"Oxford IX" International Symposium on Archaeoastronomy
Proceedings IAU Symposium No. 278, 2011
Clive L.N. Ruggles, ed.

doi:10.1017/S1743921311012853

The 'Ancient Skies' project—human cultures and their skies

Rüdiger Schultz[1] **and Doris Vickers**[2]

[1]Schultz IT Solutions, Diesterweggasse 8 Top 3, AT–1140 Vienna, Austria
email: ruediger@schultz.ch

[2]University of Vienna, Dr.-Karl-Lueger-Ring 1, AT–1010 Vienna, Austria
email: doris@vickers.at

Abstract. Human beings have recognized and interpreted celestial objects and events since time immemorial. The sky, our common and universal heritage, forms an integral part of all human cultures around the world. The Ancient Skies Project aims to collect, verify and publish available information about various human cultures and their astronomical knowledge in one single web-accessible knowledgebase.

The overall vision for the project is

One Planet ⟶ One Mankind ⟶ One Sky ⟶ One Knowledgebase

In this paper we describe the basic tenets of the project, discuss the design of the knowledgebase, and compare the project to other similar projects.

Keywords. ancient skies, human cultures, cultural astronomy, knowledgebase, star lore, sky myths, star names, constellations: cultural

1. Basic tenets of the project

The basis for the project 'Ancient Skies—Human Cultures and Their Skies' is the fact that all human beings live on one single planet and share the same sky. The relationship between mankind and the sky is as old as mankind itself.

The sky, our common and universal heritage, forms an integral part of all human cultures around the world. Knowing this, we decided to create an infrastructure to preserve this global heritage. The aim is to collect, verify and publish available information about various human cultures, their astronomical knowledge and its representation in the sky within a single, web-accessible knowledgebase. The method is to rely on primary sources and verify them scientifically, so that the published information is of value to both scientists and the general public all over the world.

1.1. *Objectives*

The following three main objectives were defined for this project.

1) To deliver to the general public and the scientific community a web-based knowledgebase, which can, based on verifiable information, answer questions such as "What is the name of the star Sirius in the Maori culture of New Zealand, and what is the name of the corresponding constellation, and what mythological story lies behind either or both of those names?"

2) To create a strong, global network of scientists working in cultural astronomy who will contribute to the knowledgebase and to facilitate that process with collaboration tools implemented on the website.

3) To secure the long-term survival of the knowledgebase after the project ends (March 2014) through confirmed public funding and private sponsorship.

It is not part of the project to collect, verify and publish the content, but rather to create an infrastructure that will enable and facilitate such projects.

1.2. *Project workplan*

The project is divided into three stages (see Fig. 1).

In STAGE ONE (January 2006 to December 2008) we defined the goals, started the project, designed the knowledgebase, implemented the necessary working procedures, created the website (`www.Ancient-Skies.org`), and populated the organisational and physical segments within the knowledgebase (see below).

In STAGE TWO (January 2009 to March 2012), which was planned to coincide with the UNESCO–IAU International Year of Astronomy 2009 and its follow-up projects, we began to communicate the project to the scientific community and to establish a global collaborative network of cultural astronomy practitioners.

In STAGE THREE (April 2012 to March 2014) we will continue to strengthen our global network and enhance the collaboration processes within that network. Another task will be to secure the long-term survival of the knowledgebase through confirmed public funding and private sponsorship. (To date, the project has received no funding whatsoever.)

2. The knowledgebase

2.1. *The data model*

The knowledgebase is NOT organised in a 'wiki' kind of structure, but based on a sound data model that, if required, allows for easy extension without compromising the model (see Fig. 2). The model itself consists of three segments (groupings of elements): physical, cultural and organisational. Only the first and second of these segments are shown and described here.

The physical segment of the model is based on almost 5,000 stars down to apparent magnitude 6.0. It includes their visual attributes such as magnitude, colour index and location (right ascension and declination) and cross-references the stars in more than a dozen astronomical catalogues (HIPPARCOS, Henry Draper, Brightstar, Fundamental Katalog 5, Bayer, Flamsteed, Durchmusterungen, Ptolemy and others). Non-stellar

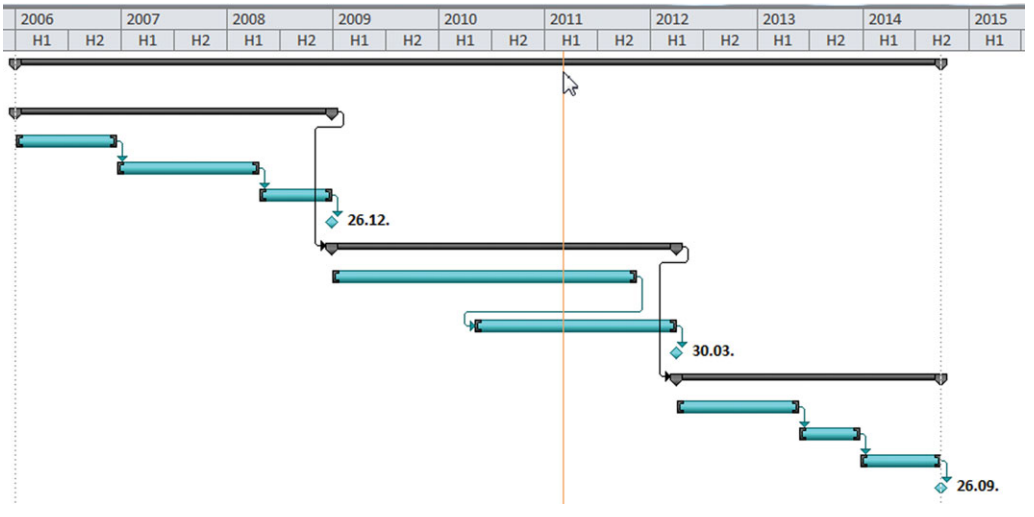

Figure 1. Project plan overview.

https://doi.org/10.1017/S1743921311012853 Published online by Cambridge University Press

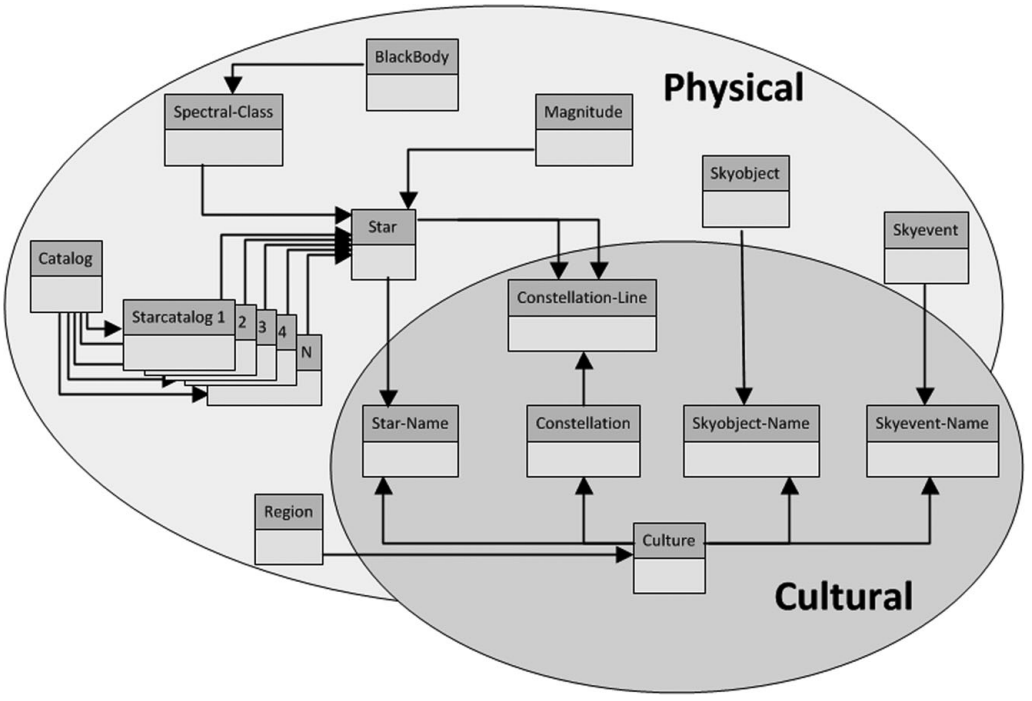

Figure 2. The physical and cultural segments of the database model.

objects visible to the unaided eye (e.g. sun, moon, planets, Milky Way, open star clusters and other deep-sky objects) and sky events (e.g. eclipses, comets, supernovae and meteor showers) are also represented in this segment of the model.

The cultural segment of the model connects the elements of the physical segment to their interpretation within human cultures. For stars, this connection consists of their names, the meaning and the mythological background of each of these names, the named stellar constellations of which they form part, and the meaning and the mythological background of these constellations. For sky objects and events this connection consists of their names and the meaning and the mythological background for each of these names. Additional information collected for each human culture is located in one of fourteen global regions.

Every individual element within the knowledgebase has a number of attributes (preferred name, short name, source of information, description, mythological story, additional information) and can be linked to additional web resources.

2.2. *The content*

The actual work on the knowledgebase content does not form part of the project, but we can describe here the process that has been implemented (see Fig. 3).

All the work of collecting, verifying and publishing data is done by knowledgeable experts. The general public is only marginally involved in this process. From the very start, the project was designed to facilitate collaboration between geographically distributed specialists. The work can be split into work packages of any desired size, reflecting the differences in available time resources between different experts. Every item in the knowledgebase is collected by an expert and has a named source. The item is verified against that source by another expert. Only after this verification does the item become visible to

https://doi.org/10.1017/S1743921311012853 Published online by Cambridge University Press

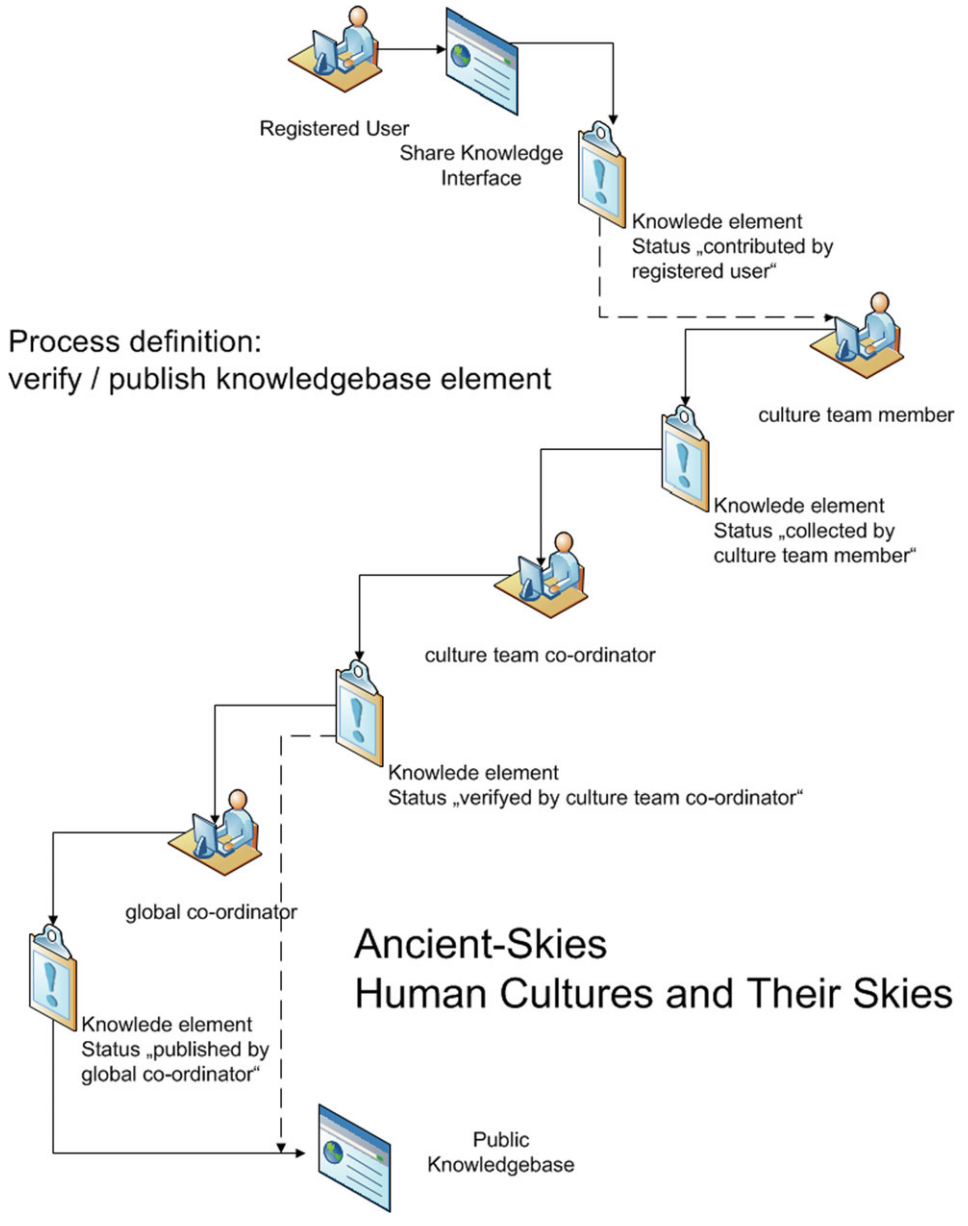

Figure 3. The working process implemented for collecting, verifying and publishing elements of knowledge.

the general public. Every item can be updated: the updated version needs to be verified again, whereupon the original version is stored in the archive.

All the data concerning a specific culture is delivered by the corresponding ‘culture team’. A culture team is a team of cultural astronomy experts knowledgeable about that particular human culture. They are co-ordinated by a ‘culture team co-ordinator’ who is part of the team and, in most cases, is also the initiator of the culture team (although this is not mandatory). The culture team co-ordinators are supported by our global co-ordinators, the scientific co-ordinator (DV) and the project co-ordinator (RS).

https://doi.org/10.1017/S1743921311012853 Published online by Cambridge University Press

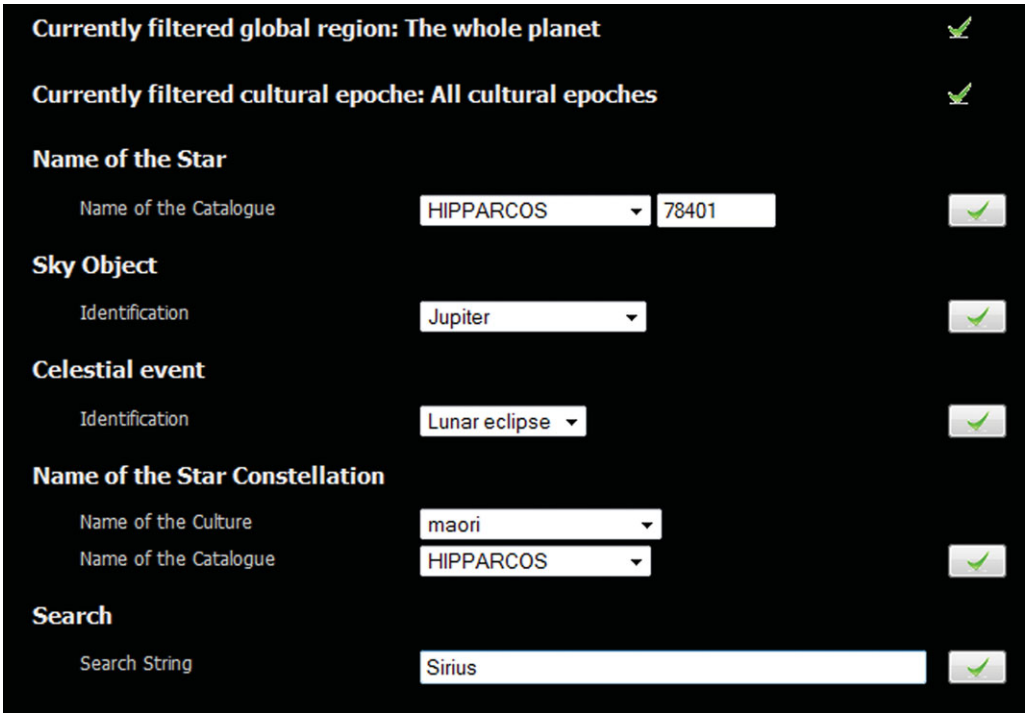

Figure 4. The central search page to query the knowledgebase.

2.3. *The user interface*

Given that the primary objective of the project is to deliver a web-based knowledgebase, the user interface is crucial to the project's success. This comprises a central search page (see Fig. 4), from which users can query the knowledgebase for various items and their collected information (see Fig. 5). The items are linked together, in order to let the user travel through the knowledgebase.

It is not part of the project to visualize the contents, hence there is no graphical, planetarium-like interface within the knowledgebase. However, locations (right ascension and declination) used in the knowledgebase are directly linked to `www.sky-map.org` (a detailed star sky map available on the internet), and the contents of the knowledgebase can, for each culture published, be exported in two forms:

1) a so-called 'sky culture dataset' to be included in Stellarium, a free GPL desktop software that renders realistic skies in real time with openGL (see `www.stellarium.org`); and

2) a well-formed XML dataset to be used for other purposes.

3. Comparison to similar projects

In order to position the Ancient Skies Project in comparison with other similar projects, we have defined a set of criteria that best describe its objectives and major advantages:

C1: Knowledge is presented to the public on a website (i.e. available through the internet).
C2: Collecting knowledge is not a one-time effort, but an ongoing process on the website.
C3: The quality of the knowledge collected is reviewed systematically before publication.
C4: Knowledge is presented in a systematic manner and is fully hyperlinked.
C5: The knowledge presented is fully referenced to the primary source.

https://doi.org/10.1017/S1743921311012853 Published online by Cambridge University Press

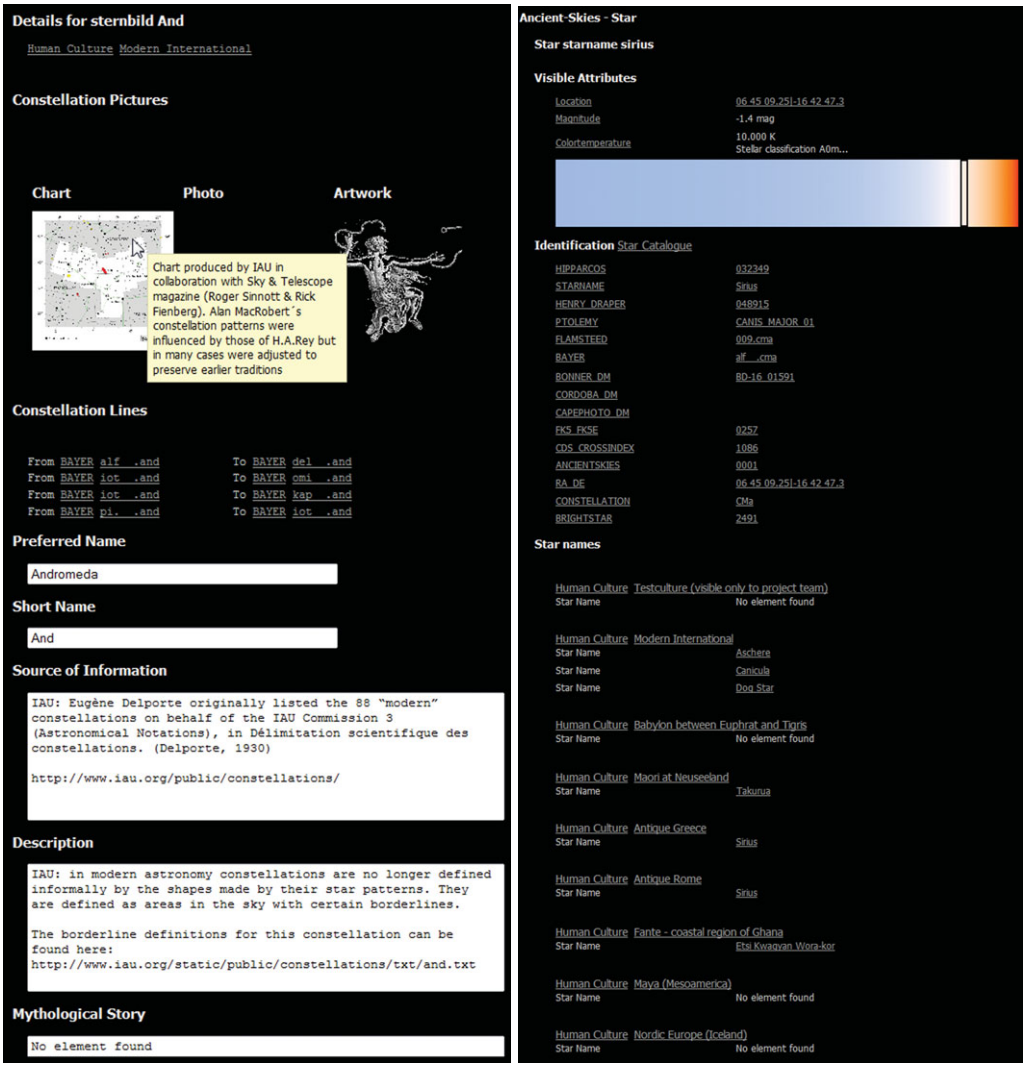

Figure 5. Search result examples. *Left:* the constellation Andromeda from 'modern international' culture. *Right:* star HIPPARCOS 032349, i.e. Sirius.

C6: The knowledge presented is searchable.
C7: The knowledge presented covers sky objects and events visible to the unaided eye.
C8: The knowledge presented is not confined to ten or fewer human cultures.
C9: Knowledge from different human cultures is presented side-by-side for cross-referencing.
C10: The knowledge presented can be used in other applications.

The projects selected for the comparative evaluation are shown in Fig. 6. With the given set of criteria and ratings between zero and three for each criterion, most of the projects we evaluated reach an overall rating between 6 and 12. Only a single project (Wikipedia) reaches 21, while Ancient-Skies reaches 30 (Fig. 6).

Of course, the criteria are optimised to reflect the Ancient Skies Project's objectives, so it is not surprising that Ancient-Skies itself fits them best. However, the differences between the overall ratings for the highest- and second-rated projects and those for the remaining projects evaluated is significant. All but two of them failed to fulfil more than

https://doi.org/10.1017/S1743921311012853 Published online by Cambridge University Press

Project	Website	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	Total
Ancient-Skies	Ancient-Skies.org	3	3	3	3	3	3	3	3	3	3	**30**
Theoi Greek Mythology	www.theoi.com	3	0	1	0	3	1	1	0	0	0	**9**
Windows to the Universe	www.windows2universe.org/	3	0	0	1	0	2	2	2	0	0	**10**
Wikipedia	en.wikipedia.org	3	3	1	2	2	3	2	3	2	0	**21**
Stargazers - Astronomy	www.stargazers.iinet.net.au/Starlore.htm	3	0	0	1	0	2	0	0	0	0	**6**
Frosty Drew Observatory	www.frostydrew.org/observatory/courses/myths/booklet.htm	3	0	0	0	0	0	1	0	0	0	**4**
Sky Script	www.skyscript.co.uk	3	0	0	1	2	1	0	0	0	0	**7**
SAAO - African Starlore	www.saao.ac.za/public-info/sun-moon-stars/african-starlore/	3	0	1	0	2	0	1	1	0	0	**8**
Maquari University - Sydney	www.warawara.mq.edu.au/research/aboriginal_astronomy/	0	3	3	1	3	0	2	0	0	0	**12**
Western Washington University P	www.wwu.edu/depts/skywise/legends.html	3	0	2	0	0	1	1	1	0	0	**8**

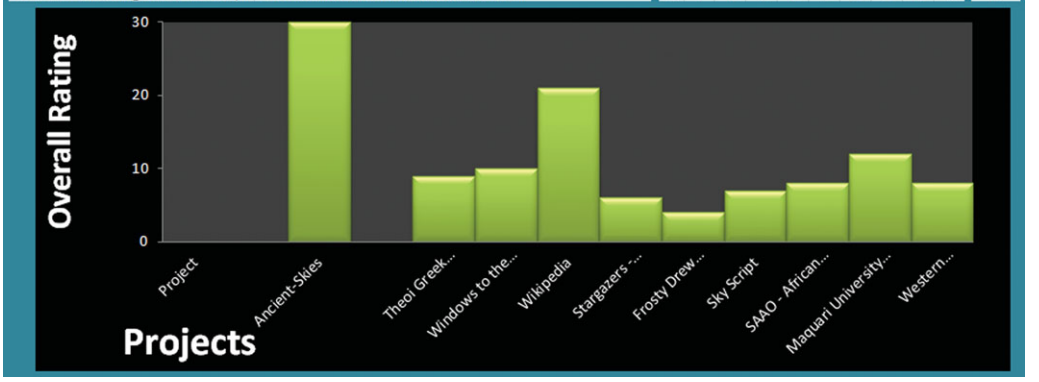

Figure 6. Comparison between Ancient-Skies and other similar projects.

three criteria. This is due to the fact that most projects collect some star-lore information and present it statically on their website. They do not refer to the original source, nor do they continue to collect more knowledge. In most cases, the scope of the collection is quite random, based on the original intended usage of the collection.

In the case of Wikipedia however, the ranking as second-best project results mainly from the lack of a sound reviewing process before publication (which is inherent in Wikipedia's editing model) and the missed opportunity to reuse the information collected in other applications.

4. Conclusion

The main objective of the Ancient Skies Project—to deliver to the scientific community and the general public a web-accessible knowledgebase where information on human cultures and the representation of their astronomical knowledge in the sky can be collected, verified and published—has already been achieved. Currently the knowledgebase holds partial information about a dozen different human cultures, and the process of establishing the global network of cultural astronomy experts to contribute to the knowledgebase is picking up speed. The success of the idea depends on a strong global network of knowledgeable experts and their will to contribute to the knowledgebase. To secure its long-term survival, confirmed public funding and private sponsorship will be required.

https://doi.org/10.1017/S1743921311012853 Published online by Cambridge University Press