30th Anniversary of the Scientific Cooperation between
the Chinese Academy of the Sciences
and the Max Planck Society

The Circuit of Knowledge and its Cultural Conditions: From Adventurous Exchange between East and West to a Global Network of Cooperation

Introduction

Matthias Schemmel
Max Planck Institute for the History of Science

Your Excellencies, Honorable President Lu, Honorable President Gruss, distinguished guests, in the name of the Max Planck Institute for the History of Science and its Partner Group at the Institute for the History of Natural Sciences at the Chinese Academy of Science, it is an honor for all of us to have the occasion of presenting you four contributions on "The Circuit of Knowledge and its Cultural Conditions: From Adventurous Exchange between East and West to a Global Network of Cooperation."

This presentation will begin by describing the work of the Partner Group on the history of scientific exchange between China and the West. What was initially an adventurous exchange has now become part of a global scientific cooperation. From this perspective, the Berlin Declaration also draws the consequences of a long historical experience. As our presentation will show, this experience ranges from the encounters between early modern scholars to the present endeavours of using the Internet for scholarly cooperation, also in history of science.

The first paper will be given by Prof. Zhang Baichun, Head of the Partner Group at the Institute for the History of Natural Sciences of the Chinese Academy of Science.

He will speak about "Science in Intercultural Contexts." This first contribution will describe the work of the Partner Group and its significance for understanding the history of scientific exchange between China and the West. He will focus, in particular, on sources documenting parallelisms and exchange of mechanical knowledge from antiquity to the early modern period.

The second paper will be given by Theresa Velden, director of the Heinz-Nixdorf Center for Information Management in the Max Planck Society.

She will speak on "Science in the Era of the Internet," explaining the Open Access Strategy adopted by the Max Planck Society as defined in the "Berlin Declaration on Open Access to Knowledge in the Sciences and the Humanities."

The third paper will be given by Prof. Jürgen Renn, Managing Director of the Max Planck Institute for the History of Science.

His talk is about "Synergies between Culture and Science," presenting an emerging open-access infrastructure for making cultural heritage available on the Internet.

I will then give the fourth and final paper on the *Qiqi Tushuo*, a text on mechanics from 1627, an early document of intercultural scientific cooperation between a Chinese and a German Scholar. It is a great pleasure for me to be part of this collaboration with our Chinese Partner Group.

The floor is now open for the head of the Partner Group, Prof. Zhang.

Science in Intercultural Contexts

Zhang Baichun
Partner Group at the Institute for the History of Natural Sciences
of the Chinese Academy of Sciences

Exzellenzen, verehrter Herr Präsident Gruss, verehrter Herr Präsident Lu, meine Damen und Herren,

Es ist eine Ehre und ein Vergnügen, Ihnen bei diesem festlichen Anlass etwas über die Arbeit unserer Partnergruppe zu berichten.

Die heutige Veranstaltung gibt mir zugleich die Gelegenheit, diese Arbeit in den Kontext der gemeinsamen Strategie der chinesischen Akademie der Wissenschaften und der Max-Planck-Gesellschaft zu stellen, wissenschaftliches Wissen und kulturelles Erbe im Internet frei verfügbar zu machen.

There is a long history of civilization in both China and Europe. In the 17th century, these two great civilizations entered into a direct exchange and began an interaction which promoted the transformation of knowledge in China. Within this transformation, also the ancient traditions of science and technology in China took on a new shape.

One of the important initial moments of this exchange was the partial translation into Chinese of Euclid's *Elements* and of the commentary by the outstanding German mathematician Clavius by Matteo Ricci and Xu Guangqi. Xu was not only a Chinese scholar but also served as the Minister of Rites.

In contrast to such early cooperations between Chinese and Western scholars, historians have mostly worked separately from each other. Most Western historians have traditionally focused on the European tradition, while Chinese historians have essentially focused on the development of science and technology inside China.

This is, of course, not the position of the Max Planck Society and the Chinese Academy of Sciences, which both share an understanding of the global nature of science and its history. And it is to this understanding that the Partner Group of the Max Planck Institute for the History of Science hopes to contribute by its work in the field of intercultural studies.

The Partner Group provides a wonderful platform for a congenial collaboration between historians of science from Europe and China.

The Group compares the cultural conditions for the emergence of science and the conditions for the exchange of scientific knowledge between cultures. Its work breaks new ground, as it does not just focus on local episodes from which it is difficult to draw generalizing conclusions.

Instead, the Partner Group studies the entire history of parallelisms and interactions between Chinese and European science from antiquity to the modern period, although it presently focuses on a restricted field; the field of mechanics.

It has turned out that the science of mechanics has emerged independently in China and the West. Our analysis has shown that there are distinct but equally scientific approaches to the same subject matter. This is shown by the great similarity between the ancient Chinese

treatment of mechanics by the Mohists and the ancient European treatment of mechanics by Aristotle and Archimedes.

Both the Chinese and the Western approaches were based on a culture of free intellectual exchange and an integration of practical and theoretical knowledge.

Unfortunately, the Chinese tradition was interrupted early on by political circumstances and other factors .

It was revived, however, when European scholars visited China in the Early Modern Period. On the one hand, they brought with them an enormous amount of knowledge, for example, on astronomy, mathematics, geography, mechanics and technology. On the other hand, they also carried back to Europe an equally impressive amount of knowledge from China, giving rise to a widespread fascination with Chinese culture in Europe.

It is less well known that this exchange of knowledge also led to a true cooperation of scholars from both cultures, resulting in a veritable integration of their knowledge.

The product of such an integration is central to the present work of the Partner Group, the *Qiqi Tushuo*, a comprehensive treatise on mechanical knowledge, published jointly by a Chinese and a European scholar in 1627.

Again this work demonstrates that scientific knowledge is deeply shaped by culture and that there can be equally valid approaches to a scientific subject from different cultural perspectives.

Unfortunately, however, this unique achievement had little impact on the onset of a culture of science and engineering in China in the Late Ming and Early Qing dynasties, although important figures, such as the Emperor Kangxi and other high-ranking officials, were very interested in Western science and technology.

This failure throws light on the important role of social and cultural contexts for a culture of innovation in which science can blossom and benefit a people.

Although we have not yet arrived at definite results, the delay with which the available knowledge was actually integrated into a culture of innovation seems to have in part been due to a breakdown of the circuit of communication of knowledge within Chinese society.

It is to the modern aspects of this circuit of communication that we have dedicated the remainder of this presentation.

Today the Internet is the essential prerequisite for the circuit of scientific information.

From our study of historical sources we have learned that it is not enough to just improve the technical conditions for this circuit of scientific information.

In order to make optimal use of the new technological possibilities we also have to create an infrastructure for the dissemination of scientific and cultural information on the Internet and contribute to the creation of a culture of science.

Science in the Era of the Internet: The Open Access Strategy[1]

Theresa Velden
Heinz-Nixdorf Center for Information Management in the Max Planck Society

Overview

1 Challenges and Opportunities
- trends in scientific publishing
- journal crisis
- eScience, Internet, Grid Technology

2 The Open Access Solution
- what we mean by open access
- benefits of open access

3 Realizing Open Access
- the Berlin Declaration
- the Berlin Process

4 Conclusions

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1. The Open Access Strategy of the Max Planck Society is documented at http://www.zim.mpg.de

Challenges and Opportunities

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Challenges and Opportunities
- trends in scientific publishing -

- traditional publication and scholarly communication models increasingly inadequate; 1:1 translation from paper-based model to digital forms insufficient
- expect complex and fundamental change in which the open access paradigm plays a crucial role

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Challenges and Opportunities
- trends in scientific publishing -

- Drivers of change:
  - Journal crisis and loss of access to research results
  - Requirements of research in Era of eScience
  - Enabling Technologies: Internet, Grid Technologies

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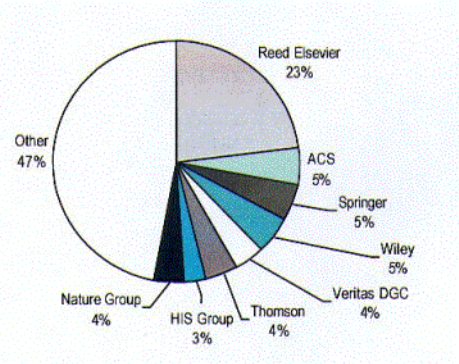
Challenges and Opportunities
- journal crisis -

- decades of subscription cancellations and expenses for periodicals eating into monographs budgets
- the growth of science as well as 'publish or perish' policy is resulting in increasing research output while library budgets remain constant
- due to mergers and inelasticity of the market very high profit margins by industry and no end in sight

→ Reduced access to research results, less visibility and impact than theoretically possible in age of Internet



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Challenges and Opportunities
- journal crisis -

- **Costs of restricted access to Science and Society:**
  - unnecessary duplication of work
  - lost opportunities for individual scientist
  - lost opportunities on global scale (digital divide), less adoption and generation of new knowledge or applications

→**Contrary to idea of results of publicly funded research as a public good.**

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Challenges and Opportunity
- eScience -

- Trends in research practice
  - Vast improvements in raw computing power, storage capacity, algorithms, network capabilities
  - Vast improvements in measurement techniques: online digital instruments & wide-area arrays of sensors
  - Powerful data-mining techniques, operating across huge datasets
- Implications
  - New approaches to discovery
  - Global networks link all this information together
  - More interactive and broader collaboration

→ **Need dramatically new environments (e.g. collaboratories) and new capabilities of scholarly communication system**

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Challenges and Opportunity
- enabling technology-

- WWW
  - since early 90s
  - invented at CERN
  - ubiquity, speed, democratization
- Grid Technology
  - evolving in 1st decade of 21st century
  - seamless and flexible access to resources, virtual, self-organized communities
  - International efforts under way
  - National German eScience and Grid Initiative about to be announced
-
- **→Technology to support a fundamental transition of the scholarly communication system.**

The Open Access Solution

The Open Access Solution
- rationale -

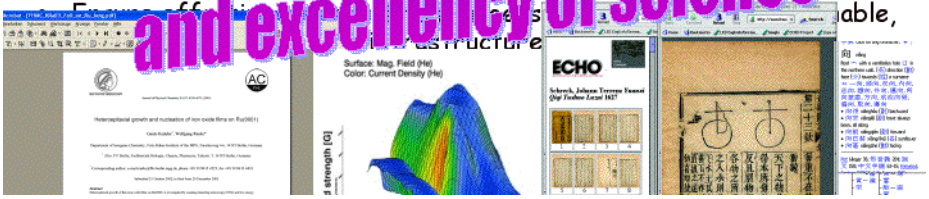
- regard dissemination as research costs - compared to entire costs of conducting research, publication costs only a minor fraction
- unrestricted access to the global knowledge base reduces opportunity costs and risk of duplication, no longer discriminate use of information
- ensure maximal impact and use of research results
  - changing role of publisher (as service provider)
- benefits 'information consumers' → reduces digital divide

has been adopted also by World Summit on Information Society, Geneva December 2003

The Open Access Solution
- what we mean by open access -

- Immediate unconditional electronic access to research results:
  - data, objects and primary scientific literature (papers/books) of scholarly interest (incl. artifacts of cultural heritage)
  - interlinking of research findings with underlying data
- Standards (interfaces, formats) that support connectivity (e.g. to build Library Without Walls Services)
- Copyright agreements which support open access – Open ac… License dedicates work to pu…
- …e (like peer-review), …ove by new transparent and community specific ap…roaches
- …able,

Open Access increases quality and excellency of science



Realizing Open Access

Realizing Open Access
- the Berlin declaration -

- Conference 21-23 October 2003, Berlin, initiated by Max Planck Society to address lack of institutional commitment in open access movement
- History: Public Library of Science 2001, Budapest Open Access Initiative 2002, Bethesda Statement 2003
- Major organizations of science and culture declare their mission only half complete if the research results they produce are not made freely available to society under the open access principle.
- To date more than 40 organizations have signed, on 12 May 2004 CERN at follow-up meeting to Berlin Conference in Geneva

Realizing Open Access
- the Berlin declaration -

- "The Internet has fundamentally changed the practical and economic realities of distributing scientific knowledge and cultural heritage. For the first time ever, the Internet now offers the chance to constitute a global and interactive representation of human knowledge, including cultural heritage and the guarantee of worldwide access."
- "In order to realize the vision of a global and accessible representation of knowledge, the future Web has to be sustainable, interactive, and transparent. Content and software tools must be openly accessible and compatible."

Realizing Open Access
- the Berlin process -

- Signing the Berlin Declaration is only the beginning
- Continuous, open but focussed process of Berlin Signatories to realize the vision of the Declaration
- Regular, 6-monthly meetings of Berlin Signatories
  - 1st follow-up meeting at CERN, 12/13 May 2004
    - → 1st Roadmap Proposal www.zim.mpg.de/openacces-cern/
- Status reports, roadmap review, alliances for specific issues and mutual help
- Model for processes within World Summit for Information: Geneva 2003, Tunis

world summit on the information society
Geneva 2003 - Tunis 2005

Realizing Open Access
- Max Planck Society -

- Sustainable, enabling Infrastructure: Open Access Platform (1st successes)
  - Seed money: Ministry for Education and Research
  - Pilot project in national eScience Initiative
  - Open for re-use (open source software and nucleus for national service)
- Continuous practical innovations & creation of new channels of dissemination (ongoing)
  - Living Reviews Journal Family (3)
  - ePublishing Tools
  - Living Einstein/Physics Project (2005 – Einstein Jahr)
  - European Cultural Heritage Online (EU, ECHO)

→ wide field of collaboration between signatory organizations of Berlin Declaration

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Conclusions

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Conclusions

- Open access is the replacement for the conventional scholarly communication paradigm and not its 2nd class counterpart
- The transition
  - will t[illegible] volve transformations in [illegible] traditional library/scientific information [illegible] ion system including the re-definition of role and [illegible] of Publishers
  - is facilitat[illegible] accelerate t[illegible] tion of a global a[illegible]ce of rese[illegible] unding organizations committed to Open Access coming together in the Berlin [illegible]s

Requires long-term commitment and readiness to share & collaborate

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Thank You for Your Attention.

Theresa Velden
contact: velden@zim.mpg.de

Synergies between Culture and Science

Jürgen Renn
Managing Director of the Max Planck Institute for the History of Science

Introduction

It is a great pleasure to be here in the middle of an event in which intercultural exchange is not just studied – as we do together with our Partner Group – but actually practiced.

I am convinced that history and practice belong together, that practice without history is blind, and that history without practice is sterile.

The present revolution of the media of scientific communication resembles the revolution of communication by printing. It therefore makes sense to take this opportunity to learn from history, which offers us a wider perspective on the present challenges.

From the experience with the printing revolution we can learn, in fact, that a revolution of media is never only a transformation of technology, but also of the entire infrastructure of learning and communication.

The Web as we know it today was in fact not simply the outcome of technological developments but of innovative usage scenarios.

To correct a widespread misunderstanding, the Web was not invented in America but in Europe, just as printing was not invented in Europe but in China. The Web was developed just some fifteen years ago when high-energy physicists at CERN were looking for new ways to communicate the enormous masses of data they were producing. I claim that culture can also provide us with such innovative usage scenarios, perhaps leading to a second Internet revolution, establishing a truly semantic Web.

In any case, if such innovative usage scenarios do not comprise culture as well as science, we are faced with the danger that the substance of our cultural heritage will be absent from the medium of the future.

We would then be confronted with the danger of a digital divide. This digital divide would not only separate scientists from scholars but would also separate both from the public at large, thus creating a situation similar to the breakdown of the scholarly communication circuit in the Middle Qing Dynasty mentioned by my friend Prof. Zhang. Such a digital divide would lead to a fragmentation of the Web into special interest groups, thus failing to use the unique opportunity offered by the Internet to create a connected, global representation of human knowledge.

What we need, in my view, is a vision exploiting the new technological possibilities for the creation of a public culture of science, a vision that includes the humanities, thus keeping alive the roots of our techno-scientific world in the cultural heritage of mankind.

Fortunately, there is a growing awareness that a joint effort is needed to prevent such a digital divide and to create open-access to science as well as to culture. As far as science is concerned, it is the combination of public debate and concrete steps towards implementation that is the

hallmark of recent successes of the open access movement, from the Berlin Declaration to the final statement of the World Summit on the Information Society 2003.

The Role of Culture for the Future of the Web

Is culture at best only a fellow traveller of the Internet revolution? First of all, although we often tend to forget it, science is also part of our culture. It could not exist without a cultural context favorable to it.

But, of course, culture is much more than science. Culture is simply part of our identity as human beings, and its appropriation by future generations is not a luxury, but the only way to preserve this identity.

I quote from the definition of the World Bank:

> "Cultural Heritage encompasses material culture, in the form of objects, structures, sites and landscapes, as well as living (or expressive) culture as evidenced in forms such as music, crafts, performing arts, literature, oral tradition and language. The emphasis is on cultural continuity from the past, through the present and into the future, with the recognition that culture is organic and evolving."

The sources of culture range from cuneiform libraries, via archeological and anthropological sources, sources of the history of science and the history of art, to video documentations of human behavior.

What you see here[1] is a sample of such collections ordered by a timeline ranging from 3000 B.C. to the present.

These collections have been brought together by the European Cultural Heritage Online Initiative, effectively representing Essential Cultural Heritage Online. This "ECHO initiative" has been launched by the Max Planck Society. It represents a first step towards creating an open access infrastructure in which holders of cultural heritage have the opportunity to make their sources available in an environment that allows for their preservation, their connectivity with other aspects of cultural heritage, and their interactive study over the Web. In a word, this infrastructure illustrates, albeit for a small collection, what a future Web of Culture and Science could look like.

Such samples illustrate, even if only to a modest extent, in which sense culture could represent a challenge for the future development of the Web. Efforts to include culture on the Web together with an appropriate infrastructure will, for instance, lead to new ways of dealing with multimedia. But in spite of the increasing role of multimedia, due to its origin in the idea of hypertext, the World Wide Web will also in the future be mainly based on texts, carrying the meaning encoded in human language.

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1. Website of the Max Planck Institute for the History of Science http://www.mpiwg-berlin.mpg.de
Website of the ECHO initiative http://echoneu.mpiwg-berlin.mpg.de
ECHO's collections can be seen on http://echoneu.mpiwg-berlin.mpg.de/echo_nav/echo_pages/content/graphics/timeline.html

It is therefore quintessential to develop efficient tools for searching, editing, and annotating texts in different languages over the Web, exceeding the limited possibilities offered by today's browsers. As humanists are specialists in dealing with texts in different languages, the most efficient tools for dealing with texts have been developed in the context of the humanities. The results of this kind of work brings us a step closer towards a Web in which one can search not only for strings of signs but also for meaning.

Let us take an example from the history of science: parallel to the work of our Partner Group we study the European tradition of mechanical knowledge from Antiquity to the Modern Period.

As we are interested in long-range patterns of development, for instance of the conditions of innovation, we have to deal with a great quantity of sources in many languages, from Greek and Latin via Arabic to Italian, Dutch, English and German. Relevant sources are being made publicly available in order to facilitate the international cooperation on these sources.

A source is typically available as a high-quality facsimile and a transcribed text, together with scholarly metadata. A word in a text represents a link leading, via a morphological analysis, to the root form of the word which can then be looked up in a dictionary, either a contemporary or a modern dictionary. In this way one can search for meaning across different languages and across different grammatical forms.

How can one find out, for example, what various authors wrote about the nature of weight, *zhong*, in Latin "natura ponderis"?

We can use the ECHO infrastructure in order to quickly look up among thousands of pages of ancient texts on mechanics in Latin all phrases in which "nature" and "weight" appear in whatever grammatical form. In the future this could be scaled up to practically all major languages to become an enriched infrastructure of the Web.

The Role of the Web for the Future of Culture and Science

From the example of a possible contribution by the humanities for the future of the Web it has become clear that, in the Internet era, also the nature of the humanities themselves will have to change radically. They can no longer hide away in esoteric niches defending their privileged access to the sources of human culture. Rather they will have to live up to the challenge of activating the potential of the Web or otherwise perish into insignificance.

Actually, even the seemingly most remote and specialized branches of the humanities may assume a new role in the Internet era.

Take the example of cuneiform writing. It has served to encode the largest part of human written history, but the roughly one million tablets covered with cuneiform writing that have been preserved are today accessible only to a handful of specialists. Given an appropriate infrastructure for culture on the Web, these widely dispersed documents can now, for the first time, again be reunited, thus reconstituting the ancient Babylonian archives and protecting them against the dangers of today's wars and devastations.

By making these tablets available on the Internet entire disciplines dedicated to their study could be radically changed since privileged access to a collection of documents can no longer

count as a criterium for qualified scholarship. Potentially, the work of isolated specialists is being replaced by Web-based collaborations of interdisciplinary teams studying issues of a wider scope and taking into account thousands of documents at the same time. In their publications, footnotes will be replaced by links to the original sources, thus transforming the results of scholarship into new navigational devices providing semantic access to these sources. In the future, such novel approaches will be able to make this seemingly remote material widely accessible, even beyond the limited number of specialists. They will thus grant access to a large share of human memory, for instance about complex administrative systems, but also about the triumphs and failures of imperial ambitions.

A future Web of Culture and Science has the potential of overcoming traditional dividing lines between cultures, nations, disciplines and specialized sub-disciplines.

The issue of the history of the scientific revolution, for instance, has traditionally been studied by scholars specialized on Galileo, Newton, Leibniz, etc. However, the scientific revolution involved the cooperation and communication of engineers, scientists, and artists all over the world.

As an example of documents that have long been accessible only to specialists but are now publicly available on the Internet due to the ECHO initiative, you see here a manuscript of Leibniz, unfortunately not one of his manuscripts concerning China, but a piece documenting his research on optics.

Rather than creating isolated digital libraries for each of these major figures, it has turned out to be much more efficient to integrate the relevant sources in a single open access platform.

An important contribution to the scientific revolution came also from practical knowledge, especially from Renaissance engineers such as the Italian Filippo Brunelleschi in fifteenth-century Florence, who constructed the Cupola of the Florentine Cathedral.

The Florentine archive documenting the construction procedure of the cupola has been made available on the Web with support of the ECHO infrastructure, which has made it also possible to associate additional materials to this unique source of Renaissance practical knowledge.

Here you see, for example, a photo documentation of construction details of the Cupola of the Florentine Cathedral, accessible with the help of historical plans of the building.

The Scientific Revolution of the Early Modern Period did not only involve an integration of practical and theoretical knowledge but also of European and Chinese traditions. When studying the interaction between Chinese and European science, bridging different languages is a crucial means for overcoming cultural limitations and biases.

Take the example of the Chinese text on mechanics from 1627, earlier mentioned by Prof. Zhang.

In order to allow access to this text also to those scientists who do not read Chinese, the language technology of the ECHO infrastructure is of great help. Take the example of *qi*, as in *junzi bu qi*. Each sign is a link leading to an entry of an online dictionary found publicly available on the Web.

While the *Qiqi Tushuo* documents an attempt to bring European knowledge to Early Modern China, this book by the German scholar Athanasius Kircher represents an attempt to synthesize what was known about China in contemporary Europe. Both sources are now brought together in the Internet.

As you will have noticed, all images are displayed by a standard image browser allowing not only various ways of image processing, such as zooming, but also a Web-based annotation and commentary of these images by marking spots on the images with reference points, whose URL can then be used as a reference.

How these techniques are being used in order to produce an online commentary on the exchange between Western and Chinese knowledge will be briefly demonstrated by Matthias Schemmel in the sequel.

State of Culture on the Web

This presentation might be misleading as it suggests that the sources and tools necessary for a Web of Culture and Science are already available. What you have seen, however, are merely a few selected examples that might help to imagine the potential of such a Web of Culture and Science.

As a matter of fact, as far as culture is concerned, the present Web is still lacking in

- content,
- instruments,
- interactivity,
- longevity,
- transparency, and
- open-access.

Clearly these deficits of the Web, as far as culture is concerned, are the same as those relevant for science.

Reasons for the Present Problems

The reasons for the present problems are also similar to those that have so far prevented the realization of the vision of an open-access infrastructure for the sciences:

- commercial interests,
- lack of infrastructure,
- lack of funds for the creation and maintenance of an infrastructure,
- lack of coordination among existing initiatives,
- fragmentation of responsibilities among institutions,
- lack of awareness among scholars and institutions,
- treasure-house mentality of museums and archives, and
- legal questions.

Strategy for a Solution

Let me now come to a possible strategy for a solution.

Given that the problems are practically identical in the case of the sciences and in the case of culture, it makes sense to envisage a close cooperation in creating an open-access platform that will become the launching pad for a future Web of culture and science.

The open access platform that we envisage should allow every scientific institution, archive, library, museum, or educational institution to make their resources available online with little effort and in a way that guarantees that there will be no walls separating the treasures of cultural heritage from each other and from the public.

This kind of a “library without walls” will only be possible if no artificial barriers such as password protection or other commercial access systems hinder the direct linking of corpora among each other.

Institutions willing to share their holdings in this way would thus become part of an “open access family” in which they would also benefit from a co-development of contents and technology providing the innovation dynamics absent from commercial solutions.

With their close cooperation based on an established tradition and their joint support of the Berlin Declaration, the Chinese Academy of Sciences and the Max Planck Society will form the nucleus of such a global family.

Let me end with a final remark on synergies between science and culture.

The next year 2005 will be crucial for the realization of the vision we have presented here.

It will be the International Year of Physics and the Einstein Year, celebrating the hundredth anniversary of the theory of relativity. It will also see the 22th International Congress of History of Science taking place here in Beijing.

It is therefore plausible to use the occasion in order to launch an initiative for a Web of Culture and Science that will receive global visibility both from the sciences and the humanities. Focussing such an initiative on Einstein and his heritage would be attractive. The Beijing Conference in particular may be a wonderful occasion to host an appropriate event as it is presently being discussed with the Institute for the History of Natural Sciences of the Chinese Academy of the Sciences to display at this conference parts of the major Einstein exhibition our institute is preparing on a national level for Germany.

The creation of a digital collection comprising both historical materials related to Einstein’s revolution and materials related to the heritage of Einstein’s work in today’s science could offer one starting point for such an initiative. Here you see, for instance, his notebook from 1913 documenting his joint work together with the mathematician Marcel Grossmann on general relativity, building on his 1905 breakthrough. Such a “Living Einstein collection” should not only be addressed to scientists and scholars, but also to teachers and students as well as to the public at large.

It is obvious that such an initiative can only come to fruition under the principle of Open Access, now jointly embraced by the Chinese Academy of Sciences and the Max Planck Society.

Another starting point for this initiative could be the work of our Partner Group on historical sources of science, which documents its global nature.

The Qiqi Tushuo as an Early Document of Intercultural Scientific Cooperation

Matthias Schemmel
Max Planck Institute for the History of Science

In 1626 the German scholar Johann Schreck and the Chinese scholar Wang Zheng met here in Beijing, probably in the Western District at Xuan Wu Men. They soon developed a mutual respect and decided to start a joint enterprise, aiming at integrating European knowledge on mechanics with Chinese practical and intellectual traditions.

Both were intellectually well prepared for undertaking this enterprise. Schreck had been in touch with the foremost European scholars working at the forefront of mechanics, among them Galileo Galilei. Wang Zheng was himself an experienced engineer in the field of machine building and, at the same time, a scholar-official conversant with the Chinese philosophical tradition.

Their joint enterprise was extremely ambitious. They aimed at creating a compendium of the entire body of mechanical knowledge then available in Europe, both theoretical and practical. They also aimed at developing a theory of knowledge that accounts for the success of science, creating at the same time a new place for science within Chinese philosophy. On the basis of this intellectual program, they obviously also aimed at nothing less than an advancement of Chinese society by transforming its knowledge basis. Of course, the Jesuit Schreck must also have hoped to exploit this master plan as a vehicle for his religious concerns.

The successful realization of the joint endeavor naturally presupposed a careful and well thought out blending of Chinese and European elements of knowledge, as well as a subtle use of rhetorical strategies. In order to achieve their ambitious aim, the two intellectual explorers could rely on a collection of some 7000 Western books brought by the Jesuits to China, in addition, of course, to the local Chinese sources.

But which of these numerous sources did they actually use? And how exactly did they combine the elements of knowledge of their respective traditions? Which strategies did they conceive in order to make European knowledge intellectually accessible to a Chinese audience? The reconstruction of this complex enterprise is one of the joint projects of the Partner Group and the Max Planck Institute for the History of Science.

It would have been impossible to address these challenging questions without the support of the open-access infrastructure of the Max Planck Society developed within the context of realizing the aims of the Berlin Declaration.

One of our tools used in this project is an online commentary on the *Qiqi Tushuo* comprising links relating passages of the Chinese text to potential European sources.[1]

1. The Web presentations of the Chinese sources are available within a presentation of the Partner Group (http://www.mpiwg-berlin.mpg.de/CHINA/) and within the ECHO environment (http://echoneu.mpiwg-berlin.mpg.de/echo_nav/echo_pages/content/chineseknowledge).

The *Qiqi Tushuo* introduces essentially all theoretical key concepts of contemporary European mechanics such as, for instance, the concept of center of gravity. There are, of course, several ways of defining this concept. As it turns out, the definition found in the *Qiqi Tushuo* can actually be traced back to the work on mechanics by the Dutch scientist Simon Stevin as is stated by the commentary jointly produced with our Partner Group. It links the relevant passages of the *Qiqi Tushuo* to the corresponding passages in Stevin. Reading of Stevin's text is in turn facilitated by the language technology available that links words in the text to entries of a Dutch-English dictionary.

When our work is complete, we plan to publish the results not just in a book about the marvelous joint enterprise of Schreck and Wang. Rather, we plan to construct a virtual library of sources including a documentation of the path which this Chinese-German team of scholars took through the literature available to them. The open access paradigm will make sure that this virtual library will truly be a library without walls.