BIRTH OF A NEW ERA
FOR HIGH FIDELITY REPRODUCTION
USING MULTISPECTRAL IMAGE ACQUISITION

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A key goal of the CRISATEL European Project, funded by the European Commission IST Program framework, is high resolution digital capture for analysis, restoration and conservation of high value fine art. To achieve these goals LUMIERE TECHNOLOGY S.A., developed a new generation of multispectral digital cameras.

This new digital capture capability permits a wide range of documents, such as fine art paintings, maps, plans, drawings, books, bound volumes, illustrations to be scanned without any physical size limitation at very high resolutions to achieve very high definition images equaling 360 megapixels [12,000 pixels x 30,000 pixels]. For comparison, most digital camera output 3 – 8 megapixel images. This is a dramatic difference!

THE JUMBOSCAN
MULTISPECTRAL CAMERA BY
LUMIERE TECHNOLOGY

The principal of color restitution widely practiced today is based on the tricolor concept. The color is decomposed by three filters, red, green and blue. But, this foundational principal of analog photography, practiced for the past 100 years, has many limitations, does not allow the entire color space [visible spectrum] to be captured. So, a large range of blue colors (Cobalt blue PB36, Turquoise PB28, etc.) and red (Vermillion PR10), very used in fine art have been replaced by other colors. Under tricolor, these colors are false.

This is the reason why the Center of Research of the French Museum (C2RMF), located at the Louvre, the National Gallery of London, the University VI of Paris, the E.N.S.T. of Paris, Hewlett Packard, and LUMIERE TECHNOLOGY and other partners, have collaborated under the CRISATEL Project to develop the first multispectral digital capture system to enable perfect color restitution.

S. Mainardi – Children with a Virgin – Cherbourg Museum
Scanned December 13, 2001 on the JUMBOSCAN.

STANDARD COLOR GAMUT
with a RGB SCANNER
COLOR GAMUT
with JUMBOSCAN

The JumboScan camera enables multispectral capture [image acquisition] that covers up to 95 – 100% of the visible color space versus 50 – 70% of the RGB mode. The JumboScan Multispectral camera exists in two versions:

1. The Laboratory version is equipped with 13 filters, 9 in the visible range, 3 in the infra-red and 1 in the ultra violet [UV]. So, each pixel receives 13 information parameters instead of 3 in RGB.
2. The Museum version is equipped with 6 filters in the visible range. So, each pixel receives 6 information parameters instead of 3 in RGB.

This means each pixel receives enough information to guarantee perfect color restitution.
The color richness of this information coupled with the high definition of the image allows not only perfect capture of the artwork with exceptional fidelity and completely accurate color, but also detailed scientific analysis for predictive restoration, pigment recognition, insurance, fraud and provenance.

In addition, completely accurate output enables reproductions having exquisite reproduction of color nuances.

Multispectral technique enables colors having subtle nuances, such as cerulean blue, maganese blue, alizarin brown, cadmium yellow, phthalo green and titanium white, to be rediscovered with unequalled color integrity.

There are even more technological innovations.

**JUMBOLUX LIGHTING SYSTEM**

**BY LUMIERE TECHNOLOGY**

Multispectral acquisition requires exceptional illumination having high light intensity and good spectral uniformity. However, curators require that their fragile and historical objects not be degraded by high light quantity and excess heat.

This is the reason why LUMIERE TECHNOLOGY developed the first lighting system capable of projecting a narrow light band that sweeps across the object synchronized with the CCD, causing no degradation.

Without the JumboLux lighting system, multispectral acquisition would be almost impossible.

From Image Acquisition to Multispectral Printing

Under the revolutionary impulse of this new technology, many laboratories are developing new printing methods using hexachrome (6 colors) or octachrome (8 colors). And so the exact spectrum of each captured color can now be reproduced without color distortion and color metamerism (closely related colors looking the same under one lighting condition and looking different under another).

The era of high fidelity reproduction is born.

As a consequence of multispectral image acquisition, widely available 6-ink printers can now reproduce any kind of color with high fidelity. The old trichrome acquisition mode is very restrictive and does not permit all the colors to be captured. This most fragile link in the reproduction workflow chain is now replaced by the most perfect technique.

At the end, the complete chain of high fidelity reproduction is more unified. In the chain of reproduction, all the links do not have the same value. Output quality is closely linked to input quality. This is more true for digital. Why? Because digital values are sustained across the chain and nothing is lost. Input can now truly impact output.

Image acquisition has become the most determinant factor of output quality. This is the reason why Lumière Technology has concentrated our efforts to raise the bar for high quality output. Now, more than before, multispectral acquisition enables hexachrome and octachrome printing methods enable to faithfully reproduce the entire color spectrum. Lumiere Technology’s multispectral capture technique allows an almost unlimited variety of treasured documents and fine art to be captured without loss and be reproduced and disseminated with extraordinary color never completely seen before.

**A New European Technology Installed in the United States**

After the Center of Research of the French Museum (C2RMF), located at the Louvre, the Musell Color Sciences Laboratory (R.I.T.), the biggest color laboratory has acquired the Multispectral JumboScan. R.I.T. will promote applications for this technology in industrial and institutional environments where color counts.

This is the promise for the future!

As a further indication of the stated benefits, the Library of Congress Geography and Mapping Division has acquired a JumboScan and JumboLux lighting system to faithfully digitize its collection of maps.

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