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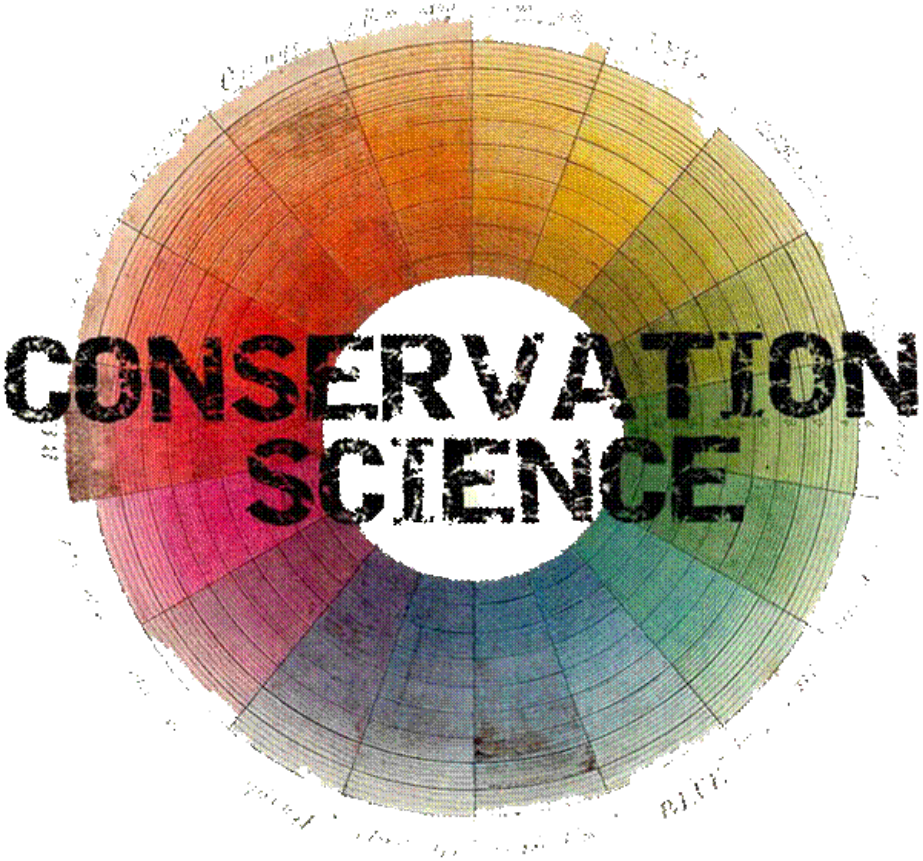

ICCROM FORUM on Conservation Science

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Discussion group reports

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Discussion group report

Needs & strategies (group a): Assessing needs and developing strategies in different contexts

Members:

Alberto De Tagle (moderator)
Marie Lavandier
Sujeong Lee
Marco Leona
Stefan Michalski
Webber Ndoro (rapporteur)
Janneke Ottens (speaker)
Luca Pezzati

1. DISCOVER

What discoveries has the group made?

1. The way to assess needs is very irregular. Success for the needs analysis is one which moves from the specific to the general needs.
2. Conservation Sciences does not exist and has no recognized platform.
3. Monitoring has not been incorporated into the conservation science.

2. DREAM

What positive implications do these discoveries have for cultural heritage conservation?

1. Develop global web-based tools to collect and share data to discover the real needs by collecting properly randomized data on the state of heritage over time, establish protocols, and involve stakeholders;
2. Incorporate long term monitoring in heritage and in conservation science projects (links to 1);
3. Efficient delivery of scientific data to decision makers.

Discussion group report

Needs & strategies (group b): Assessing needs and developing strategies in different contexts

Members:

Zaki Aslan
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Gunilla Lagnesjö (moderator)

The Preservation of Cultural Heritage has in Conservation Science one of its pillars. However, this term is often interpreted too narrowly. For sure, it englobes in addition to the conservation practice (technique) also the technology and the production of data that can be used by present and future generations.

The complexity of cultural heritage preservation, which takes into account the different values in the object, such as symbol values, usage and esthetic, also implies the need for the conservation scientist operates a multidisciplinary approach, involving in the task other branches of knowledge that enable such a view of the various values involved.

Beyond the question of disciplinary knowledge, the field for conservation scientist must also involve setting strategies sometimes local, regional, national and often global. There are some objects that have value not only for a smaller group, and local population, but also for a bigger group. The list of World Heritage Site is a good example of those in whose work the look must be aware of the various interests involved and the impact that the work of conservation scientist can have. Still, if certainly the realities of each location on the globe can be absolutely different, it is also true that there are other priorities competing with the necessary preservation of cultural heritage. That is why the scientist conservation has to assess how his work can help, through the use of the best technology and the comparison of data already available on the subject, achieving reasonable costs with high quality.

The conservation science is a field that deals daytime with the need to build strategies that take into account, in addition to the previously mentioned items, also the spread of knowledge constructed and the rapprochement between the scientist and the community. This is an important way to increase the value of conservation scientist activity. It is essential to promote the development of leadership characteristics among these professionals. Such leadership involves the definition of priorities in the field, aligning time allotted for work, amounts to be spent also in comparison with other public policies and the production of knowledge so that it can be dispersible in the form of training for both future conservation scientists - or even for those who wish to enhance - and even among those who are not specifically working in this field.

It has to be emphasized that development of leadership qualities in the professional sector is essential for the recognition of its importance: it provides qualified people to act as interlocutors between the scientific community and the public, including politicians, and influence the implementation of public policies for the conservation area. And that recognition must also come from the population because it is the population who gives value to property protected, so the popularization of the work of the scientist conservation is essential. Advertising campaigns, the "translation" of what is done in clear language, the

use of diverse media – i.e. internet, television, movies - to show how it is done and the special result that is achieved is essential for activity growth and recognition.

There is, therefore, clear objectives to be achieved so that it can evolve from conservation science we have to conservation science we desire, duly entered as a priority for both the public sector and the private one. For this, it is up to each member of this community to promote and publicize the actions that have been successful considering the budget, quality and preservation of values. Such performances can serve as models, inspiring other actors to engage in this struggle which is, fundamentally, the preservation of the history of mankind.

Discussion group report

Education & Training (group a): Exploring education paths for conservation scientists and education strategies for science communication

Members:

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Stavroula Golfomitsou (moderator)
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Eduardo Muñoz Gonzales
Navin Piplani
Norman Tennent (speaker)
Yu Zheng

The first day of the Forum was focused upon three crucial aspects: discover the field of Conservation Science (CS), dream about what CS can contribute to cultural heritage conservation and finally, design methodologies or tools for achieving the larger vision and objectives for CS through education and training.

The discussions generated a rather stimulating exchange of ideas and views on a range of issues and complexities related to this subject matter. The group participants from diverse cultural and professional backgrounds provided insightful perspectives on this emerging domain and its implications for the benefit of particular heritage disciplines and the communities at large.

1. DISCOVER

The group discovered several key aspects:

- CS education and training needs to be broad based and this emerging domain should be able to contribute in different areas of theory and practice within the cultural heritage field. The understanding of heritage is evolving with time, embracing wider and diverse notions of cultural expression and meanings. It is imperative that the scope of CS includes the broadest dimensions of cultural heritage whilst addressing the specificities of each culture and its context.

- CS education and training should incorporate mainstream science and traditional knowledge. It should be based upon an in-depth understanding of the various processes and disciplines related to conservation such as weathering, deterioration, analytical techniques, art history, architectural history-theory and so forth.

- It is essential that science is incorporated in the education of other cultural heritage specialists, decision-makers and stakeholders. This will help develop a deeper understanding of scientific principles, investigations and alternatives whilst addressing the issues and challenges related to the conservation and management of cultural assets. Today, the field of heritage conservation involves a wide spectrum of experts and interest groups and therefore it is crucial that all these individuals and groups provide a more informed and inclusive solutions.

2. DREAM

The group shared a broad vision or dream for CS:

- CS should bridge traditional and contemporary conservation through research. There seems to be an ever-widening gap between traditional building knowledge systems and modern conservation approaches. We dream of this new scientific domain to establish a two-way link or a dialogue between traditional and contemporary approaches to conservation through structured and informed research and inquiry.

- CS to have deep sensitivity towards cultural heritage issues. The challenges which arise in the conservation of cultural heritage involve a broad spectrum of issues – social, economic, political, cultural, ethical, anthropological, environmental, identity, gender and so forth. In addition to this, the actual conservation process deals with various scientific issues related to deterioration, damage, decay, weathering, climate change, reconstruction, reversibility, repair, new materials, sustainability and so forth. The application of science in conservation should try and understand all the various aspects of cultural heritage conservation and develop sensitive solutions to each specific problem.

- CS should be versatile and develop problem-solving creative approach. Unlike some of the hard sciences, the new domain of conservation science should be more flexible, sensitive and inclusive. It should primarily be based upon a solution-oriented approach, offering innovative solutions and directions to address the rather complex and multi-dimensional problems associated with cultural heritage conservation.

- The domain of CS will only be effective and relevant if it attempts to embrace diversity i.e. different countries, different needs. The scope, nature, methodology and deliverables for science in conservation should be developed in response to and within the specificities of diverse cultural contexts worldwide. One size fits all approach should not be imposed upon any region/ country/ context; instead CS education, training and research methodologies should be designed using local, national and regional understanding of cultural heritage issues.

- CS should enforce communication between science and cultural heritage departments. Culture and heritage studies usually come under the Arts and Humanities departments, therefore it would be key for this new domain to establish a robust communication mechanism between

the 'hard sciences' department and the 'soft sciences' department. A two-way exchange of knowledge, expertise, skills and experience is the only possible way to integrate the two fields and extend their benefits for the wider society.

3. DESIGN

The dreams for CS could be realized by designing specialised methodologies:

- We need to allow different paths for CS education and training depending upon the local, national and regional needs. This will provide an interesting and challenging range of options for professionals to choose from and engage with the filed in a more dynamic and flexible way.
- It would be crucial to raise awareness of CS field among scientists and public through good and effective communication. This might be a new domain in many countries and therefore heritage professionals, cultural studies experts, conservation practitioners, scientists, researchers, decision-makers and the general public need to be made aware about the various aspects of this field. CS education and training modules and courses need to be developed keeping in mind this aspect of outreach and learning where CS as an emerging new domain is made easily accessible in terms of its vision and benefits for conservation practice and the society at large.
- In order to develop this domain further, it would be critical to build an educational platform for professionals interested in CS, such as scientists, conservators, architects, art historians and so forth. A trans-disciplinary pathway will need to be evolved to gain higher education and specialized training as a Conservation Scientist.
- The day ended with sharing these views with the Forum participants.

Discussion group report

Education & Training (group b): Exploring education paths for conservation scientists and education strategies for science communication

Members:

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Yohei Kiyonaga
Maria João Melo
Luiz A. C. Souza (moderator)
Dean Sully (rapporteur)

1. DISCOVER

What discoveries has the group made?

1. **There is a diversity of responses to educating conservation scientists, along a spectrum of science based conservation to conservation based science.**

Conservation training requires a foundational understanding of scientific methods in order to apply science to conservation problems. As an applied science, the challenge for conservation science is to maintain the rigour of research, whilst retaining its relevance to real world problems.

2. **Conservation science requires a multidisciplinary approach in order to solve complex problems in local situations.**

Conservation graduates need to have a multidisciplinary approach that allows them to work with others to solve problems. Training is required to produce open minded, self-confident professionals with a multidisciplinary broad based understanding. They are required to be able to innovate, anticipate, negotiate, and communicate with others to solve conservation problems. They need to be able to perform good science and to understand that conservation is a cultural process. Conservation research combines material science and cultural knowledge and is therefore embedded in the Humanities and Sciences.

3. **Multidisciplinary working is embodied in individuals, teams, and processes.**

Multi-disciplinarity should be embedded in education and training. This process of working can be embodied within the individual practitioner, and within the teams in which conservation is one specialism amongst others. This multidisciplinarity may not reside in one person however; each conservator should know how to access appropriate knowledge.

This requires diverse responses from training institutions, for example at postgraduate level conservation teaching needs to reflect the disciplinary specialisms of conservation.

For undergraduate level, conservation training needs to be integrated within other specialist areas of material science, museology, fine art, archaeology, anthropology, etc.

It is understood that early career conservators are more likely to focus on developing a sound disciplinary framework in order to establish a specialist expertise. Conservators will be better equipped for a multidisciplinary focus as they gain confidence in their specialism as their career develops.

4. **This requires an open minded approach.**

We require self-confident students with an open-minded creativity, who can work together and with others within multidisciplinary teams, in order to solve problems within the complex systems encountered in conservation.

Conservators need to be confident in their professional role within these teams and projects.

2. DREAM

1. **Training in multidisciplinary understanding to develop open minded, self confident professionals able to innovate, anticipate, negotiate, and communicate with others to solve conservation problems.**

To produce conservation graduates with competence in the key areas of the conservation process. This requires critical thought, reflexive thinking, and context specific problem solving. It requires skills in communication and negotiation. Conservation graduates are required to act as mediators and brokers between heritage and people, to balance the needs of international and national heritage institutions with local institutions ensuring an equitable balance between top down and grass roots actions. This requires shared tools to assess needs and guide practice, and to measure impact of this work.

2. **To develop a conservation research method, unique to the conservation discipline, this can be applied to diverse cultural questions that are generated by and justified within a dialogue with stakeholders.**

Conservation research offers a prism though which to study the world and is interwoven in the making the world of which we are a part. Through an intimate contact with objects and their materials, this specific 'object' focused analytical approach allows us to understand the field of relations in which, objects and people are interwoven in the present and the past. It reveals traces of past action that have a recursive influence on the present. Conservation has a role in a broader analysis of the past that is central to heritage research and practice.

A set of tools is required so that conservation science research can address the needs of conservation problems and provide solutions for humanities challenges. Socially responsible heritage processes are required to respond to the needs of society in a way that can influences policy makers.

A set of tools is required that authorise locally generated solutions that respond to contemporary problems. This requires the production of integrated decision-making process that reflects the real lives of the communities that conservators serve.

Conservation projects can mediate relationships between the different actors in heritage processes to ensure social justice. Solution orientated research is required that links researchers with practitioners and with those who fund the process as taxpayers, and visitors.

The justification of such approaches should be evaluated in terms of the impact of conservator's work via feedback from the people they serve (local people, connected people, communities of practice, villagers, interest groups, stakeholders, communities, clients, and more).

Conservation research needs to move away from internally generated closed expert systems towards open co-produced, co-designed, open sourced research systems. Conservation research outcomes can be linked with cultural health and human health, social stability, economic development, social identities, self-determination, education, jobs, energy consumption, housing, and more. Crosscutting multidisciplinary projects that break down the boundaries between heritage disciplines and institutions allow us to see heritage research in a new way.

3. DESIGN

1. We need to educate conservation professionals as solution makers

Internally generated research questions that do not offer a solution to an identified problem, will not be valued and supported.

Conservation is able to integrate the humanities and sciences in a broader dialogue between local volunteers and national politicians. We need to be able to make heritage operative within these complex areas in order to provide policy makers with functional solutions. This includes tackling issues of social inclusion, injustice, poverty, population change, climate change, urbanisation, pollution, fracking, and more, as part of conservation research and training. We need to be able to support professionals from other specialisms to work with us on these problems.

2. **To develop interactive didactic teaching tools through international cooperation, which can be feely available nationally, regionally and locally, through top down and grass roots practice.**

The production of didactic tools for use by training institutions: online resources, interactive case studies, models. These resources should be open access, multi lingual, and multi cultural. This could be generated by an international courses/seminars/workshop to develop new tools that can then be disseminated broadly. ICCROM could be the provider of such a course.

3. **The focus of training conservators should be on how they help people to conserve their heritage.**

To develop graduates who can navigate a relationship with people who express belonging with the heritage being conserved. The role of conservation in developing civic society can provide a greater focus for the conservation process. Social structures can be developed through specific community building methods that seek to develop the ability of people to participate in the use and care of their heritage, spaces, places, and objects.

Conservation can be a vehicle to develop networks for a heritage community that function as a resource for sustainable development of our spaces and places. Conservation research needs to have mechanisms for building long-term relationships based on trust. Researchers have agency in creating communities of practice. Effective conservation research needs to invest in and nurture these communities.

4. Successful projects are more persuasive than mere words

Heritage projects that are cross cutting through to key areas of the contemporary political agenda will get support and funding. A critical evaluation of case studies provides evidence of local processes that can bring innovation in global practice. We need to provide functional guidance to develop integrated projects that engage heritage within social issues. The low visibility of conservation research can be addressed when good stories about people's lives can be revealed by conservation practice. In order to affect change in policy makers, advocacy and influence may be more important than sound data and more evidence.

5. Research and training in industry and the academy

The potential analogy with medicine was discussed as a model for structuring conservation research and practice. This draws a comparison between surgical and conservation intervention, the role of hospitals and museums, and the role of general practitioners in surgeries and conservators in heritage institutions. The model of medical research and training taking place in university hospitals as hybrid institutions, equates with the development the museum departments as research and teaching facilities, linked to Higher Education Institutes. This would help to ensure an intimate exchange between heritage industry and academic institutions in research and training. Less flattering analogies between the role of conservators and medical practitioners were also considered.

Discussion group report

Dissemination (group a): Improving dissemination of scientific knowledge across cultures and disciplines through published and unpublished literature, and other media

Members:

Marie-Claude Corbeil (moderator)
Hilde De Clercq (rapporteur)
Fatima Fall
Linda Lindblad
Katy Lithgow
François Mirambet
Anupam Sah (speaker)
Min Seok Seo

1. DISCOVER

1. Variety of levels of information keeping in mind the end-user.

Knowledge in conservation science is a parallel coexistence of oral traditions and practice (intangible form of information) versus modern scientific knowledge (tangible form of information). A balanced compromise consisting of the best of both types leads to good results. Communication, dissemination and accessibility of knowledge are key factors.

The language and **the source of information** are determining factors for the implementation and the absorption of knowledge by the **recipients** or those receiving the info: what is the way people absorb information? English seems to be the language in higher educational programs but not really practical for the day-to-day people taking care of CH unless someone can demonstrate it. For daily use, you need to create faith through demonstration and tangible results on top of the ground.

A scientist, curator and conservator are working on a different level; collaboration is often missing maybe due to a lack of time or motivation. A scientist should communicate with an end-user. Communication should work **in both directions for an efficient and interdisciplinary dialogue**: from a scientist to a conservator and vice versa. A scientist should be informed about the needs of conservators who might be used to work with traditional techniques. To enable an efficient dialogue, coming **to a common language** is very necessary (see also point 2).

Knowledge should be disseminated while respecting a variety of **levels of information** according to the type of audience/recipients. A paper meant between scientists might be of a higher level than one that is only meant for a conservator or practitioner. Especially in case of the last, this implies that the information should be disseminated in such a language that there is a clear practical message linked to it: how can a conservator or practitioner use it?

2. Need for common platforms and glossaries adapted to the context

Common language is not only related to the language as such but also to the terms used to describe the state of conservation (i.e. Stone glossary of ICOMOS, existing in several languages). It should be in a form by which craftsman can use it.

3. Value of interesting narratives that demonstrate the applicability and usefulness of scientific knowledge

Media: can play an important role in bringing knowledge of conservation science and cultural heritage in general to the public even though there is a lot of concurrence like childcare. Via the media we should try to sensibilize the community and dramatize stories to attract the audience to CH.

4. Need to improve quality and accessibility of existing tools such as abstracts, workshops, interdisciplinary dialogues, media etc…

This is a more general statement rising from the previous points.

2. DREAM

1. Provide open and credible information

A dream might be that *everything is available*, open literature, free of costs.

2. Reach as many end-users as possible

Dream is that conservation science information reaches all types of end-users (public, stakeholders, a wide audience) hence as much people as possible.

3. Adapt the content to level/context

The scope "level" refers to conservators, end-users, scientists, industry, media ….

How to judge the content of available information? An idea would be that a conservator could translate the content in his/her context. In the form of articles, ideally would be a common paper in which the end-user or a policy maker is defining the state of the art. The conservators can and should write themselves; their information can be used to feed scientists: to get scientists closer to the conservation part, they need to be informed about the gaps and needs. Information should be (re)packaged to come to the essential of the scope.

A point raised during the discussion but not taken up in the report during the forum: a dream might be that articles in the field of conservation science are equally judged as articles in prestigious journals. A question remains as to whether conservation science is considered as real science? A further dream would be that the industry thinks in of terms of conservation and incorporates scientific research.

4. Broaden the dissemination to include exchange of information

We dream of doing more than just producing information but also stimulating the exchange which implies the need of a dialogue. A dream might be the creation of a resource bank – consultation bank (question-answer type). The creation of a research agenda (who is doing what?) would ease the type of person to access and increase the level of answer.

3. DESIGN

Points are summed up that came finally to the following three design statements:

1. **List the end-users groups and their needs, identifying the appropriate level of communication and developing specific content.**

Dissemination implies also a need of what is happening

A strategy could be:

Listen to the needs; Define the level of communication/language; Build up on the content (that might already exist, although the process of delivery might be different); Short projects

Strategy of dissemination: How will we launce the information into the nation? It could be via the national museums to give it a national sanction.

2. **Create a culture of sharing knowledge, including improving dissemination skills through education and training and making sure that dissemination is built into project planning.**

Encouraging the aspect of CS: creating an environment where people are stimulated to contribute, a culture of sharing; a culture with a trend towards another way of publishing;

All projects should end up with publications;

Training and skills in conservation dissemination is needed;

Communication strategies should be defined in which the level and content of information is adapted. Communication through the media (television) using a famous and known person for rendering the public sensible for CH;

3. **In consultation with existing information providers (institutions), find a way of making scientific information openly available.**

Articles could be made available while respecting the aspects of copyright (refer to it, not sell it); free digital library.

Wikipedia could be a tool to develop a common glossary.

Discussion group report

Dissemination (group b): Improving dissemination of scientific knowledge across cultures and disciplines through published and unpublished literature, and other media

Members:

Mandana Barkeshli
Giacomo Chiari (moderator)
Veerle Meul (speaker)
Salvador Muñoz-Viñas (rapporteur)
David Saunders
Katriina Similä
Xingling Tian
Stefan Wülfert

1. DISCOVER

The discussion began with a short presentation from Veerle Maul. The presentation described the efforts done in trying to preserve the historical floors of some churches in Belgium. One of the reasons why this case is so appealing is that its conservation involves a number of persons at very different levels. Firstly, the cultural managers, who allocate resources and make the great, overall decisions as to whether or not the floors are worthy of preservation ---and, equally important, how worthy they are –expressed in Euros. The priests must also be taken into account, as they are in situ users and, in a way, the *curators* of those floors. Maintenance staff also plays an important role: the products and cleaning techniques they use can have, and have had, an important impact on the long-term conservation of the floors. Visitors, tourists and churchgoers also need to be considered, because their behavior (their following or not a path, their visiting or not some chapels, their using some type of shoes, etc.) also affects the way the tiles are preserved. Scholars may also influence the preservation of the floors, because they in turn influence the value society assigns to a particular piece of heritage.

Dissemination, therefore, may encompass different groups of persons, with different interests, backgrounds, and needs. The message sent to each groups needs indeed to be customized: its contents need to be adapted in each case, but also the language employed to transmit it, and the media used for the transmission. Thus, an article published in a research magazine, or a talk in a meeting may be the right way to convey the message to scholars or to other scientists, but it would not reach the maintenance staff. Similarly, an in-house technical report may be adequate for addressing the cultural managers, but not the visitors.

Just as the language may or may not be adequate for different target audiences, the media may or may not be adequate for the different actors involved in the floor use and care. As the experience of Veerle Maul proves, making communication media-, content- and language-aware is crucial for its being successful.

In fact, not being media-, content- and language-aware might be some of the primary problems of conservation science as it is practiced today: it just does not disseminate as well as it should, or indeed could. Our group wished that scientists, conservators, art historians, and other heritage professionals could speak to each other in a meaningful way; we went as far as to wish that even laypersons could take part in this meaningful exchange.

The fact that this is described as a wish (or a "dream", to use the exact word we used) suggests that is, presently, not a reality. One of the reasons why this might happen is the scarce prestige that less traditional dissemination methods enjoy among the scholar community at large, even if these methods may have a much greater impact. Acknowledging the value of these methods (mostly Internet-related) could push more and more scientists and scholars to use them, thus breaking past the restricted circle of scientific publications that have reached a high position in the commercial bibliographic indexes used as an assessment by most academic and research institutions.

In this regard, the value of the publications that summarize the state of the art on a particular conservation topic must be stressed, and indeed publications of this kind seem to have a much higher impact in the conservation community than the articles they review and summarize.

Expanding the literature survey and indexing methods would also help. Valuable information can be found in grey literature and in language others than English or any other widespread language. Adapting the meta-information of each source to existing and future Internet-based search engines would also be a good move.

However, in spite of these technology-based recommendations, the importance of face-to-face engagement cannot be overstressed. This is a crucial aspect of communication, and effective communication cannot be based on the authority the scientist presumes she or he has (or is conceeded by the audience), but on other factors, that unfortunately depend on personal skills and can hardly be systematized. Perhaps, the best recommendation here would again being language- and content-aware.

In fact, this last aspect is of paramount for the effective dissemination of science. Simply put, the contents of the message transmitted by scientists need to be interesting to the listener or to the reader. In practical terms, this means that the messages of conservation science must be oriented towards dealing with topics that the audience cares about. This straightforward principle is not always implemented when attempting to disseminate conservation science. As well as the media and the language, the contents need to be adapted to the intended target audience. In doing so, conservation science will undoubtedly increase its practical relevance in the heritage scene – which will be beneficial to all of the involved actors.

Discussion group report

Research projects: Selecting and designing successful (relevant and impactful) research projects

Members:

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Bruno Brunetti (moderator)
Marjolijn Debulpaep
Bertrand Lavédrine
Valerie Magar Meurs (speaker)
Yoshinori Sato
Jan Van't Hof (rapporteur)
Yong-jae Chung

1. DISCOVER

The session started with a **presentation by Valerie Magar**, which is summarized below:

Selection of successful topics is starting point

Focus of the forum is on scientific research, but is this enough? Art history, for instance, could also be part of an integrated approach – in Mexico this is important when answering practical questions ('two parts of the coin').

Seven main questions:

1. Who proposes and undertakes scientific research? This is important for the question itself and the outcome; different fields of knowledge have different languages.

- Who does research, universities, research institutes or others?
- Are multidisciplinary investigations really multidisciplinary or are the just being stapled together?
- Different partners (scientists, curators) seem to be on an island

2. How are research topics being selected?

- Via research gaps, on an opportunistic basis, on bigger ideas or on very specific topics?
- What is the actual added value of new technologies, for instance with 3D modeling?

3. How are the research projects being designed?

- Often very specific issues are being dealt with and on a short-term basis too; long-term research is rare and the European Union is one (the only?) exception
- Hypothesis, methods, how are they designed? When can we harvest all results and methods and take a huge next step instead of saying 'we are a young profession'?

4. How are analytical techniques being selected?

- Is availability of funding or the use of a buzz word important for the selection?
- Do we really look for feasible techniques or are we trapped in for instance new or long techniques? Sometimes results are only available after a problem is already solved. And who can pay for this?

5. How do we assess the impact or research?

- Do we have clear indicators? What was impact of research, did it really add or make a difference
- Are the real issues being addressed?
- Do we use the right techniques?
- Do we integrate new circumstances like climate change or sustainability in our care for heritage and our research questions?
- We are amassing enormous amounts of digital data, but is this done in a durable way?
- Are we looking enough to other areas of research?

6. Are we being clear enough about our research, both in disseminating it and in stating our data and outcome?

- We have the risk of duplicating research. We also run the risk of a gap between laboratory and practical solutions. We also run the risk of good practices being used in a wrong way
- Is our profession self-critical enough? How do we learn from failures, do we expose both good and bad examples?
- Do we provide data as raw material for the use of other researchers and research areas?
- Do we publish for our peers, for other scientists, for society at large? What should be made available?

7. Budgets

How do we obtain budgets? How are the distributed? Do we allocate them where they are needed? Is funding directing the format or even the outcome?

After this presentation, the group was ready for **discussion**. Major points of the discussion were (and of course, since this order reflects the discussion, the order is not totally balanced):

- Scientific research should be defined very broad and there are lot of new techniques.
- 'Heritage science' covers a lot of fields; do we include only research on natural sciences or also art history, history, philosophy etc.? Human science should be included – some say, others disagree. Conservation science is the interface between the various disciplines.
- What is the goal of research? Always conservation or preservation.
- Who poses the research question? All kinds of disciplines can be in charge of posing questions and of leading research projects – and society at large can pose the questions too.
- Thus: are technical improvements the issue or are other developments more vital, for instance the posing of new questions or the integration of various research fields? Or access, might that be the vital point? Access to data will further both research and conservation. So again, are we talking about technical milestones or societal milestones?
- Science is renewing itself and also addressing new topics (for instance sustainability); it is, in other words, difficult to pinpoint one vital development of technique. So what establishes a vital impact.
- Milestones, however, can be identified. Using of imaging techniques were very important, for instance. Predictive modeling and laser cleaning might also be important. Another issue is the different level of expertise in the various parts of the world.
- There is no contradiction between technological progress and societal impact progress.

Following this discussion, one can **conclude** the people present at this table have an open mind as to the scope of the definition of cultural heritage and heritage science. But the context of heritage research and the aim or goal of research cannot be so easily concluded upon: both an emphasis on for instance the technical issues concerning research as a more inclusive approach were thought to be valid. Nevertheless, the following **discoveries** were pointed out:

- Technical progress is needed;
- Integration is needed, we need to avoid or abolish various research islands and languages;
- A broader approach is needed, we need to take societal challenges more often as a starting point for our research.

2. DREAM

This afternoon, there was no presentation to get started; we worked upon the major issues which were defined earlier:

- progress of techniques
- progress of integration
- progress of broadening

The day's moderator Gawlinsky suggested that the last one is the pivotal one. It includes **building a domain**, which means: everybody is convinced of the importance of scientific research for conservation and preservation. Or, putting it a bit differently: recognition of quality, meaning: decent exposure of the various disciplines as one interdisciplinary field of expertise which acts as a grown-up research community (and has a way of communicating its successes).

Once this domain is established, the next step will be: do we speak the same language and are we visible to other fields of research as a mature discipline? And are we a domain which also has answers to societal challenges like sustainability, safety, quality of life etc.?

At this moment, for building this domain, we are in want of:

- delivering high quality, inter- and multidisciplinary research;
- methodology for the assessment of quality of our work;
- recognition of our publication by the scientific community;
- having impact on cultural heritage by solving problems for preservation and conservation;

- recognition by society and having impact and answers on societal challenges.

The need to address societal issues pops up again and again. Following the discussion, the following incomplete list of societal challenges, and also of tools which we can use, can be made:

Overview of societal issues – both old and new - and the current challenges for heritage:

- Ageing population (in Europe) (challenge)
- Migration (challenge)
- Sustainability (challenge)
- Safeguarding (challenge)
- Access (to cultural heritage, but also to knowledge (including research centers)) (tool)
- Use and new use (challenge)
- Interpretation (challenge)
- Valuation, perception of values (challenge)
- Understanding of differences between countries, both situations and - more down to earth – languages (challenge)
- Industrialization versus traditional techniques (challenge and tool)
- Digitization (tool and challenge)
- Data mining (tool)
- Infrastructure (tool)
- Monitoring including definition of indicators (tool)
- Impact of new technology (challenge)
- How do we reach our own audience and broader society (challenge) (do we have a 'stage' for our work via a first-rank magazine?)
- Transfer of knowledge (tool)

Also, the attitude of cultural heritage researchers was questioned; this might even be a threat: some researchers have an obscurant approach towards showing their results or knowledge (i.e. not sharing). The experience in law could be helpful: teachers in law encourage teamwork, not a solo-approach. Via teamwork, the threat – which was presented to the table more than once – could be turned into an opportunity. From this, another, more matter of fact, opportunity arises: could we not have a magazine in which only multi-disciplinary articles may be published?

3. DESIGN

During the day and the discussion, ambitions rose. To set the next step, from discovering and dreaming to designing, the group thought we should start with the following design, the following things how to reach our goal:

- Improving communication;
- Making better use of new technologies and media;
- Make our research efforts sustainable and our data durable; making a larger, better use of our research infrastructure; (N.B. research infrastructure comprises archives, laboratories, portable devices etc.; in other words: both formal and informal)
- Establishing a special magazine for multi- and interdisciplinary research;
- Training young researchers to cooperate instead of being soloists.

Via these efforts, which enhance our domain, we should reach the three goals which were established earlier, which meant making more progress in technique, in the integration of our research and in the broadening of our audience.

Discussion group report

Research & practice: Changing practice through research. When does it happen and why? How can it be measured?

Members:

Gunnar Almevik (moderator)
Nancy Bell (speaker)
Kenza Dufourmantelle
Nia Naelul Hasanah Ridwan
Isabelle Pallot-Frossard (rapporteur)
Fernando Pina
Andrew Thorn
Qing Wei

1. DISCOVER

What discoveries has the group made?

- The transfer from research to practice is non-linear and long-term process. Collaborative work between disciplines needs mutual understanding and respect;
- Changing practice and influencing policies need good evidence from research;
- Conservation science should address big questions (societal challenges).

2. DREAM

What positive implications do these discoveries have for cultural heritage conservation?

- Evolved profession to "problem-solvers" - Change perception of the discipline (respect of competences);
- Greater impact on policies and practice;
- Better effective metrics for measuring impact of conservation science research.

3. DESIGN

What are the things that we, as a community, can do?

- Involve a broader range of disciplines for example social science, economics.
- Training to improve communication and engagement with policymakers, colleagues.
- Exploit new research methodologies to bridge the gap between research and practitioners.

"CONNECTING OUT": How can conservation science connect with and contribute to wider societal priorities?

Discussion topics:

- Enhancing Access
- Environmental Policies
- Promoting Diversity
- Emerging Heritage
- Science for the Macro-scale

Discussion group report

Science for Access (group a): Enhancing access and quality of experience: how can science contribute to provide more and better access to heritage.

Members:

Hilde De Clercq
Alberto De Tagle
Marián Del Egido
Philippe Goergen
Marco Leona (rapporteur)
Katy Lithgow (speaker)
Yoshinori Sato
Katriina Similä (moderator)
Yu Zheng

1. DISCOVER

The first item of discovery is that **ACCESS**, defined in the broadest possible way, is an essential value of cultural heritage. Social and physical sciences contribute equally to describe and define **ACCESS**. There are physical, intellectual, and social aspects to **ACCESS**. Different disciplines in turn must be brought to bear on how cultural heritage is accessed and how access is managed.

Science can enable, facilitate, and deepen intellectual access to cultural heritage through discovery and sharing of knowledge as well as through optimized technologies aimed at presenting cultural heritage in all its aspects (simulations, renderings, enhanced access, etc.).

Science can help to manage the deterioration risks caused by physical access to cultural heritage, by understanding the physical tolerance of heritage for access.

Social sciences research can help to understand the social aspect of access: what people want and need from cultural heritage and whether these needs are met.

Access must be managed comprehensively and in diverse ways.

2. DREAM

Access should be tailored to place and audience, in emotionally and intellectually engaging ways. The scientific contribution to any discourse on access to cultural heritage should be informed by a vibrant and human tone, privileging understanding and communication.

Existing technologies should be optimized to render cultural heritage freely accessible to all in all its aspects.

Our understanding of the physical tolerance for access of cultural heritage is still imperfect: a research effort in this direction is necessary.

3. DESIGN

Our field can respond to these challenges by creating a community or a forum where conservation scientists, social scientists, physical scientists, communication and interpretation experts, conservators, curators, heritage managers can meet.

Big data, metadata and grey literature must be shared and exploited to facilitate access.

Communication training should be included in the formation of conservators and scientists.

Tolls such as risk assessment methodologies must be developed and used widely. Old concepts and received wisdom (light thresholds, for example) need to be investigated and updated to efficiently and effectively manage access.

As well as facilitating and enhancing access to cultural heritage, conservation science can itself increase people's enjoyment of, and interest in cultural heritage (value added), especially if scientific aspects of cultural heritage are illustrated and shared in an inclusive way, i.e., by giving users the tools to understand the scientific process and the knowledge it generates.

Discussion group report

Science for Access (group b): Enhancing access and quality of experience: how can science contribute to provide more and better access to heritage.

Members:

Mandana Barkeshli (speaker)
Kenza Dufourmantelle (rapporteur)
Kyeong Soon Han
Luca Pezzati (moderator)
Fernando Pina
Jan Van't Hof
Stefan Wülfert

The discussion "Science for Access" between professionals of varying opinions resulted in a number of recurring themes. The themes or discoveries, though expressed in differing ways, are summarized as follows. Each heading is followed by an elaboration of the DISCOVERY, DREAM and DESIGN outline.

1. Communicating science (and heritage) has to address societal needs.

Resources dedicated to science and research must address issues or problems that touch not only the conservation community but society at large. It is becoming increasingly a social responsibility for researchers to investigate issues that can have a broader benefit to society. Furthermore, the conservation community is relatively small and will remain so if science for cultural heritage addresses singularly conservation related issues. Science, through the examination of larger issues that also encompass conservation (e.g., green conservation, sustainability, national identity, etc.) could serve as an entry point to engage those generally not associated with the field, ranging from students to policy makers to the wider public.

Science for conservation will connect to wider societal needs, starting with those in local communities. Natural, traditional and local approaches will once again take a place in solutions that are seen as green, sustainable and coherent with a local heritage/identity. Science will provide a means for traditional materials and techniques to survive in the face of modern society and will help empower local communities through scientific validation of their traditional knowledge. Science will also provide accessibility to intangible heritage through the use of interpretation and documentation tools.

2. Conservation Science should be recognized and presented as a holistic profession.

It was recognized that improving access through science would entail associating science with other disciplines, rather than separating it into a class of its own, as has been the case in recent centuries. Many audiences relate to cultural heritage more readily through its artistic or historical attributes. In recognizing that conservation science encompasses culture, art, science (and so on), valuable connections between the differing realms would be made and far greater entry points would be created to engage the public or policy maker. In recognizing the holistic nature of the profession, conservation science will be better equipped to address issues of greater societal concern.

There will be a second renaissance where culture, art, science, etc. are seen as one for the pursuit of knowledge. There will be dialogue and exchange between the differing disciplines. The differing disciplines will not be institutionally segregated.

3. Effective communication is key to science for access.

It was recognized that access cannot be achieved without good communication and that, generally speaking, scientists working in the field of cultural heritage struggle to present to varying audiences what they do, how they do it and its relative value or importance. Effective communication includes a better understanding of the audience(s) to be addressed and improvement in the means/tools/language employed to reach those audiences.

Better communication skills will be expected of the conservation science professional and achieved through training. Alternatively, communications professionals should be employed to effectively deliver conservation science messages. We must use means that correspond to today's generation, including media. The language employed and the stories we tell should be attractive and should convey the connections between culture, art and science. Amongst practitioners, there should be a common language to understand each other, regardless of profession, culture, generation, location, etc. A lexicon consisting of image + text could be a good tool to share a common language.

4. Digitization is a good global solution but challenged by differences in local policies.

Digitization is the ideal future for increasing access to the cultural heritage field and also for the democratization of knowledge. Although it is hoped for this to be achieved globally, it is recognized that there are set-backs to open source information that may occur in different regions due to local policies. This may somehow be connected to the global geographically distributed inequalities in accessibility to knowledge/education/information. It is also recognized that there exists a great challenge in having the exchange of knowledge on a global scale via a technical platform that is standardized and sustainable.

There will be global data and information sharing from a political and technical point of view. Open access will draw increased governmental support. Digitization will not only serve ourselves but will convey data and information to future generations. A set of well-researched long term best practices for digitization must be established before implementation of such a project. Not only the data itself but global tools for accessing data (including metadata) will be exchanged.

5. Internal/external validation and "buy-in" are necessary to improve access.

At the root of many discussions remains the identity problem related to the field of conservation science. Although a fixed identity may never be established, it is important that there be recognition, starting with practitioners, of the field and of its value within wider, more flexible margins. Validation from within will help to unify a stronger voice that will be necessary in creating awareness and generating interest for the conservation science cause.

Conservation science will be acknowledged, understood and considered as relevant by society. Conservation science will be better integrated in the mechanisms that drive society such as the economy, politics and academia.

Conservation science will no longer rely almost exclusively on public funding and government supported initiatives but will be increasingly funded through private means. Increased connections will be made with venture philanthropy and with emerging start-up companies. These collaborations could potentially lead to much better and sophisticated tools, for example those related to global data sharing. Conservation science will emerge from "behind the scenes" and marketed as such, for example, through exhibitions that are focused on the scientific investigations of cultural heritage. The "CSI" model will be exploited.

Conservation Science will become a familiar term in politics because projects will be presented to policy makers in terms of direct benefit to the community, caring for the community, net savings over time, etc. A risk management approach for conservation science projects will translate better into the language of policy makers.

Students will have exposure to conservation science at a young age, through greater public access and through messages targeted to students. They should recognize conservation science as a valuable contribution to society and as a valid profession for consideration.

Discussion group report

Science for Green Conservation (group a): How science can contribute to green policies for conservation

Members:

Gerhard Banik
Giacomo Chiari
Stavroula Golfomitsou
Maria João Melo (moderator)
Joseph King (rapporteur)
Gunilla Lagnesjö
Navin Piplani
David Saunders (speaker)
Yong-jae Chung

1. DISCOVER

What discoveries has the group made?

1. Science can help us to better understand materials and their deterioration to create tailored-made solutions for museum objects and sites (for example creation of specific microclimates for objects rather than a single standard within a museum). This could help reduce energy consumption and minimizing treatments. This implies the use of appropriate, reasonable standards to fit the object.
2. Science can help in the study of using traditional technologies for more energy efficiency. As all places have their traditional adaptive strategies to their climates, we can learn from these traditional environments that have been tested and used over time.
3. Science can develop more green (less toxic, less dangerous) materials and technologies for conservation treatments.
4. By valorizing traditional technologies we are using ancient knowledge and therefore conserving our cultural heritage. We need scientific investigation to be able to determine which traditional technologies are "green" (in terms of the environment, human health, and efficiency. (Examples could be traditional craftsmanship, traditional biocides, traditional climate controls, etc.).

2. DREAM

What positive implications do these discoveries have for cultural heritage conservation?

1. We dream that conservation scientists are doing adequate research to advance green conservation principles (including learning from past practices and past mistakes).
2. We dream that conservation professionals are advocates for green conservation using scientific knowledge that we already have (or create), to better argue for green solutions to people taking decisions.

3. We dream that conservation scientists are working with traditional craftsmen, learning from them and embracing their knowledge, but also enhancing their skills using new, advanced scientific knowledge and using critical analysis, and having them participate in decision making at a meaningful level. (Enhancing teamwork)
4. We dream that environments are created for heritage (both objects and buildings) which are more energy efficient through adaptation to the specific needs and deterioration mechanisms of that object. This includes a more rational approach to climate control, including both traditional and "contemporary" technologies. (Example, wind towers)

3. DESIGN

What are the things that we, as a community, can do?

1. Develop flexible legislation to ensure that heritage values are protected as part of energy efficiency standards.
2. Raise the status of craftspeople through dialog and training.
3. Develop research projects to be able harvest scientific knowledge and advances in other fields that we can use to improve green conservation. (For example, we can learn from the energy efficiency field, or research on purposeful deterioration of garbage in order to enhance our knowledge for conservation.) We also need to be able to translate/interpret it (make it understandable) for broader audience.
4. Develop predictive molecular aging models that correlate with physical performance, to be able to advocate for extending the lifetime of the cultural heritage object.
5. Develop long-term monitoring systems including damage indictors as a reference for energy efficiency.

Discussion group report

Science for Green Conservation (group b): How science can contribute to green policies for conservation

Members:

Bruno Brunetti
Zani Cajueiro Tobias de Souza
Nia Naelul Hasanah Ridwan
Marcella Ioele
Bertrand Lavédrine (moderator)
Linda Lindblad (rapporteur)
Stefan Michalski (speaker)
Norman Tennent

1. DISCOVER

What discoveries has the group made?

1. We want the conservation community that conservation science serves to be fully aware of how it can contribute to sustainability.
2. We can combine ethically and economically powerful arguments for sustainable behavior.
3. Open an interdisciplinary approach, including new disciplines creating broader and integrated approaches in developing new research projects.

2. DREAM

What positive implications do these discoveries have for cultural heritage conservation?

4. Promote the social, economic and environmental aspects of preserving the existing cultural heritage.
5. Improve risk management of cultural heritage with a broader perspective.
6. Engage a broader community to achieve our goal of implementing green conservation.

3. DESIGN

What are the things that we, as a community, can do?

7. Start a global network for green conservation scientists - Function: to coordinate research, to communicate, to advocate.
8. Recommend green conservations to be the theme of an IIC international conference and/or a theme of an ICOM-CC working group (ICOM, ICOMOS etc).
9. Educate future conservators and conservation scientists in sustainability.
10. Develop and extend tools for assist decision making (risk management analysis, predictive models, new metrics and indicators).

Discussion group report

Science for Diversity (group a): Supporting sustainability through learning from and supporting the use of diverse materials and approaches in conservation.

Members:

Tharron Bloomfield (speaker)
Łukasz Bratasz (rapporteur)
Marjolijn Debulpaep
Sebastian Dobrusskin
Fatima Fall
Marie Lavandier (moderator)
Salvador Muñoz-Viñas
Min Seok Seo
Gamini Wijesuriya

To help and stimulate a discussion of very diverse group of the panel members having very different skills, education and cultural background and coming from various geographical areas Tharron Bloomfield gave a lecture entitled "*Indigenous knowledge and conservation science",* which looked at indigenous knowledge and how it can be incorporated into conservation science.

A free discussion which started afterwards illustrated that **diversity can be an opportunity as well as barrier** in developing common strategy towards given aim. The discussion panel decided that our work should start from the exchanging views on what exactly we mean by main terms in our discussion and if possible propose common understanding. Although the latter task was too demanding within time frames of the discussion a general understanding of members opinions was established.

The discussion and main conclusions was structured according to the main Science Forum scheme: discover, dream and design.

1. DISCOVER

What discoveries has the group made?

1. Importance of traditional not codified (inc. indigenous) knowledge is adequately recognized by heritage filed but which is not the case for "classical" conservation sciences.
    - It's importance was already acknowledge in political documents and other fields of sciences – medicine, genetics;
    - It is important because understanding of heritage is directly related to an important social challenges like developing a reflective society, connecting people with heritage, creating knowledge, safeguarding our cultural heritage resource ect.
    - It is important because understanding of heritage is an alternative way to build innovative solutions. As an examples can serve passive buildings used by various cultures, materials which in production process don't require high CO2 emissions. Moreover, it can have impact on sustainable to solutions in other fields than heritage sector. ENVIRONMENTAL SUSTAINABILITY;
    - It is important for conservation because traditional (inc. indigenous) knowledge is a long term "testing laboratory" in real word conditions from which we could

understand better materials, objects, practices for better safeguarding of cultural heritage. This gives a large advantage over short-term and reductionistic-scientific approach - SUSTAINABILITY OF SAFEGUARDING METHODS;

2. Understanding of traditional knowledge is essential for CULTURAL SUSTAINABILITY

- We have to understand our own heritage for its adequate value recognition by society ;
- In times of global migrations which is another societal challenge, understanding of divers heritage (tangible and intangible) is a more then only convenient way for understanding of various cultures.

2. DREAM

What positive implications do these discoveries have for cultural heritage conservation?

1. Respect of various disciplines, experts and stakeholders.
2. Equality in geographical and cultural distribution of **adapted** approaches in conservation in terms of (ethics, methods and expertise) as well as production of conservation materials.
3. Exploration and support of diversity by scientific method, especially conservation science, would be more solution oriented.
4. Research questions are driven by main social challenges – cultural, economic and environmental sustainability.
5. World in which various diverse sources of knowledge, such as traditional knowledge, social sciences and material sciences are inseparable.
6. World in which conservation science is adequately and fully recognized in the conservation field.
7. World where conservation science can collect, analyze and publish traditional knowledge in order to design and develop sustainable conservation methods.

3. DESIGN

What are the things that we, as a community, can do?

1. Delivering academic papers and policies should be focus on traditional knowledge and thus support global issues such as sustainability and diversity.
2. Recognize other forms of research results (e.g. documentation, recordings, etc.) are a valid means of dissemination of knowledge.
3. Review traditional knowledge and practices. We should analyse these processes through conservation science programs so that it can be applied in practice.

Discussion group report

Science for Diversity (group b): Supporting sustainability through learning from and supporting the use of diverse materials and approaches in conservation.

Members:

Gunnar Almevik
Marc Jacobs (rapporteur)
Yohei Kiyonaga
Valerie Magar Meurs (moderator)
François Mirambet
Janneke Ottens
Dean Sully
Andrew Thorn (speaker)

1.DISCOVER

What discoveries has the group made?

1. Traditional & new materials and techniques.
2. Maintaining a long-term view while recognizing that conservation passes through shorter steps and many hands – need for documentation, evaluation.
3. Maintenance is part of conservation – CS must engage stakeholder and be integrated in the heritage community from project start.
4. Culture of caring for culture – 4th pillar of sustainability.

2. DREAM

What positive implications do these discoveries have for cultural heritage conservation?

1. Expand focus of conservation science to heritage research, including other disciplines and different traditions/approaches.
2. Complement notion of research with mediation, cultural brokerage, co-conservation.
3. Research into traditional conservation methods and materials and their wider impact for society so as to provide choices and alternatives.
4. Research modern and new conservation methods and materials.
5. New approaches to documentation as core conservation.

3. DESIGN

What are the things that we, as a community, can do?

1. Communication and coordination (sharing and combining new and existing initiatives, methodologies, results); courage to publish truthfully and honestly, including failures.
2. Validating and sharing information through major conservation institutions.
3. Using new methods to enhance the experience of materiality (visualization, etc…).
4. Designing a heuristic methodology for conservation.

Discussion group report

Science for Emerging Heritage: Recognising and adapting to changing cultural heritage values

Members:

Nancy Bell
Marie Berducou (speaker)
Agnes Brokerhof (rapporteur)
Marie-Claude Corbeil
Leslie Johnston
Sujeong Lee (moderator)
Luiz A.C. Souza
Xingling Tian

1. DISCOVER

1.1. Introduction

The session was introduced by Marie Berducou who pointed out that the title of the session is 'science' and thus stretches beyond 'conservation science'. Emerging heritage will require input from more science disciplines than only the natural sciences. On that note, she rose the question what this emerging heritage might be. Contemporary art is obviously emerging and some of it will become heritage yet a lot will not pass the filters of time and quality. Irrespective of what is coming and what we already have, paramount is that we are aware of what heritage we have, why we want to keep it and how we best do that. In other words, we need to understand heritage values and how they influence our collection and conservation behavior. To illustrate how different value frameworks affect conservation, Marie presented five case studies from France:

- For the historic Lambotte flour mill in Aumale that was valued for its authentic, historic character, the classical approach of freeze framing was chosen, with the consequence that it is not accessible for the public as that would disturb the scene.
- For the 'Island of Nantes', the site of a former shipyard, the focus was put on the social and functional values, and the choice was made to keep the spirit of activity alive and re-develop the site with its characteristic cranes as a workplace for artists creating modern day installations.
- In the case of the Amiens cathedral, where scientific research revealed traces of paint but the original design was contested, a suggestion of the possible appearance was recreated with coloured light in a non-interfering manner.
- In contrast the façade of the church in Poitiers is illuminated without knowing how the polychromy was meant to look. The concept of a painted façade is recreated in coloured light, yet the public may well see it as a light show rather than a reconstruction of artistic and historic values.
- The chapel of Bethlehem was restored keeping the original concept of contemporary gargoyles by replacing missing gargoyles with modern day figures and iconography.

1.2. Discussion

As the case studies showed, conservation can choose different directions depending on the value framework that one uses. The conservation of traditional heritage already shows a change from material authenticity values to conceptual authenticity, social values and the opinion of the public.

With contemporary art, intangible culture and other emerging heritage, the values are expected to shift from the materiality and the traditional approach of freezing the container, to managing material change while preserving the contents, concepts and context of the temporary material expression or experience. Emerging heritage will bring new materials (plastics and new support media), new formats (digital, holographic and 3D-printed creations and recreations), and see a shift in emphasis from form to function. Science can contribute to finding solutions for preserving this wide range of features. Repurposing existing heritage, giving new use while respecting original character, will become more common practice. These developments require both science for new materials and new sciences for the intangible features and character of emerging heritage. There is also an expected change from Western concepts of conservation to Eastern approaches of keeping the spirit alive. And in those cases where the original object or experience will be lost, the role of documentation will become more important, requiring new methods to document aspects of heritage which are not covered in the present systems, such as experience of loudness of sound, composition of smell, and luminosity of image, context and interaction with the audience.

New forms of heritage will be created as co-designs and co-productions which will enhance social values and networks. With emerging heritage will also come a new look on traditional heritage, seeing it with new eyes and in a different light. This also requires a much stronger input from the humanities. It also asks for inclusion of local society in the assessment and determination of value. No longer will the expert be the judge of value. Thus along environmental and economic sustainability, social sustainability will be at least as important for keeping heritage.

1.3. Three main discoveries

1. Emerging heritage will consist of new materials, new formats, new technology and new, intangible processes and networks;

2. There will be a shift from valuing the container to valuing the concepts, content and context, a shift from form to function and a shift from the single user to communal use of heritage, a shift in value frameworks and emphasis on societal values;

3. Science should go beyond the traditionally material oriented sciences to include social and societal sciences and include a wider range of stakeholders in determining and preserving value.

2. DREAM

2.1. Dreaming out loud

To be able to deal with emerging heritage and be ready to face the coming conservation challenges, the heritage profession should look at the future and:

- Anticipate what it coming by trend watching, horizon scanning and following technological developments;
- Map existing knowledge and intelligence, within and outside the profession, build partnerships, and initiate projects with or by others to generate the knowledge that will be needed to face the challenges of the future (for example computer forensics for digital authenticity);
- Create awareness of what might be heritage for future generations (for example , items representing 20th century every day culture are hardly collected and are considered of low value compared to collections of earlier centuries);
- Advise collectors of potential future heritage on how to develop, use and conserve their collections;
- Understand the process of how something becomes heritage and adopt heritage, both top-down and bottom-up;
- Develop prognosis models for change of the heritage assets, their changing values and the risks in the future;
- Respect the differences in valuing heritage by different stakeholders and cultures;
- Be clear on a national level about what it wants to achieve and develop national heritage strategies in which the sciences have their place;

- Develop strategies to already now find funders for the preservation of emerging heritage and for research into solutions for future problems;
- Develop and use science disciplines to proactively advise creators of possible future heritage to work with durable and sustainable materials and concepts and document the character determining features that need to be kept (such as standards for permanent paper for creation of archives and advise artists on proper use of modern materials) ;
- Find better ways to disseminate and share knowledge within and outside the profession;
- Involve federal prosecutors in keeping governmenst acting in the benefit of society and its culture (such as happening in Brazil);
- Give preservation and conservation a place in decision making at collection management and organizational level;
- Be flexible, adaptable and open minded;
- Ensure that conservation of emerging heritage fits in and is equally regarded as economic development;
- Become an equal partner to others;
- Find funders and invest in building a critical mass with a strong voice and visibility to promote conservation of emerging heritage;
- Create recognition of the heritage profession, by strong leadership and dynamic advocacy.

2.2. Summarized dream

Science for emerging heritage should:

- Be pro-active, engaging, influential and sharper about what is coming, what the problems of the future will be and what we want to achieve;
- Advance questions of what the emerging values will be and who the stakeholders are that attribute value;
- Have leaders and advocates who can make a strong, clear voice for funders and decision-makers.

- Ideally conservation of the cultural environment should be integrated on an equal level with that of the natural environment feeding into an economic development in which societal values are leading.

3. DESIGN

To make the dreams come true, the most achievable activities would be to:

- Develop heritage strategies that include understanding of what makes heritage, analysis of values and stakeholders, intelligence mapping, and that promote involvement of all sciences;
- Develop mechanisms for disseminating and sharing knowledge, for identifying problems, for creating a 'technology watch', and for documenting information and characteristics (what do we know, what do others know, what do we need to know, who is going to develop that knowledge);
- Assume an advisory role towards creators and keepers of future heritage (today's artists and public are the keepers of the collections of the future);
- Find charismatic champions to promote conservation and advance strategies.

Discussion group report

Science for the Macro Scale: Using skills, tools and knowledge from fields outside conservation to support site/regional scale heritage decision making.

Members:

Zaki Aslan
John Fidler
Veerle Meul
Eduardo Muñoz Gonzales
Webber Ndoro (moderator)
Isabelle Pallot-Frossard (rapporteur)
Anupam Sah
Qing Wei (speaker)

1. DISCOVER

What discoveries has the group made?

1. Science can help decision making at every scale with innovative use of existing technologies (ie GIS, GPS, mobile technologies)respecting regional and local specificities
2. Evolution from closed expert systems to open sourced systems (open softwares and open inputs) with participation of new information providers at local level.
3. Need for sustainable platforms (continuous updating and maintenance).

2. DREAM

What positive implications do these discoveries have for cultural heritage conservation?

1. Improve communication, connectivity and understanding between local stakeholders, managers, and disciplines from other fields, for heritage management at different levels.
2. Tailoring new simpler interfaces through mobile technologies for decision makers and public use.
3. Establishing protocols for site management (rules for decision-making), that could be included in national or regional regulations and laws.

3. DESIGN

What are the things that we, as a community, can do?

1. At various scales and through local and regional engagement, identify the multi-sectorial mapping (large range of disciplines: geography, statistics, natural heritage, regional planning, computer science, space science) and actions required for heritage decision making.
2. To innovatively adapt accessible technologies to achieve the above actions (ex. UN program using mobile technologies).
3. Create resource banks of technologies and human capital to provide expertise, training and technology transfer.

"LOOKING AHEAD": How can we build an integrated and impactful future for conservation science?

Recommendations:

Connecting in: contributing to the sector

Connecting out: contributing to society

Building the Future

Tools

Institutions

Educators

Policy makers

The Public

Discussion group report

CONNECTING IN: How can Science connect with and be of greater benefit to Conservation Practice?

Members:

Gunnar Almevik

Hilde De Clerq

John Fidler

Valerie Magar

Navin Piplani

Wei Qing

Luis Souza

Jan Van't Hof

How can Science connect with and be of greater benefit to Conservation Practice?

Scientists involved in heritage and conservation practitioners should collaborate and develop a Heritage Science strategy to:

- Engage in creative partnerships,
- Make assessments of need (and gaps),
- Improve methods, and
- Optimize access and dissemination,

and thereby:

- Expand and exploit knowledge;
- Improve understanding of heritage and its sustainable welfare, and
- Deepen the recognition of values and significance.

Contributing to societal benefits from heritage

Through the use of the Strategy, we recommend:

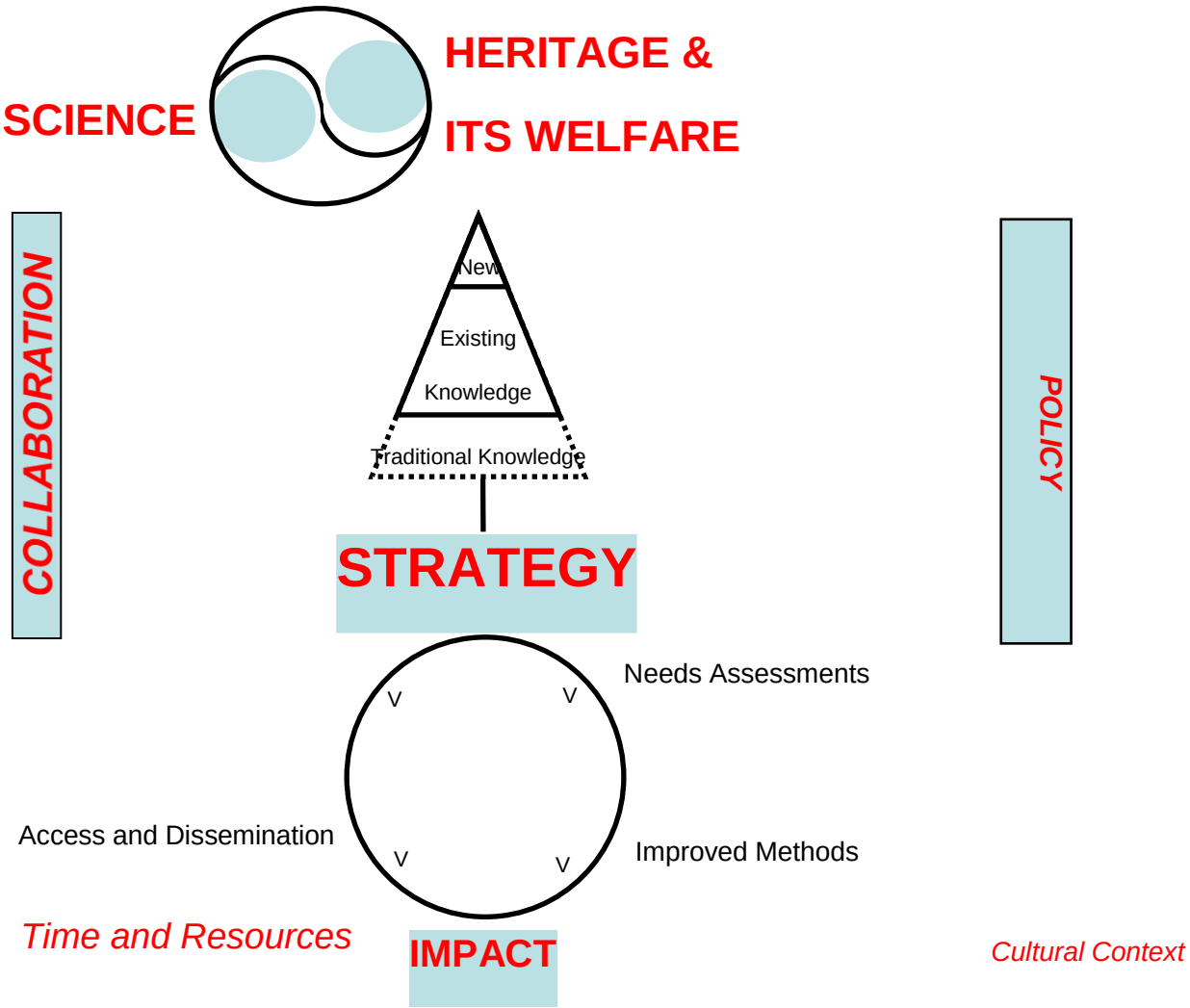
- To promote an interdisciplinary understanding in problem solving conservation processes.
- To develop interactive teaching tools and platforms, based on science to meet needs in practice.
- To scientifically assess traditional knowledge (craftsmanship, ancient techniques) to understand it as an alternative in conservation practice.
- To optimize conservation processes, through the use of heuristic and sustainable methods, linking research and practice.
- To tailor new approaches in scientific documentation that guarantees open access and co-conservation.
- To assure open and credible information, using common language and terminology, accessible for as many end-users as possible, adapted to the level and context.
- To use impact assessments, to assess the effectiveness and influence of science in support of conservation practice, by means of the ROAME methodology (Rationale, Objectives, Appraisal, Monitoring and Evaluation).

For example, evaluating the quality of the science, its societal relevance, the access to and dissemination of the findings, and professional and public awareness and understanding of the results.

- To explore the narratives of conservation practice with scientific support, to demonstrate the applicability, use and benefits of scientific conservation knowledge.

To do all of the above, we need champions (who are well-known, respected and dedicated); press coverage; illustrated examples.

For Benefit of Society…



Discussion group report

CONNECTING OUT: How can conservation science connect with and contribute to world societal priorities?

Members:

Marc Jacobs

Gunilla Lagnesjö

Marco Leona

Janneke Ottens

Isabelle Pallot-Frossard

Yoshinori Sato

Andrew Thorn

Xingling Tian

How can conservation science connect with and contribute to world societal priorities?

Why do we think it is important?

Because it is included in human rights:

"Everyone has the right freely to participate in the cultural life of the community, to enjoy the arts and to share in scientific advancement and its benefits."

Article 27, part 1 of the International Human Rights Declaration

Share

- Participation: on a society/stakeholder level;
- Scientific advancement: peer level;
- Communication: decision makers and politicians Participation: on a society/stakeholder level;
- Scientific advancement: peer level;
- Communication: decision makers and politicians.

General

- Conservation science increases access to cultural heritage (facilitating physical access with better risk assessment tools) and improves enjoyment by delivering an intellectual and emotional experience through sharing of deeper knowledge.
- Assessment process necessary for conservation science is a multidisciplinary, participatory process. It requires stakeholders involvement, data collection, long term monitoring, evaluation of cultural heritage and predictive models
- Optimization of available resources by facilitating the harvesting of scientific knowledge and its transfer to professionals and to a wider community
- Improve communication, facilitate connectivity, interactions and understanding between conservation scientists and other stakeholders in heritage community.

- Improve the quality of the conservation science response to societal needs by cultivating an interdisciplinary approach.
- Training professionals to solve problems in a collaborative environment with the appropriate skills for communication with stakeholders, peers and policy makers.

Advocacy

- Encourage the emergence of leaders in the field, able to meet the local, regional an global agenda of societal needs, through strategic planning and knowledge transfer
- Advocacy at every level for strategic investment in high quality heritage conservation research

Discussion group report

BUILDING THE FUTURE: How can we build an integrated and impactful future for science in conservation?

Members:

Catherine Antomarchi

Nancy Bell

Agnes Brokerhof

Bertrand Lavedrine

Webber Ndoro

Luca Pezzati

Anupam Sah

Min Seok Seo

How can we build an integrated and impactful future for science in conservation?

An integrated and impactful future for science in conservation is important:

- To ensure that usefulness and relevance of conservation science is more effectively evident
- To build capacity to deliver solutions more effectively
- To improve visibility of the professional community

Recommendations for integration:

1. Map the existing professional community
2. Strengthen and expand our community to an inclusive one that is capable and willing to reach out to engage with other communities
3. Define a common vision and mission describing the shared aims to lead this professional community towards the final goal of preserving cultural heritage in a sustainable way leading to national research strategies
4. Create a knowledge infrastructure, from local groups to global networks, integrating other communities and the society at large (case histories)
5. Exploit opportunities to promote conservation science on existing platforms (meetings, conferences, etc)
6. Develop participative science (including the public in projects, citizen science, crowd sourcing)

Recommendations for impact:

1. Provide evidence that conservation science can inform societal issues
2. Provide credible/trustworthy evidence to inform standards
3. Initiate new and more sustainable approaches to address conservation problems
4. Establish end-user research needs through mapping, local and international

5. Explore how multi-disciplinary research outcomes can achieve a higher impact within the academy
6. Work together with social sciences to develop metrics to quantify the social and economical benefit for the community
7. Show examples of how local communities have been strengthened by together solving a conservation problem and illustrating the role of conservation science (case studies)

Discussion group report

Tools: Tools for assessing needs and impacts (and management strategies)

Members:

Zaki Aslan

Łukasz Bratasz

Bruno Brunetti

Marjolijn Debulpaep

Philippe Georgen

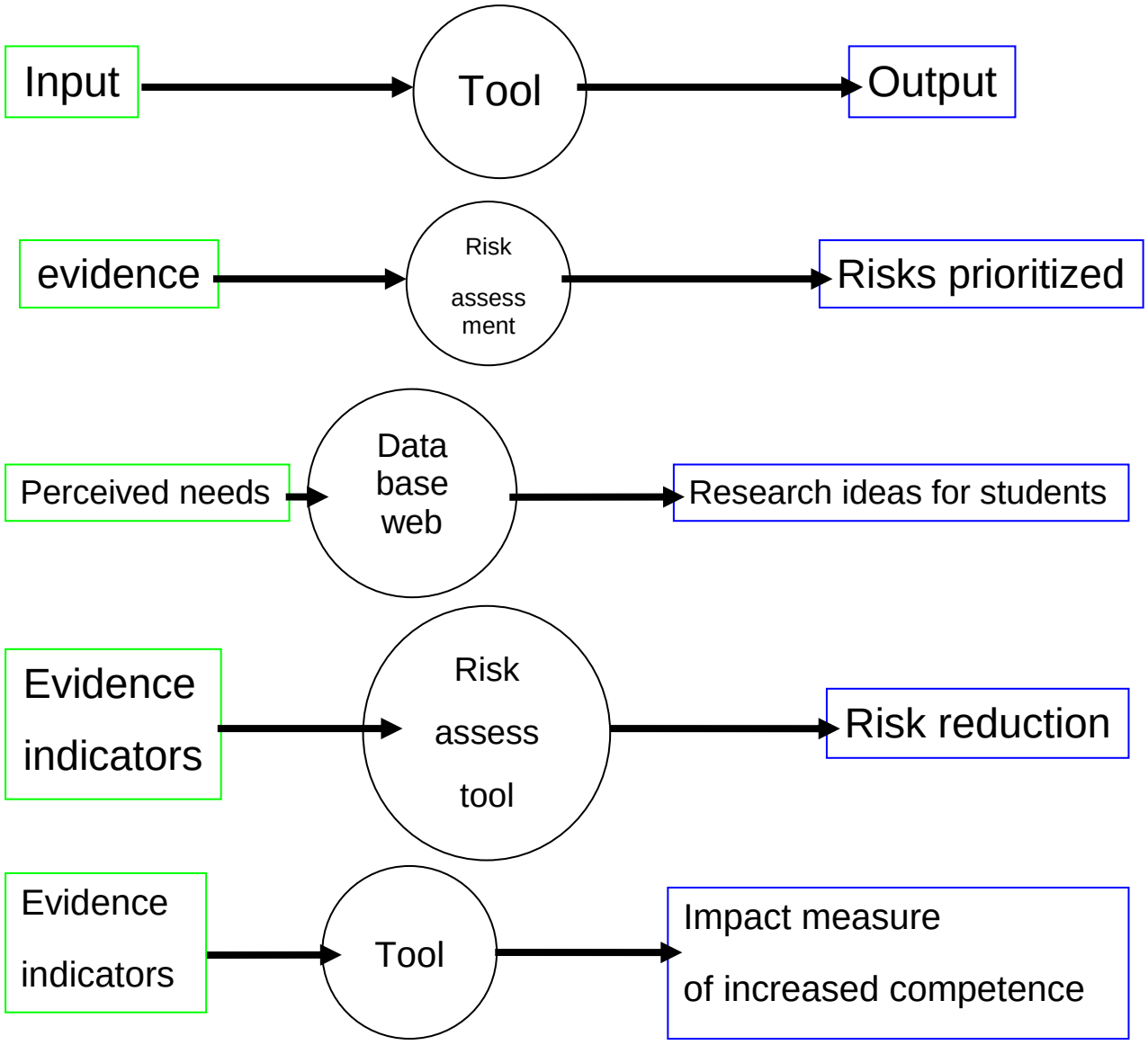
Leslie Johnsston

Stefan Michalski

Why do we think it is important?

- To get things done that meet our goals (Efficiency, effectiveness)
- To link beyond preservation issues to social and environmental needs and impact

What is a tool? Examples



Recommendations: design principles

1. Apply these criteria for tools:

- cost to operate (expertise x time)
- accuracy (depends on algorithms, raw data)
- communication effectiveness
- Comparability (is there a significant group of users to share results?)
- integrated with macro/micro tools and considers intersectorial integration for government

2. Identify target groups:

- managers
- students (who can also contribute research)
- conservators
- scientists
- Learn from other fields, their successes (and failures!)
- Make tools not only for analysis but also for communication
- Make tools for intangible and tangible heritage
- Include intersectorial clients and public in the early design phase of tools when necessary

Recommendations: examples and new building blocks

- Provide infrastructure for archived data sharing, i.e. museum data, research data
- Use community "polling"
- Make tools for specific Risk Analysis (e.g. scenario tool)
- Use mass communication technology
- Use global satellite data
- Provide needs and impact measuring tools for decision makers before they develop their own for us (be pro active to meeting decision makers' needs!!)

Discussion group report

Key messages to conservation institutions

Members:

Giacomo Chiari

Yong-Jae Chung

Marie-Claude Corbeil

Sebastian Dubrusskin

Marie Lavandier

Maria-Joao Melo

Francois Mirambet

Yu Zheng

KEY MESSAGES TO CONSERVATION INSTITUTIONS

1. Conservation science is an essential part of conservation. We need a Conservation Science community with critical mass, credibility, relevance, influence that is well connected both within the science field and with other disciplines (transdisciplinarity).

2. Research & Development projects must include all concerned (i.e. scientists, conservators, other heritage experts) who together will define the issues and objectives.

3. Conservation Institutions should engage in Research & Development that anticipate issues and provide sustainable solutions and guidelines.
   Example:
   The green agenda provides opportunities to test ancient traditional techniques that may be more sustainable.

4. Conservation Institutions should share resources and expertise to be more efficient, increase access and reduce inequalities.
   Example:
   This can be realised by fostering scholarly exchanges, sharing instrumentation and experts, providing workshops, internships for scientists.

5. Conservation Institutions must assume a leadership role, promote conservation and ensure knowledge (including knowledge produced by others) is made available at all levels.
   Examples:
   publications
   conferences
   web platforms
   interactive discussions

Discussion group report

Key messages to educators

Members:

Tharron Bloomfield

Kenza Dufourmantelle

Stavroula Golfomitsou

Joe King

Eduardo Muñoz Gonzales

Salvador Muñoz-Viñas

Kyeong Soon Han

Stefan Wulfert

KEY MESSAGES TO EDUCATORS

Why: Education is the future of our profession

1. Educators should have a clear understanding of the vast array of necessary sciences that contribute to conservation to ensure graduates can bridge these different disciplines
2. Educators should value traditional knowledge systems as part of the cultural heritage in their own right. Conservation science could be used as a means of better understanding this traditional knowledge.
3. Conservation education should consider the social and political dimensions of conservation in addition to technical and scientific. This should include how conservation can contribute positively to societal priorities.
4. Education should empower students with skills that could be adapted to meet local needs.
5. Education should foster solution oriented learning attitudes that seek cost-efficient outcomes.
6. Conservation education should expand beyond concern for material culture to consider issues such as emerging and intangible heritage and sustainability
7. Educational programmes should respond to the needs of the profession as well as ensuring that graduates have the skills necessary to be employed.
8. Educational programme must provide communication skills so that students may dialog effectively with a variety of audiences (political, community, professional, etc.) and be strong advocates for conservation
9. Conservation education should foster collaboration at the university, professional, governmental, and community levels
10. Educational frameworks should be developed to be flexible enough to take into account, local, governmental, and social conditions.

Discussion group report

Key message to the public

Members:

Kathy Lithgow

Katriina Simila

Marie Berducou

Linda Lindblad

Yohei Kiyonaga

Nia N. Hasanah Ridwan

KEY MESSAGES TO THE PUBLIC

1. Key question being addressed

What Conservation Science can do for People through Cultural Heritage?

2. Why it is Important?

Because we, the conservation science community are working for them (people) and their sustainable future.

3. What are we recommending as solutions or goals?

The Message should:

- Be co-authored with the public
- Be optimistic - give hope by telling inspiring stories
- Provide intellectual space for personal connection
- Use emotionally engaging narratives (tranquil – energetic)
- Be inclusive for all people involved/affected by cultural heritage (e.g. traditional practitioner experts in culture heritage)
- Be relevant locally or globally
- Reflect the 'Spirit of the Place' where the message is located
- Be designed for and value diverse audiences e.g. traditional workers, migrants, visitors, tourists and locals

4. Examples of how these might be progressed

- The message needs to be matched to the communication tools available locally and globally.
- Example tools: media, internet, TV science shows, face to face, demonstrations, passive/interactive exhibitions, training camps, mobile laboratories, conservation science tents, cartoon, comic, games 'the young conservation scientist box'.
- Example audience: the young (children) and adults, local inhabitants, global, migrants, and tourist.

5. Recommended themes

Cultural Heritage…

- is about making connections
- is about people
- is about enabling people to travel through time from the past through the present to a good future
- is personal (belongs to you and us)
- is a resource

6. Possible messages that conservation science investigations could contribute to:

- Heritage Connects People in Time and Place
- Heritage is Yours
- Heritage is Open for Restoration/Conservation
- Cultures Caring for Culture through Conservation Science
- Common Interest, e.g. Dust Connects Heritage with Individual
- Discover for Themselves Treasures and Possibilities
- What can You Tell Us about Your Heritage?
- Access to Heritage is Your Human Right

Discussion group report

Key message to policy makers

Members:

Sujeong Lee

Marian Delegidoi

Zani Cajueiro

Fatima Fall

Veerle Meule

Fernando Pina

Dean Sully

KEY MESSAGES TO POLICY MAKERS

1. Key questions being addressed

- Who are the policy makers?
- All actors in decision process, we can mediate between the actors, to bring hope to civil society
- What do they want from us?
- What do we want from them?
- How do we develop common interests?

2. Why we think convincing policy makers is important

- Conservation science research provides evidence for decisions, research needs to support "the integrated approach" – economics, social, cultural;
- Raise priority of heritage within political agendas by connecting to contemporary challenges, as heritage is a fundamental human right;
- To direct allocation resources to heritage, to ensure long term sustainable heritage policy.

3. What we are recommending as solutions or goals

- To identify Heritage, as a resource to generate economic benefit and social solutions that should be integrated into contemporary political priorities.
- To ensure obligation to heritage is managed as a long term process.
- Legislation and long term policy should be developed.
- Integrated instruments to evaluate and provide feedback on the work of heritage professionals and policy makers, is needed.
- Political science and governance studies should be incorporated into conservation research.

- A mechanism for the continuous participation of all actors should be developed.
- To build civic society, platforms and Institutions for heritage communities , through efficient tools such as membership belonging association (National Trust UK).

4. Examples of how these might be progressed

- Public Audience, Brazilian legislation
- Membership organisations (National Trust UK)

Way to achieve this:

- Efficient resource/data to demonstrate the impact of political decisions on their electorate with rapid response to questions and certainty (Roof Survey, Monumentenwacht, Belgium, Heritage at Risk (UK)).
- Use heritage concepts, language and ideas that reflect contemporary social needs.

Discussion group report

Dissemination and publication

Members:

Gerhard Banik

Mandana Barkeshli

Alison Heritage

Marcella Ioele

David Saunders

Norman Tennent

MANDATE

- We were asked to look at "how we can progress publications on the proceedings of this forum within a continuing platform"
- We have slightly widened this to include ongoing dissemination as well as more traditional notions of publication.

WHY?

- The forum has been a unique process and has messages worth disseminating.
- The forum has generated important ideas for many different audiences* with whom we need to collaborate.
- We need to help change perceptions towards the value of conservation science among both stakeholders and policy- makers.

WHEN? (AND FOR HOW LONG?)

Outcome 1. Very short term: a press release.

Short lifespan

Outcome 2. Short term: focused statement documents

Medium lifespan (to be largely superseded by 3.)

Outcome 3. Medium term: our substantial 'publication'

Longer lifespan

Outcome 4. Long term: evolving content on web platform with continuing contributions and feedback

Potentially indefinite until superseded

WHAT?

Outcome 1. Press release and supporting press pack

Electronic by email and release to web

Outcome 2. Focused statement documents synthesizing and summarizing results of table discussions

Web release

Outcome 3. Longer substantial document giving in depth analyses of discussions and supporting material

Web release and print-on-demand

Outcome 4. Evolving content, to include all background material, documentation and comments produced throughout forum and afterwards and potentially as a repository for other related documents and links

Web only with moderated feedback

Possible content for Outcome 3

Foreword

Introduction

Executive summary

A: synthesis of day 3 discussions – linked to evolving content

B: synthesis of day 1 and 2 discussions – linked to evolving content

C: background material and appendices

(literature survey, discussion papers, etc?)

WHO?

Outcome 1. Press release. ICCROM and forum partners with regional or national contact

Outcome 2. Focused statement documents. Moderators and rapporteurs to provide initial synthesis of key points for group feedback. Output co-ordinated by ICCROM (content teams).

Outcome 3. Medium term: Substantial 'publication'. Content teams work up detailed documents based on all the available inputs from the discussions and subsequent feedback.

Outcome 4. Web team posts and moderates continuing discussion.