The E-ternals.com Project
for the protection and publishing of the cultural heritage

Technical issues on the way to universal standards in digitisation

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Introduction

The e-ternals.com project is an open multilateral project with the aim of protecting and publishing the world's documentary heritage, such as manuscripts, drawings, paintings, wall paintings, inscriptions and printed materials.
The project was started in the 1990s following concerns for the physical condition of some of the world's most significant documents and expressions of art, and because such world heritage items are often unpublished and inaccessible.

The development after the last world war indicates that physical preservation or restoration alone will not ensure the availability of world heritage items into the future.

- There are natural physical limits to which all material items are subjected. For instance, a paper manuscript or a palm-leaf manuscript will only last a given number of years, even under perfect preservational control with unlimited budgeting. After the natural physical life-span, any original document or work of art will eventually become unavailable.
- Physical preservation and restoration are often extremely expensive. In most countries, including supposedly rich ones, satisfactory treatment is only possible for a small percentage of particularly significant items.
- Budgets for preservation and restoration are limited and continuously shrinking in virtually all countries in absolute and relative terms, due to the generally low priority generally awarded to heritage protection projects in relation to other sectors such as health care, unemployment, or military safety. Every year, even some of the supposedly relatively well-endowed libraries all over the world physically destroy literally container-loads of innumerable irreplaceable documents due to the sheer lack of physical storage space.
- Physical preservaton and restoration cannot protect heritage items from destruction. Germany, where the e-ternals.com was started, has lost about 30% of its entire cultural heritage during the last century, due to wars and other political factors. Similar developments from all over the world are becoming known almost on a daily basis.

Another main concern was that spending vast sums on the preservation and restoration of heritage items did not seem to be rewarding, if these items remained inaccessible to the research community and the public. To put it a bit crudely: what good is it if large sums of money are to be given to

preserve certain documents, when these documents are then going to be locked away and will eventually fall apart anyway?

The local nature of heritage originals makes it difficult to do research on them and get them published and studied. Often, heritage originals are stored outside their culture of origin and receive less interest from the local research community or public than they should. For instance, the only copy of the Kashmiri Paippalada recension of the Atharvaveda, one of India's Vedas and a centrally important item of prime world heritage stature, went virtually unstudied for 100 years, in a library basement far away from its original country of origin. It is the e-ternals.com project that has finally published the first complete version of this historic document. We are now planning to hand it over to the Indian government in this form.

With physical preservation and restoration financially problematic and of little help for publishing, we started looking at other ways of protecting and publishing heritage items.

Unfortunately, facsimile print reproduction is also a very expensive proposition and certainly not feasible for more than a small percentage of documents. It requires a relatively huge amount of expensive technology and infrastructure, and the resulting facsimile publications are generally too expensive to be considered a viable alternative for mass publication. While the technology has been available now for many decades, it has never become more than an expensive luxury.

In this area, microfilming has also not yielded all the positive results that were originally hoped for. For one, microfilming is also an expensive process – too expensive for the quantities involved in heritage preservation. In most cases nowadays, microfilming is done only for a certain number of core documents, and only upon special request for all others. It has now become a fringe activity, also due to other problems connected with it:

- Microfilms are only black-and-white, and mostly done at only 256 or even less grayscales. As such, microfilming is ruled out for many heritage documents such as drawings, miniatures, paintings, etc.
- The contrast quality of the microfilmed image is very low, which makes it totally unsuitable for many types of manuscripts (such as many Asian manuscripts, for example the South Indian type of incised palm-leaf manuscripts).
- Microfilming is normally done at a resolution of only 400 dpi (or even less), as a result of which the pictures are blurred and extremely difficult to read. Many important manuscripts are very old and in precarious physical condition. Letters are faint, fringes are crumbling, edges are bending. In such cases, a microfilm will only show a gray area with nothing to see.
- Particularly painful: microfilms have themselves only a lifespan of up to ca. 50 years, after which they themselves will have become unreadable. This is happening even in major national libraries all over the world where the films have been kept very conscientiously.
- Because microfilms are an analog material, the films decay without quality control. In other words, it is frequently impossible to differentiate between defects in the film and actual blemishes in the original, because the film is not under any technological control.
- During copying, the original microfilm is quality-reduced, and the copy is of lower quality than the original.
- Microfilm copies are expensive and difficult to obtain. Not to mention of course microfilm reader and printer equipment, which is extremely expensive, being manufactured by only a handful of exclusive manufacturers, and has therefore remained a fringe phenomenon.

While microfilm has generally been a step forward from what was previously possible, it has ruled itself out as a heritage preservation technology and is unsuitable for publishing.

Luckily, there is a technology which has none of the above problems, and solves our dilemma.
The digital revolution has presented mankind with the first ever opportunity to produce *perfect copies*. While all previous methods of creating copies were necessarily imperfect, a digital copy is either perfect – or it is not a copy at all. Digital copies can be copied on and on, from one type of digital data carrier to the next, without any loss of information – an alchemist's dream...

Thanks to the massive distribution of digital equipment, digital copies are extremely inexpensive to produce and to distribute, making it an ideal publishing method.
It seemed therefore a good idea to place the priority of the e-ternals.com project on digitisation.
However, when we started to examine digital possibilities at an early stage, we encountered several serious challenges.

The intensity of light

Digitisation is a photographic process. Unfortunately, during the microfilm era, many sensitive documents were badly damaged by excessive exposure to intensive light sources. They often very rapidly developed an unexpected brittleness and started to decay fast, with the result that for example the entire Joh. Seb. Bach manuscripts in the National Library in Berlin are now so badly damaged that they can no longer even be handled. The remaining pulp-like mass is now kept in a special kind of casing which is not allowed to be opened any more.
It was found that this so-called "light cancer" would set in when a manuscript was exposed to light of an intensity of more than approx. 13000 to 15000 LUX. Even the fraction of a second that a photographic flash requires is already enough to trigger the destructive process, which cannot be halted once it has set in.
13000 LUX has therefore become the light intensity threshold for heritage photography in Europe. Microfilm projects have been largely abandoned. Where it is still done it is a special activity, done on special request, and only on "safe" materials.
Unfortunately, just like analog photography, normal digital cameras or scanners are way above this threshold. Normal digital scanners have the added problem that they take considerable time to capture the image, thereby multiplying the damage from overall light exposure.[1]

As a result, a large proportion of European manuscript holdings were banned from any form of photography, whether analog or digital.
It became clear very early that if digitisation were to be permitted, we had to come with a technology that would not have this problem.

Temperature issues

Another problem we faced was temperature. All photography lighting normally develops considerable amounts of temperature. Normal digital scanners are even worse than normal ambient light sources,

1. exposure = intensity time

because they develop particularly high temperatures, almost like a stove. Both types of equipment were ruled out as a result.

We therefore had to start on a technical sub-project first, with the aim of developing equipment that would stay below the light intensity threshold and which would not develop the usual high temperatures. It took our electronics team about two years to solve this problem. The result is what we call our "cold-light system". This equipment generates an average of 4500 LUX for approximately 54 seconds, and an overall exposure equivalent to under two minutes of normalized office lighting. It develops no measurable temperature of its own, even after many hours of uninterrupted usage.

Research-level quality calibration: abolishing the camera

We all know the notorious problems of camera photography: problems of focus and positioning (some areas less sharp than others), difficulties to reproduce colour ("that might have been an old film"), variable light sources ("we couldn't light that part of the room properly"), interference by the flash, permanent need for manual readjustments, and so on. In microfilming, it became a rule that each image had to be taken at least twice. The problems are the same for all camera lens-based photography, whether it is analog or digital.
On normal digital flat-bed scanners, temperature changes lead to considerable variation in image quality (colours, contrast, sharpness etc.) over the working period. This is a problem that is well known in the graphics and publishing industries, where images scanned in the morning tend to be different from the ones scanned in the evening, and transparencies that are forgotten in the scanner for a couple of hours can be safely discarded...

It is clear that this lack of quality control will not do for research and for long-term archiving, where comparability of information is critical. In other words: apart from eliminating light exposure and temperature issues, we also had to eliminate any form of camera- or lens-based method of photography.

Developing the equipment

We therefore had to start on a technical sub-project first, with the aim of developing equipment that would comply with the following requirements:

- Minimum intensity of light
- Minimum overall light exposure
- Minimum temperature development
- No camera lens, to avoid focus and readjustment problems
- Maximum colour depth
- Maximum image sharpness
- Maximum capture area
- Minimum variation, i.e. maximum calibration and stability of quality of information

The equipment also had to be easy to use, affordable, and operational in common digital environments.

Seeing that normal digital flatbed scanners were the devices which had the fewest problems, we decided to see if we could find a solution by re-engineering the best possible such device. Flatbed scanners have no focus problems, because their lens system is linear. They produce a very high colour depth and sharpness over a sufficient area of capture. The problems that remained were the intensity of light, overall exposure to light due to the relative slowness of processing, and the high temperatures and temperature fluctuations, with the resulting quality variations.

We solved the problem with the help of our electronics division. The base system is a top-model flatbed scanner yielding 42-bit colour depth at a resolution (sharpness) of 800 dpi (dots per inch) over an area of A3+. Using a special cold-light technology, the equipment could be brought down to a minimal intensity of light and virtually no temperature development at all. With the help of a specialized software company, and by using top-level computers, we managed to bring the overall light exposure period down quite dramatically.
The specifications are as follows:

Average intensity of light:	ca. 4500 LUX
Average exposure duration:	ca. 54 seconds
Peak intensity of light:	ca. 9400 LUX
Exposure duration of peak intensity of light:	ca. 0.1 sec
Temperature:	negligible
Temperature variation:	negligible, even over elongated periods of operation. The equipment does not need to be switched off even for quality-control reasons.

These values are the equivalent of just under two minutes of normalized office lighting.

We demonstrated this equipment in the National Library in Berlin and in many universities and colleges in Europe. The initial reactions were extraordinary, almost ecstatic.

With our equipment, we have been authorized to digitise even the most sensitive documents in the National Library in Berlin and many other libraries, including material that is banned from normal photography and microfilming. We can say without exaggeration that we have become the de-facto quality standard for digitisation.

Image quality is almost microscopic in sharpness. Our lens systems passes by the original at very close distance, producing an incredible resolution. With our data, scholars were able to detect amazing details, for example text in a miniature book held by Shah Jahan in a famous Mughal miniature.

Another beneficial by-product of our developments was that we are able to digitise through glass, without any measurable refraction, another impossibility for traditional photography. Many manuscripts are kept inside special glass frames, which were impossible to photograph. We are also able to digitise metallic surfaces, such as Turkish gold-plated book covers or miniatures with gold painting, because our technology has almost zero reflection properties.

The low amount of light that we are allowed to use forced us to use a particularly powerful lens. This had the collateral advantage that we now have a digitisation depth of several centimetres, which allows us to also digitise the inner and outer areas of thick books and palm-leaf manuscripts or other manuscripts with bent edges or otherwise irregularly shaped forms, without significant loss of quality, and without having to use stabilizing tools.

Using special digitisation software with automated permanent colour calibration and three simultaneous inputting devices, one operator is able to produce three large-format digitisations (up to A3+ size) every nine minutes, without having to stop for adjustment intervals, or an equivalent of three digitised A3+ pages per minute (equals more than six A4 pages per minute).
We have been optimising configurations and workflow over time. We are able to scale our operations to fit digitisation projects of any size. Projects can be easily costed, because we are working on the basis of a modular "digitisation unit" concept. Project cost is basically a factor of the number of units required.

The equipment has been made dust-proof and shock-proof to a very high level and can even be mounted in a digitisation vehicle (DigiMobile).

Our equipment has been in use all over Europe and in India for some time and can be set up in almost any location with basic facilities within a few days.

Our digital archive editions have been ordered by many leading research institutions, such as Berlin, Harvard, Heidelberg, Kyoto, Michigan and Oxford.

For only a few dollars per data carrier, scholars around the world can now obtain digital manuscripts at breathtaking quality. Many researchers have commented that having these high-resolution digital versions on a big computer screen is much more practical than staring at the original manuscript with a magnifying glass or under a microscope.
And there is no need to travel abroad, no need to make harmful photocopies, no need to touch the original.

But before we could start sending out digital discs, we had to solve some other issues:

Data carriers

Digital data carriers are notoriously unreliable. Hard discs carry a maximum of five years of warranty and are optimised for operating speed more than for reliability. The same is true for any tape- or film-based material. This ruled out basing the data on large networks. The situation with normal CD-ROMs is not much better, with estimated maximum life spans of no more than twenty to thirty years. For heritage archiving, such data carriers would be too short-lived. Until very recently, the only alternative were special glass-based CD-ROMs, which carry a lifespan of roughly 100 years but are very expensive to produce and not suitable for mass distribution. Fortunately, the situation changed about two years ago with the emergence of the new Japanese-technology CD-ROMs with a guaranteed life-span of at least 100 years (silver-coated) or at least 200 years (gold-coated). These are

still fairly inexpensive to reproduce but more than satisfy the needs of libraries and archives. There are two manufacturers (Ricoh and Mitsui), and production plants have been set up all over the world. With material sciences now working on optical, molecular and other new long-term high-performance media technologies, we expect that there will be no need for CD-ROMs any more in 100 years, and we therefore normally use the silver-coated 100-year CD-ROMs. Special editions (such as of the above-mentioned Atharvaveda manuscript) are done on gold-plated 200-year CD-ROMs for the maximum of what is currently possible.

Data carrier formatting

One major concern was that the digital revolution generates new waves of data carrier formats every few years. How can we ensure that digital data carriers formatted today can be read and used by the libraries and the public in future?
For this issue, the library community has set up special international ISO norms that document how long-term data carriers must be formatted. For the CD-ROM, this is ISO 9660 Level 1. All manufacturers of CD or DVD readers have to comply fully with this norm, as are operating systems manufacturers and data publishers such as ourselves.
We fully comply with ISO 9660 Level 1.
We have even defined a special, even stricter Archive-Quality Standard for CD-ROM formatting which adds certain important additional rules to the ISO 9660 Level 1 rules. For example, ISO 9660 Level 1 allows for some additional information to be inserted besides the actual data content. This additional information was originally intended as a basic meta-data facility (information about the data), but is internally structured very loosely and actually represents a mixing of data and meta-data. It has since been superseded by proper international meta-data construction norms. We have therefore banned the use of this sub-feature, as well as some other similar sub-features.

Data file formatting

We also faced the problem that the actual data content is subject to file formatting definitions. The challenge was to find data formats which would be guaranteed to be readable by future generations of users. Fortunately, these issues are also managed by the International Standards Organization, in collaboration with researchers and scholars from the respective disciplines, including ourselves.

The image file format has been set as uncompressed and uncustomized TIFF, using PC byte ordering.

Meta-data and digital texts

Meta-data are information describing the data, i.e. the original document and – where already available – its digitised surrogate. Meta-data information is essential for researchers, libraries, for communication, for the publishing effort, etc.

Meta-data have so far mostly been provided on paper, such as in catalogues or concordances, and until recently we have also been providing our own meta-data to others in printed form only. This is different from our production of meta-data, which has been exclusively digital from the beginning, based on our own multilingual database software, and we have recently begun publishing them digitally upon request.
We have been active in the push towards an international standardization of meta-data formatting and exchanging, because meta-data are as important a component of the digitisation effort as the digitisation itself. Without normed meta-data and meta-data exchange, reasonable access and use of the digitised material will not be possible.
Digital meta-data and meta-data exchange are currently in the process of being normed, and the next year will see our first normed digital meta-data publications. We will be among the first implementers of these norms, and we are currently developing and testing implementation prototypes for one of the committees.
One aspect of meta-data creation currently being normed is the character sets to be used for text-based data in archives and libraries. These have been normed under the Unicode standard, currently being integrated in all relevant operating systems. These norms ensure that digital texts can be read on all operating systems in the same way, without the need for special software or converters.
For example, the transliteration of Indian manuscripts was normed under Unicode section ISO 15919. e-ternals.com is advising the ISO 15919 team and currently implementing the first ISO 15919-compliant text creation technologies. We are advising certain major operating system developers to ensure that some remaining issues are ironed out. We also develop new technologies for maximum user comfort in generating normed text, and for quality control in e-texting projects (digital typing/transliteration projects).

The international community is currently also in the process of norming the data warehousing and data communications methods to be used by the digital libraries of the future. These norms are already well under way. Central components are SGML/XML (warehousing) and XMP (communications). These norms are already sufficiently advanced to permit preliminary versions of the data processing environment in which our graphical and textual archive data will be managed in future.
We are working with colleagues in indology and related areas towards the definition of standards that will cover the special issues involved with managing Indian manuscripts (scripts, materials, writing method, etc.).
Together with the Oxford Centre for Vaishnava and Hindu Studies (OCVHS) and the Indian Institute Library at Oxford University we have formed the Oriental Manuscripts Meta-Data Standard (OMMS) initiative for providing a common documented platform for indological meta-data and meta-data exchange.

In 2002, we will be replacing our existing multilingual database (pre-standard) with standardized meta-data processes, allowing us to publish meta-data on universally exchangeable and ISO-normed data carriers, along the similarly ISO-normed graphical digitisation data.

Meta-data and textual representations (transliterations, translations, critical editions, etc.) of the digitised manuscripts are expected to be managed by similar processes, and their data formats are likely to overlap or even converge.

We are currently working towards our first digital transliteration in accordance with the new international norms. The first title is expected early next year (a transliteration of a 13th-century South-Indian palm-leaf manuscript), simultaneously with the final publishing of ISO 15919. We expect other existing and new e-texting projects to adopt the same universally normed technology, and we will assist them in doing so.

By making the digitised manuscripts available for study world-wide, we expect to generate a steady stream of transliterations, translations and editions from the scholars working on them. We offer these scholars the possibility to prepare their transliterations using the new international norms and exchange them with their colleagues. We will also offer to publish the texts in this form.

A positive side-effect of the new international standards for text representation of South Indian manuscripts is the new common platform for writing software algorithms for text analysis. So far, text has been stored in a babylonic variety of digital formats, and scholars had great trouble even with exchanging texts. Textual informatics initiatives often remained isolated enterprises because there was no common platform. With the new international norms for text representation and communication, analytical results become directly comparable and exchangeable. Using universally acceptable data, previously isolated teams of researchers can contribute to larger threads of research. This could lead to better forms of cooperation and opportunities to build larger and internationally operating teams of researchers.

In the e-ternals.com workflow, meta-data creation takes place in several stages, before, during and after digitisation. It involves considerable amounts of academic input, which is why we always make a point of partnering with specialists from the respective fields. In the case of indological manuscripts, for example, we rely on indologists to provide us with their expertise on the order in which manuscripts should be digitised, identification issues (authours, works, types of material, provenance, illustrations, etc.), reliability of existing catalogue information, etc.
Without massive help from a large and growing number of academic partners on all continents we would not be operational.
What makes meta-data work particularly interesting is the fact that almost in every library where we are digitising, we keep finding manuscripts which have somehow managed to escape detection, or unknown letters, notes, transliterations or other interesting “new” material. Just recently in Tübingen University Library, we detected three entire “new” Indian manuscripts, a note by Rudolph Roth on a Malayalam bamboo manuscript of the Hari Vansa, and a large sheet with his personal hand-written Devanagari edition of a section of the Atharvaveda hidden away in an Atharvaveda manuscript. All of these are currently being digitised, meta-data are being created, and they will be available to the interested public in a few weeks’ time.

Digitising ageing microfilms

We have also been asked to digitise ageing microfilms which are no longer readable on microfilm equipment.
For example, we have digitised an already unreadable last microfilm copy of a lost manuscript, for the National Library in Berlin. Without having to enhance the graphics, we have been able to make the

microfilm readable again on the computer screen, just by digitising it with our equipment. In the meantime, digital copies of this manuscript have also been sent to Japan, Finland and the USA.

In fact we have discovered that staff that has previously been working in microfilming departments make extremely good partners in the digitisation effort. Many of them are acutely aware of the needs for manuscript preservation, have a very high knowledge of manuscript collections and of the issues of keeping them in good shape, and in many cases microfilming staff are technically particularly advanced members of their respective libraries. Many of them are now utilizing their broad-based expertise for implementing digital libraries, not only for manuscript originals, but also for saving their microfilms into the future in digital form. We have recently been asked to consult a government-funded project which is planning to digitise 150000 microfilms.

Interactive publishing, size-reduced publishing, script teaching, critical editions

The above developments have allowed us to publish hitherto unavailable documents to the academic or scholarly interested public, mainly in Europe, India, and the United States.
Most of these documents were manuscripts of Indian origin. Soon after the first such manuscripts reached an academic audience, we were flooded with requests for specially enhanced CD-ROMs for learning the various scripts. Only a small fraction of early manuscripts is in a script that can be read by Western indologists, and even in India the knowledge of scripts such as Grantha and Sharada is limited. We have therefore started developing special interactive software for teaching and self-teaching these scripts, as well as for keeping up reading practice. The first prototypes are ready, for Sharada and Grantha. We are basing this software on an installation-free technology that we have developed for Windows and Apple Macintosh computers. We are also publishing peripheral materials such as the Devanagari transliteration of the Atharvaveda which Rudolph Roth had received from Kashmir, together with the birch-bark Sharada original.

Another request that has come from the academic community was to provide size-reduced versions of the archive data, to allow for quick reading of well-preserved manuscripts even on smaller computers. We are currently in the process of creating such versions. One such product is already available. We are offering these size-reduced versions on the same type of normed CD-ROM disc as the full archive versions.

We can also publish size-reduced versions in connection with a special interactive software interface for Indian palm-leaf manuscripts, installation-free, for Windows and Macintosh computers. However, this is a very labour-intensive form of publishing (long development cycles), and we have so far only been able to produce one manuscript in this way. The source code and tools are very modern and high-level and could be easily taught to additional programmers. We think that a single programmer could produce up to three complete interactive palm-leaf manuscript editions per month, after a training period of about two weeks.

We are also working on audio- and video-enhanced versions of our interactive editions. The idea is to enhance manuscripts with the voice of a scholar reading out the manuscript, which would be a valuable tool for learning the script (for example Grantha), or for hearing a recital (for example the

Gadyatrayam). Certain components of this are ready for integration, as are some audio and video streams that we have commissioned from Indian scholars.

Another project we are working on in collaboration with the University of Cologne, Germany, is the production of interactive critical editions with integrated pictures of the actual manuscripts (Tamil).

Digital manuscript restoration

Digital techniques can be used to restore damaged manuscripts without having to operate on the original. For example, when letters become faint or contaminated with wax etc., digital techniques can isolate minute traces of ink from contamination material or from the background material. The detected traces can then be used to rebuild a lost character. We have been demonstrating such techniques with a few manuscripts in the University Library of Tübingen, where we are currently digitising the entire Indian manuscripts collection (ca. 900 manuscripts).

Digital manuscript enhancement

One particularly rewarding activity is digital enhancement. For example, South-Indian palm-leaf of bamboo manuscripts are not written with ink (like the North-Indian manuscripts), but by incising the palm-leaf with a sharp metal stylus. Such manuscripts are sometimes difficult to read. They are therefore often "blackened" using a special black paste that sinks into the incised characters and gives them contrast. Unfortunately, the process of applying the black paste and the chemical properties of the paste itself gradually damage the palm leaf, leaving characteristic blemishes, gradually growing in size and eventually destroying the leaves. Consequently, this technique is not permitted in libraries any more.
We have therefore developed a special digital enhancing algorithm which performs the blackening digitally, on the digitised version of the manuscript. The algorithm is generic and works with all incised and unblackened palm-leaf manuscripts.
One by-product of this is that the digitally blackened version of the manuscript can be printed on paper very well also, which was previously not possible with the unblackened originals.
We have been doing similar work on difficult-to-read manuscripts of the poet Friedrich Hölderlin, at the Federal Library in Stuttgart, Germany.

Returning manuscripts in digital form to their culture of origin, safety through distribution, democratization of access

One of our objectives is to return manuscripts to their culture of origin in digital form. Whether it is Indian manuscripts in Germany, or a Greek papyrus in France – they can all be brought back home in digital shape.

Such multiplication has the additional advantage that it increases the survival chances for the documents that are distributed around the world in this way. Even if the original should eventually fall prey to the tooth of time, the digital copies that were shared with the rest of the world will still be there. If a digital copy should get lost in one country, it can be resupplied from another. In other words: it pays for a culture to be sharing. Cultures that share their heritage with other cultures have a much better chance of survival.

Another positive side-effect of digitisation is that it makes access to cultural heritages more democratic. With digital carriers becoming cheaper and better by the year, it is possible to make works of art or texts from national treasure vaults available in digital form to the academic and non-academic public alike – to do research on them, to print them, or just to enjoy them as books or pictures in all levels of society.

Working towards universal standards means working together

In the move towards universally acceptable technical standards for the digitisation of heritage documents, a single initiative like e-ternals.com can only be a minor technical facilitator, and at best a communications and publishing forum, for all those governments, institutions and researchers who put such standards and norms into actual effect and usage.
This is why we measure the success of our initiative by the degree of openness and cooperation that we are able to offer to all those who share our concern for cultural heritage issues. In Germany, where e-ternals.com was originally founded, we have been awarded recognition as a charity,[1] and in the meantime some of our most active partners have also turned out to be charities and public organisations, often driven by like-minded people with the common vision to help preserve our cultural heritage and to make it accessible to all.

1. Kulturschutzbund e.V.