三百萬倍。此外，早期的時候，一台桌上型電腦 32 位的電腦晶片，就讓我覺得很神奇可以在每秒鐘處理五百萬個指令；而我現在的筆記型電腦竟可以每秒鐘處理五億個指令。現今電腦記憶體與運算速度這樣的發展，有時讓我有些茫然，而且很難理解這短時間內所發生的變化。但是，此時我就會想起自己以前，也曾經因為使用到一台擁有 1MB 的電腦而感到驚奇。

作為現今數位世界的「新移民」，我花了很大的力氣去理解所謂「新科技」帶來的意義及契機，因此，我要感謝多位慈悲的電腦工程師，他們一直耐心地引領我穿越軟體、編碼與數據分析的迷宮，讓我能善用電腦科技進行研究。我在此要特別介紹兩位很重要的男士：美國加州柏克萊大學的藍效農（Howie Lan）先生，他從 90 年代起便開始協助我；還有近期開始協助我的，在 Google 工作的工程師 Alex Amies。另外，還有佛光山精通電腦科技的法師們：有在法師、妙光法師和知悅法師，他們都支持著我，讓我們努力發揮數位發展所帶來的科技力量。

過去數位世代來臨時，我們在人文和佛學研究領域的首要任務，就是將足夠的資料輸入電腦以進行使用。現在，相較於科技發展初期，隨著超級電腦的記憶體不斷增加容量以及其高速效能，現在大量數據的需求更是重要。例如二十世紀初期的電子版《大正藏》，其所占的容量只是兆位元組的一小部分，就算我們收集與輸入了大量的資訊，對電腦記憶體的存限容量都不會造成問題，因此，我們一點都不必擔心佛教數據可能會超過目前電腦記憶容量存限的問題。

在未來，電腦記憶容量更不是個問題，因為電腦研發實驗室已產生

新的儲存方式，甚至只要有一台平板電腦就可以處理十個國立圖書館的數據資料。不過，我想儘管就連目前看起來很大的電腦容量，將來也無疑會讓後代人取笑的。但是，我們也明白無論目前的數據有多大，只有在能以配套工具來瀏覽、分析、搜尋、存取、分享使用時，這些數據才能顯示其重要性。儘管多種佛教藏經資料的數據，相較於如瑞士強子對撞機（LHC）的資料數據是小很多，但是，藏經研究工作的複雜性，卻是目前許多的電腦工具所無法處理的，尤其是當我們的研究工作涉及到佛典是在一千多年之間，有著不同的語言、文字、體例和相互影響發展時，這複雜性又更高了。

我們的佛教藏經研究不能僅限於分析數量，也還涉及到探究藏經的詮釋與歷史背景研究。電腦沒有處理數據的問題，但是當我們的研究涉及到內涵的研究時，問題就會產生。我們如何運用這麼大的記憶容量、快速的量化計算與分析能力，來研究佛典文本結構、語言特性、意涵與詮釋？當我們處理佛典文本所蘊含的重要概念，而這概念只能以推理來了解其作用和意義時，電腦能有什麼角色呢？從事藏經文獻研究時，當我們遇到複雜的句子中包含隱喻、典故和譬喻時，這樣的問題會變得更為困難。尤其是當佛經文本的段落包含前後的因果關係、發生的順序和相互比較等等內容，而且當這些情況被當作回溯過去的事件而討論時，電腦的程式設計就尚未能處理這種挑戰。

傳統的文獻研究方法是尋得現存最早的一部佛典文本，對勘其因為多次複寫後衍生出來的訛誤、冗文和疏漏處，這種研究方法仍然很有價值而且被廣泛使用。電腦的軟體工具應該朝著簡化及加速這樣的文獻研究所需方向發展，同時，數位科技也應該被運用在分析我們的研究方法和所得到的數據上。因此，我們是否需要修改我們傳統的研究方法？或者是，我們是否應該採用全新技術的研究方法，運用這些可以在數秒之間便能處理所有查詢程序的技術？

我曾經有過一個令我痛苦又震撼的經驗，如上所述，我是一個數位世界的「新移民」，五十多年前，我做研究和撰寫博士論文時，那個年代沒有電腦、沒有數位藏經，也沒有在數秒內可以分析大量數據的設備。光是完成統計七種漢譯《般若經》中詞彙出現的次數，就花了我兩年的時間。然而，當韓國把《高麗藏》完成數位化，第一部漢文電子版大藏經問世後，我就把以前花了兩年時間完成的工作，借助電腦的功能再做了一次，那時我僅僅花了十九分鐘，就得到了相似的結果。現在，我可以運用分析工具，在兩秒鐘之內，就完成很多類似的工作。能夠將執行作業時間從兩年縮短到兩秒的速度，這是在開始製作電腦程式工具與數位化藏經的初期時，我所無法預見的。

近二十年來，電腦數據的速度及容量已突飛猛進，學者們現在的問題是要開始思考我們希望擁有什麼樣的軟體工具呢？是不是要請電腦工程師讓我們能以更快和更準確的方式，藉以完成傳統的學術研究就夠了？如果可以使用一個比對多部佛典歷時變化的電腦工具，因此讓我有辦法建構出一部佛經文本是如何被完成和被使用的歷史脈絡，這樣就能滿足我的需求嗎？如果有一個軟體能夠提供文本中異文歷時的發展情況，因此可以讓我在幾秒鐘內，看到我所研究的文本的歷史發展脈絡和分支，這樣的軟體功能就足夠了嗎？我應該如何使用這種數據發展建構所帶來的結果？特別是當這結果意味著我研究的佛教文本似乎不是來自於單一古老來源，而是來自很多不同的來源，或者是，如果我無法找到或是重塑這文本的來源，而是看到了這文本起源於許多個佛教傳統，而且隨著歷史演變，相互交織成一個複雜的樣貌，這會如何影響我研究這文本的方法呢？

電腦是否可以幫助我了解當時是經由哪些人整理某個早期版本，而集成我眼前的這部文獻嗎？我能否透過字跡分析來研究一部梵文寫本，因而得知這寫本是經過多少抄寫員之手而完成的呢？我該如何使用

這些資料呢？與其使用在單一傳統的資料中逐頁查尋的「縱向」搜索方法，如果我現在改成找尋在同一時段中的多種傳統版本的「橫向」搜索方法，這種研究方法應該有新的意義吧？如果我所用的搜尋結果，與其只是數據的列表資料，是否以圖像來呈現會更好呢？這意謂著：我該如何使用圖表、地圖、時間軸或密度圖像呢？另外，我該如何使用圖像中新的複雜元素呢？我是否可以用圖像來搜尋資料，而不是只能輸入文字來搜尋資料呢？如果我用一張有著建築特徵的圖像，去搜尋其他也有同樣設計的圖像時，會有什麼樣的結果呢？

此外，當我們在為藏經研究決定發展的方向時，我們一定要記得的考量是——如何將這些資料運用在教學課程中。現今的教育範疇有一個顯著的變化：就是從單方向獲取知識的學習型態，轉變成從集體互動討論的學習型態。從這個角度來看，佛教藏經就可被看作是眾多「聲音」互動的內容。佛教藏經中眾多的「聲音」，雖然分別有梵語、巴利語、藏語、西夏語或于闐語，但是卻形成了佛法中相互重疊的內容。我們在研究不同語言的藏經時，一定要了解這些不同語言的藏經，不只是有著內容相似或重疊的段落，而且也意味著這些藏經之間是相互交流的。漢文大藏經是從印度佛典翻譯而成，體現了佛教教義的各種歷史流變，在翻譯的過程中，中華和印度的文化與思想互相交流，因此佛典內容不僅是從禪修和心靈洞察的內在經驗醞釀而編輯成的，這就是為什麼我們永遠無法只把漢文佛典當作純粹認知的語言來研究。我們在研究這些大部頭的佛典時，必須要能看出牽繫著這些經典思想的關聯，如此才能了解串連一部佛典的完整性的脈絡，而這牽繫著佛典中很重要的一個脈絡就是——歷史文化與人類社會的互動。

我們在佛教經典中所聽到的眾多「音聲」，就是很多世紀前社會集體互動討論的回音。但是，我們的電腦是否有能力可以協助我們看到，21世紀時我們所讀到的一部佛經，是經過怎樣的歷程而被書寫傳衍下來

的呢？電腦是否可以釐清此佛經內容的連貫性，以及回溯我們眼前所看到的這頁佛經是如何完成的？因此我們可加以閱覽、輸入、儲存和搜尋。用更簡單的問法來說：古代那些不具名的僧俗二眾，是如何完成我們現今在出版品中所看到的佛典呢？由於佛典裡很多的話語都能回溯到佛陀涅槃後，第一次結集時大眾所努力回想的佛陀教法，那麼這些話語又是如何被整理和書寫在貝葉上，成為內容連貫的文獻呢？

我們的數位資源的確可以協助我們了解這些文字內容在不同時間、不同語言以及不同文化背景中的歷史演變脈絡，同時也可以將這些文字分別進行標記：譬如標記其中一個字是動詞、名詞、主詞、受詞或是修飾語。藉由字典的功用，我們也可以在所有不同的藏經中尋找出一些字詞以及它們變化的過程。但是，更大的困難是電腦程式要能夠推判一個字詞在一部或多部藏經中的重要性。或是，電腦是否能從字裡行間找出譬喻中難以發現的意涵？既然藏經中很多的佛典都包含抽象、錯綜複雜和推論性的訊息，我們要用什麼辦法才能看到整部佛典想表達的意涵呢？許多我們在網路上閱讀到的訊息都是片段式的，因為我們所收到的訊息是透過使用搜索關鍵字和搜索引擎的功能而得來的，經由這種閱讀方式所獲得的訊息，雖然提供了大量的資料，但往往讓讀者無法得知全文的主要論題。軟體程式是否可以讓我們看到，只有讀完一整本書之後才能知道的核心思想呢？

在數位人文的領域中，有另一個正逐漸發展成熟的電腦科技叫做「擴增實境（AR）」，但是，利用這種建構的視覺效果來研究藏經尚未被廣泛使用。透過藍效農先生的協助，我現在已經能夠使用「藍點」程式，建構比較容易看到文字出現頻率模式的方法，我們因此在《高麗藏》的文字上做了些改變，在原本是文字的地方，以藍點取代之。這種「藍點」程式竟然可以將非常豐富的資訊連結在一起，「藍點」程式會知道哪個字被藍點取代，那個字是在哪一行和第幾個字，經題、譯者和譯經

年代等等訊息。然後，Sarah Kenderdine 教授再將這「藍點」版本放在香港城市大學的虛擬實境之中，讓這些藍點轉換回原文，藉以方便閱讀。如此，使用者能夠漫遊在佛典的文字之間，或是用紅點取代藍點展現結果。使用者也能夠在此虛擬環境中建立多頁總覽，因此一次不是只能「翻閱」一頁，而是可以「翻閱」一百至兩百頁的相關文獻。

但是，我至今仍舊不能確定這套軟體的用途，畢竟，沒有人會想把時間花在你不太確定是不是有用的東西上。話雖如此，儘管有時在尚未確定研究成效為何的情況下，我們仍然需要去探究，因為很多有幫助的新資訊都是在這種情況下發現的。我認為佛教學者應該多考慮接納這種探究的基礎態度，而不僅僅是被「我所做的每件事都必須具有明顯用途」的思想所約束。我在虛擬實境（VR）中的嘗試可能不會產生出什麼特定的產品或軟體，但毫無疑問地佛教研究者需要開始考慮這項技術。

我的另外一項研究計畫是做海上佛教地圖集。感謝我的合作夥伴——洛桑聯邦理工學院的 Sarah Kenderdine 教授和香港城市大學的邵志飛（Jeffrey Shaw）教授，我們透過逾 70 張佛教聖地的圖像，建構了 3D 影像的虛擬地圖。感謝佛光山佛陀紀念館館長如常法師的宏觀，他計畫在館內推出「重塑歷史——海線佛教的紀錄」展覽。我們將首次展現一個全新的佛教史觀，包含從不同觀點看待佛教藏經如何從印度弘傳到中國。我們可藉此看看，相較於閱讀靜態圖片的書籍，這是否是個有價值的展覽。

從這個講演可得知，佛教大藏經的研究反映了電子科技所帶來的電腦發展以及社會議題。我們所面臨的挑戰是找出使用這些資料內容最好的方法以及用途。我們要如何提升佛典文獻研究的傳統方法？以及思考在使用新的研究方法及數據後會帶來什麼樣的成果？我們的佛教數據庫雖然不是全世界最大的，但是由於不同語言的藏經所收不同佛典的複

雜性，使得佛教大藏經的研究是最複雜以及最具挑戰性的。

我希望此次的學術研討會能讓佛教藏經研究重新被顯著的重視，超越紙本文本研究而邁進電腦數位環境，藉由仔細地分析電子數位佛經版本，我們可以更清楚看到各種藏經過去傳播及演變的完整歷程，但這需要我們先對這些流傳下來的藏經版本的製作過程中，其製作的方式和數位的表現方式有相當的了解。我們現在所面對的任務難以定義，也可能難以達成。生活在這數位時代的開端，是我們的因緣，但也因此我們有這特別的機會，能以審慎探究、數位形式的表現方式和數位原型的方法從事藏經研究，建立具開創性的豐功偉業。感謝大家參與此次活動，也期待與大家進行討論，相信透過大家的分享，我們可以對未來的藏經研究有所啟發。