DRESDEN DECLARATION

First proposal for a code of conduct for mathematics museums and exhibitions

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TABLE OF CONTENTS

1. OCCASION

Mathematics is gaining an increasing relevance on science communication. A number of math outreach projects, and specifically math museums and exhibitions have appeared in the last five to ten years. Today, one can say that there exist a community of math museums and math outreach professionals. Driven by this reality, the Museum of Mathematics (New York) and Erlebnisland Mathematik (Dresden), with the partnership of the KOMSO network and IMAGINARY, organised the first MATRIX (Mathematics Awareness, Training, Resource, & Information Exchange) conference, held 2014 Sept 18 — 20 in Dresden, Germany.

The Dresden conference was the first meeting specifically devoted to math museums and exhibitions, and it gathered representatives of the majority of most relevant math museums to the date. It served as a meeting point to discuss approaches to math outreach practices, and evidenced the interactions, similarities and differences between different institutions.

Following this discussions and debate, and with an initiative of Erlebnisland Mathematik and IMAGINARY, the present declaration of principles (Dresden Declaration) was proposed. The aim of this declaration is to get a consensus basis on the principles driving the interaction and collaboration of math museums and exhibitions, and the way how different museums and projects interact and exchange exhibits and ideas.

The Dresden Declaration attempts to be a guideline of good practices for math and science museums and other math outreach projects. It will become a declaration of respectful ways to share and exchange ideas, concepts and designs about exhibits, performances and other creative activities developed by these agents. It will be a reference to address issues such as intellectual property, licensing, citation, rights of authoring, or collective goals for the community.

This code of conduct seeks to support the efforts of maths museums to communicate the science and applications of mathematics, and to maximize the dissemination of this communication to the public. Accepting this declaration is voluntary; the organisations subscribing it seek to maintain the spirit laid down in these principles.

2. PREAMBLE

Science, and especially mathematics, is essentially a worldwide activity. There is no bounds of any research or result to any geographical or cultural group, besides its historical development. Once a result is well established, the worldwide community is aware of it and benefits from its knowledge. Nowadays, internet repositories, international conferences and exchanges of researchers make this global interaction a fact in the academic world. This aspect of mathematics should be transmitted to the general public as a proof of absoluteness and ubiquity of mathematics; furthermore, museums and expositions should also adopt this paradigm of global knowledge and collaboration on their development tasks.

Museums and expositions of mathematics generally do not possess or rely on historical heritage, nor on extremely advanced and expensive machinery. Rather, they rely on objects and modules specially designed to exhibit and visualize an abstract concept. These objects include puzzles, jigsaws, sculptures, software on computers, audio and video media, etc. Most part of this material is easily reproducible, and can potentially be shared and multiplied without detriment. This openness paradigm reflects the nature of mathematics, of free knowledge and a collaborative community. Ownership rights or plagiarism are weakened concepts since museums are not competing companies, but rather cultural social services. Economic and human effort saved by an open, collaborative environment has proved to be valuable in computer software, academic research, arts, and to some extent in most innovative activities. Math museums and expositions should also adopt this model.

The openness paradigm does not restrict to materials and resources. A mere collection of jigsaws and brain-teasers can transmit the wrong idea of mathematics as just an intelligence test for the public. Instead, the main value of a well designed module is the way of transmitting the idea or concept, the key point one must focus on, the difficulties and distracting issues for the understanding; the highly valuable knowledge achieved by experience. Sharing this know-how is essential to replicate activities and create feedback.

We can summarize the following characteristics that make math exhibitions particularly different from other sciences outreach:

REPLICABILITY. Most of the math museum pieces are especially designed and built for this purpose, and can be easily reproduced by anyone with the appropriate knowledge, without the need of particular instructions.

ABSTRACTION VS REALIZATION. The value that a math exhibit has is the mathematical ideas it conveys. The realization is only the physical envelope. One can largely redesign the appearance, interfaces, materials, size… while keeping the abstract idea underlying the exhibit intact. Thus, there are plenty of ways to modify an exhibit, much more than for other science exhibits that might be constrained to a specific setting of an experiment. On the other hand, the realization of the exhibit must be safe, attractive, accessible… and this work of design can distinguish a successful exhibit from a failing one.

FREE KNOWLEDGE PARADIGM. Mathematicians and researchers in pure sciences assume an open paradigm of knowledge. No patents or legal restrictions apply on theorems or mathematical research, and the intellectual rights reduce to giving proper credit to the authors. This paradigm is very different to other sciences and research bounded to industry or economy. Math museums can (and should) reflect this paradigm both to the public and into its own structural organization.

COMMUNITY. Professional math communicators conform a relatively young and still small community, and most often they share a specific training in mathematics, rather than in other sciences. As pioneers and as mathematicians, there is generally a vocational motivation behind their projects, which weakens the feeling of competition and profit pursue, and strengthens the feeling of community.

These ideas have been already driving most of the math museums and their interactions. As of today, virtually every exhibition copies the ideas and exhibits it finds interesting, and develops new exhibits when innovative ideas appear. However, sometimes there may appear strains due to lack of proper crediting, claimed exclusivity on ideas and exhibits, clash of interests with producers and manufacturing companies, reluctance to exchange information, and other possible conflicts that undermine the relationships on the community.

The occasion makes opportune to engage a collective debate on these issues, and to state this Declaration of Principles. This will shape the bounds and the relations between math museums and math communicators, and will collectively decide the future of the community.

3. INFORMATION ON THE LEGAL FRAMEWORK

This section describes the legal protection of exhibits in maths museums in a nutshell.

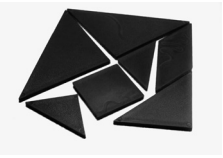
Mathematical exhibits are not always, but sometimes protected by copyright.
Although the legal framework is determined by the national law and thus differs from country to country, one can state as a general rule that mathematical exhibits can be protected by national copyright law, if they contain a certain degree of originality.

Besides that exhibits may also be protected by patent law, by trademark or design law, if such an Intellectual Property (IP) right has been registered. In this document we will focus on copyright law as the most relevant IP right in this respect.

3.1) WHAT IS PROTECTED BY COPYRIGHT LAW?

Copyright does not only protect works of fine art - such as belletristic literature, music and sculptures -, but also protects creations serving practical purposes such as software, texts, photos, diagrams, maps, charts, plans etc. Thus, it can also protect texts and photos used in an exhibition, but also mathematical exhibits as such.

Within the European Union, the precondition for copyright protection has been recently confirmed by the European Court of Justice in several judgements. A subject-matter is protected by copyright, if it is original in the sense that it is its "author's own intellectual creation". So as a matter of principle, copyright protection is granted to works which involve a degree of originality or an individual achievement that go beyond a routine, every-day achievement. In the USA, a similar originality threshold applies.



No protection of tangram tiles due to lack of originality
Picture by Wikimedia Commons, author John Reid, original uploader Phidauex, released under the GNU Free Documentation License. http://de.wikipedia.org/wiki/Datei:Tangram-set-blueplas.jpg

In 1989, the Federal Court of Frankfurt held this scientific drawing of proteins to be protected by copyright law. However, it is doubtful whether a court today would arrive at the same conclusion.
source: OLG Frankfurt, no. 6 W 31/89, Gewerblicher Rechtsschutz und Urheberrecht (GRUR) 1989, p. 589

A mathematical exhibit can be original in three ways:
- × firstly, the way of illustrating or visualizing a mathematical phenomenon can be original
- × secondly, also the aesthetic design of an exhibit may enjoy copyright protection as works of applied art
- × thirdly, also an exhibition as such can be protected as a compilation.

3.2) LIMITATIONS TO AVOID MONOPOLIES WITH REGARD TO INFORMATION

× Copyright does not apply to facts, scientific theories etc. So the mathematical phenomenon illustrated by an exhibit is free and will not be monopolised by copyright.

× Copyright does not apply to the idea how to visualise a mathematical phenomenon, but only to the material expression of that idea. An idea may be used repeatedly, as long as the original expression of it is not repeated. However, the borderline between idea and expression is sometimes hard to define.

× Copyright does not apply to exhibits or features of exhibits, which are dictated by technical or functional reasons. In this case, the ways for implementing an idea are so limited that the idea has to remain free so that it can be used by others.
This is especially relevant with regard to illustrations of scientific or technical nature, such as drawings, plans, maps, sketches, tables and three-dimensional representations. In most cases the author's margin of creation will be quite small, due to technical or functional requirements. Therefore, also the scope of protection provided by copyright will be quite narrow.

3.3) SCOPE OF PROTECTION

Generally speaking, the author has the exclusive rights to communicate his work to the public, e.g.
× the right to determine whether and how his work shall be published
× the right to reproduce the work and
× the right to make the work available on the internet.

So it is not permitted to reproduce a copyrighted work and to display it in a mathematical museum without a licence by the right owner, even if the exhibition does not serve commercial purposes.

× Besides that, the creator is entitled to proper credits and has the right to prohibit any derogatory treatment of his work.

Limitations to the copyright in order to safeguard public interests are e.g. the right to quote and the right to make reproductions for one's own scientific use.

3.4) SUMMARY

In summary, it is in principle possible that mathematical exhibits are protected by copyright law, if they involve a creative achievement which goes beyond everyday's routine. On the other hand, standard visualisations of mathematical phenomena will not qualify for copyright protection.

So one can differentiate between two types of exhibits:
× exhibits free of copyright
× exhibits which are completely or partly protected by copyright

However, in the absence of jurisdiction, there is a lot of legal uncertainty about the application of copyright law to mathematical exhibits.

If an exhibit of the museum A is protected by copyright law, it is up to A to decide how to manage this copyright: whether e.g. to publish the exhibits under the liberal terms of an open content licence or whether to keep the use exclusively to A. If museum A opts for an exclusive use of its copyright, museum B may not reproduce the exhibit without A's permission.

However, B would be free to create an own exhibit illustrating the same mathematical phenomenon. B would also be free to use the general idea of A's exhibit and those features of A's exhibit, which are dictated by technical reasons, since they are not covered by copyright law, without having to give proper credit to A.

4. CORE PRINCIPLES

The code of conduct aims to be a guideline of good practices and partnership between the members of the maths museums community. This is open to debate and we encourage you to talk and think about it. We plan to achieve some consensus on these guidelines and formulate a code of conduct under the name of "Dresden Declaration".
The Code of Conduct is driven by the following core principles:

4.1 DISSEMINATION OF EXHIBITS.

It is a main goal of all museums to reach the maximum possible of the population in the most effective way. Exhibits with great design and conveying great ideas are the tools needed to this goal, and preventing its dissemination or keeping exclusivity of ideas goes in detriment of the general public and the philosophy of math communication.

4.2 RESPECT TO THE CREATORS.

The designers, creators and handcrafters of exhibits deserve respect for their work, be it in form of crediting, commercial agreements or other forms. When maths museums replicate math exhibits or otherwise rely on achievements made by third persons, they should within the bounds of possibility give proper credits to the person(s) who had the idea, developed the concept and realised it.

4.3 COLLABORATION.

The balance between dissemination of exhibits and the respect for the creators must be achieved in a framework of mutual collaboration. Exchanging and trading exhibits is encouraged, as well as exchanging experiences on their use. Communication between the various partners plays an essential role.

4.4 SHARING KNOWLEDGE.

The exhibits are only one part of the value of an exhibition. The knowledge of how to explain these exhibits, how to organize activities, the experiences and feedback from the public and all the immaterial assets that a museum collects is also a high value to be shared with the community.

5. ROADMAP

- × First draft (this document) is shared with the maths museums community
- × Presentation by Anne Lauber-Rönsberg and Daniel Ramos followed by a discussion at the MATRIX conference in Dresden
- × Revision of the document (feedback/input by the community)
- × Preparation of the first version (consensus) and state it at an official place
- × Further refined work on the core principles and if applicable a more detailed code of conduct with respect to dissemination/sharing and crediting.
- × Gather information of the legal framework in different countries
- × Prepare a repository/register of mathematics exhibits including license details, author credits, etc.

6. CONTACT

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