MOVING THE PRETTY PICTURES INTO THE 21ST CENTURY

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ABSTRACT

One of the first steps towards an Astro-Google or even a Virtual Repository (see Christensen, 2006, this volume) is the proper meta-tagging of outreach products such as images and videos. Meta-tags will allow information such as ID, object name, image coordinates and more to 'travel' with the products and thereby facilitate proper searching of the products. The ESA/ESO/NASA Photoshop FITS Liberator v.2 will support meta-tags, but a global consensus on these meta-tags must be reached. We report on the latest progress in this area.

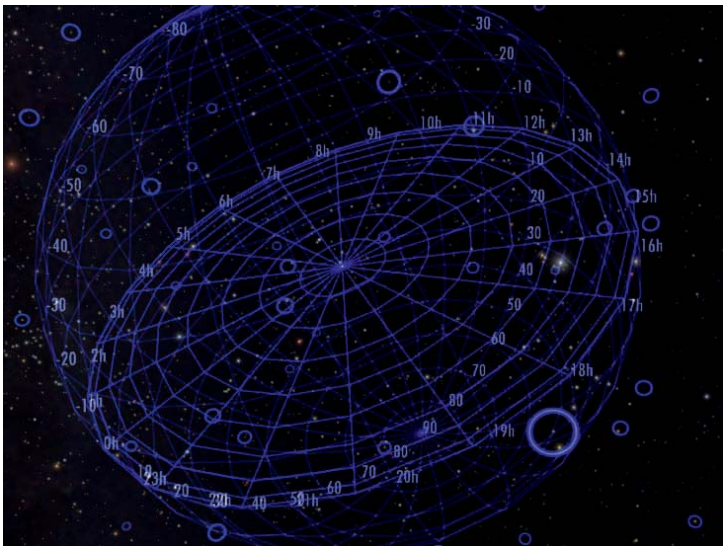

Figure 1: *Attaching metadata to EPO data is the first step to place them in a context as it is here done in an impressive way by the company Sciss AB in collaboration with the American Museum of Natural History. Credit: Image from the Uniview application, property of Sciss AB Sweden, and the Digital Universe database, property of the American Museum of Natural History*

Imagine if the wonderful collections of press release materials from ground- and space-based telescopes could include common information, known as metadata, such as their positions on the sky, object names etc. An elaborate and standardised system could be envisaged whereby the world's archives of more refined outreach and education products such as 'pretty pictures' and videos could be tied together and made accessible.

This would make it possible for outreach offices as well as third party companies to build automated tools that could interface with image databases on the Internet and

allow this treasure to be explored. Anything from simple searches using existing, and very powerful, internet search engines up to interfaces to fully three-dimensional 'digital universe' settings is conceivable as an outcome of such a framework. One could imagine using outreach images in live planetarium shows, in comparative multi-wavelength views, as a teaching aid and in many other places. Finally, and most important of all - so long as future PR images are compatible with some yet to be agreed upon standard, the treasury of 'mouse-click accessible' images will grow from day-to-day.

This is a challenging, but manageable, task. It demands consensus and collaboration among the entire outreach and education community - from the people creating the 'pretty pictures' (image processing specialists), via the data Holdings (the outreach archives) to the different end-users such as educators and 'visualisers', who use the resources to visualise 'Digital Universes'. The International Astronomical Union (IAU) Virtual Repository Programme Group was set up during 2004 to nurture the growth of such a collaboration known as the Virtual Repository (see Christensen, 2006, this volume)

On the technical, or implementation, side, the Virtual Repository is, in essence, a framework consisting of four components, namely:

1. Resource metadata tags attached to images, videos, news etc.
2. A centralised organiser / controller (for instance the IAU Working Group Communicating Astronomy with the Public)
3. A list containing the data archives, i.e. a "telephone book" or a registry that contains metadata about data resources and information services, and
4. A definition of a protocol for communication between the physical repositories and the users. For instance through the Registry with the help of a VO-style Data Access Layer, such as the Simple Image Access Protocol (SIAP)

The second component should be a well-defined list of metadata descriptors that would always accompany products such as images and videos. A draft for such a list is given below. It is currently under final discussion before hopefully being endorsed by the International Virtual Observatory Alliance (IVOA) and the IAU.

The Virtual Repository system content envisages that the metadata are transported within the multimedia files, i.e. embedded within the actual image and video files etc. in a so-called XMP format, which is Photoshop's XML format.

THE IAU VIRTUAL REPOSITORY PROGRAMME GROUP

The metadata topics are being discussed by a metadata subgroup of the International Astronomical Union (IAU) Virtual Repository Programme Group, see: http://www.communicatingastronomy.org/repository/virtual_repository.html. A more in-depth description of the suggested Metadata tags can be found here.

Table 1: *Metadata tags example. Courtesy of the Metadata sub-group of the IAU Virtual Repository Programme Group.*

Identity Metadata		
1.	VR MetadataVersion	1.0
2.	Identifier	ivo://nasa.opo/opo0511a ivo://esa.heic/heic0503b
3.	Title	Hubble Detects Faint Galaxies
4.	DatasetIDs	ivo://ESO.HST/U2JZ0607B ivo://ESO.HST/U2JZ0603B ivo://ESO.HST/U2JZ0605B
Curation Metadata		
5.	Publisher (string)	NASA/AURA/STScI/Office of Public Outreach
6.	PublisherURL	http://hubblesite.org
7.	PublisherID	ivo://nasa.opo
8.	Date	2005-07-29
9.	Contact.Name	Cheryl Gundy
10.	Contact.Email	gundy@stsci.edu
11.	Copyright	CopyLeft
12.	Credit	NASA, ESA & Bent Smölph
General Content Metadata		
13.	ObjectType	SolarSystem.Mars
14.	ObjectName	NGC 256, Andromeda Galaxy, M 51
15.	Description	This spectacular color panorama of the center the Orion nebula is one of the largest pictures ever assembled from individual images taken with the Hubble Space Telescope. The picture, seamlessly composited from a mosaic of 15 separate fields, covers an area of sky about five percent the area covered by the full Moon.
16.	ReferenceURL	http://hubblesite.org/newscenter/newsdesk/archive/releases/1995/45/image/a
17.	Type	Photographic
Observation Metadata		
18.	Facility	Hubble Space Telescope Hubble Space Telescope Hubble Space Telescope
19.	Instrument	Advanced Camera for Surveys Advanced Camera for Surveys Advanced Camera for Surveys
20.	Coverage.Spatial.ReferenceValue	123.50,-59.56 [degrees]
21.	Coverage.Spatial.ReferencePixel	250.5, 250.5

22.	Coverage.Spatial.CoordinateFrame	FK5
23.	Coverage.Spatial.Equinox	J2000
24.	Coverage.Spatial.Scale	1.55e-5 [arcsec/pixel]
25.	Coverage.Spatial.Rotation	23.56 [degrees East of North]
26.	Coverage.Spatial.CoordsystemProjection	TAN
27.	Coverage.Spatial.Dimensions	2048, 2048 [pixels]
28.	Coverage.Spatial.Quality	A
29.	Coverage.Spectral	Optical Optical Infrared
30.	Coverage.Spectral.Bandpass	B [SII] I
31.	Coverage.Spectral.CentralWavelength	552.4 [nm] 659.1 [nm] 820.3 [nm]
32.	Coverage.Temporal.StartTime	2000-12-23-1205 [UT] 2001-11-29-1707 [UT] 2002-07-02-0005 [UT]
33.	Coverage.Temporal.IntegrationTime	200 [seconds] 400 [seconds] 800 [seconds]
34.	DataQuality	A
Image Processing Metadata		
35.	StretchFunction	Logarithmic Logarithmic Logarithmic
36.	BackgroundLevel	103.75 95.54 17.32
37.	PeakLevel	37506.52 17346.45 34523.34
38.	ScaledBackgroundLevel	0 0 0
39.	ScaledPeakLevel	10 10 10
40.	BlackLevel	0.754 0.293 0.191
41.	WhiteLevel	9.7 8.5 8.7
42.	ColorAssignment	Blue Green Red
43.	CreationNotes	This image was created with FITS Liberator. Total workload 38.5 hours. Cleaning was very difficult. Had problems with the CMYK gamut.