BUILDING AN OPEN COLOUR STANDARD

PRECEDENT, TOOLS AND QUESTIONS TOWARDS MORE OPEN PRINT PROCESSES

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ABOUT THE OPEN COLOUR STANDARD

The Open Colour Standard (OCS) is a union of colour theory and large scale information organization. OCS is a project meant to create a viable alternative to the Pantone colour system. The main difference between OCS and Pantone is that OCS will be executed within an open source framework.

OPEN COLOUR STANDARD GOALS

- Create an Open Colour Standard to rival proprietary colour spaces
- Study colour for commercial and artistic uses in an open and transparent way, within the spirit of Free/Libre Open Source Software (FLOSS)
- Educate designers, creators and businesses about the importance and benefits of open standards
- Grow a community of open source colour developers
- Take the prohibitive costs out of getting precise colour in print media

OPEN COLOUR STANDARD MISSION

- Educate the populous, specifically the fragment of the populous made up of designers, print professionals and existing Open Source adopters, about the theory and politics of colour
- Democratize the precise use of colour in real world applications
- Encourage experimentation and development with colour
- Make colour accessible

OCS RESEARCH REPORT

The purpose of the following research report is to create context for the Open Colour Standard project. To that end, this report discusses issues of colour, commercial and non-commercial colour spaces, the use of colour in industry, the Pantone colour space and the business behind it, Open Source projects, their adoption and the possibility of Open Source design.

COLOUR: HISTORY, THEORY AND COMMERCE

White light is made up of all the colours of the visible light spectrum. In order to see the visible light spectrum, try passing a white light through a prism. That's what Newton did. The first ever colour wheel was created by Sir Isaac Newton, who made it by wrapping the visible light spectrum into a circle (Birren, 10). He also assigned colours to the notes of the diatonic scale (Birren, 10). Since then, there have been manifold other versions of the colour wheel. Now, the colour wheel has made the leap to digital: it can be found in all graphics programs, whether they be bitmap or vector.

Historically, colour theory has been based on three colours: red, yellow and blue (Birren, 17). The theory goes that red, yellow and blue are primary colours. When any two given primary colours are mixed together, they form secondary colours, such as green (yellow and blue), orange (yellow and red) and violet (blue and red). When a secondary colour is mixed with a primary colour, it forms a tertiary colour, such as blue green (blue and green), yellow green (yellow and green) or yellow orange (yellow and orange) among others. Added to those are tints (a given colour mixed with white), tones (a given hue and lightness, but with differing saturation levels) and shades (a given colour mixed with black). This has been the base of colour theory and mixing since 1831 (ibid). However, the theory of red yellow blue as the base constituents of colour has existed since 1731 (Birren, 11). Red yellow blue has carried over into the world of print. It is seen today in the form of CMYK (cyan, magenta, yellow, black). CMYK is the standard for printing, whether it be cartridges in ink jet printers or the four plates in offset printing.

CMYK is, of course, not all there is. In many media, such as paints, markers and even printing inks, colours outside of the CMYK range exist. These pigments are made of animal, vegetable and mineral constituents (Bustanoby, 9).

Computers view colour slightly differently. They employ the same strategy as the human eye, to a certain extent. Colour is perceived in the human eye by an assortment of sensors. There are rods, which are responsible for the detection of black and white. There is a cone for red, a cone for green and a cone for blue. So, like in the human eye, digital colour is made up of red, green and blue. The dominant colour space used by monitors is sRGB. sRGB is considered to be the standard colour space for computer screens.

Unfortunately, sRGB and CMYK aren't necessarily cross-compatible. Many colours that exist in sRGB do not exist in CMYK. The reverse of this is, of course, also true. The most egregious examples of these incompatible colours (in my experience) include very bright sRGB colours and Caucasian skin tones. This creates colour differences when a work is begun in RGB mode and is then changed to CMYK. It can cause disappointment and dull colour. There are, of course, many colours that exist both in RGB and CMYK (including #0099cc, the colour of the OCS logo).

In areas where precision is desired, CMYK is often not the best or most popular solution. What's more, when price is an issue and only a single colour is required, CMYK can be uneconomical. Into these niches steps spot colour. Spot colour allows the specification of one or more specific colours of ink. The ink, rather than being made up of a mix of CMYK, is instead its own pigment. The most popular spot colour system is Pantone. Programs like Adobe Illustrator and Photoshop have integrated support for Pantone colour.

What makes Pantone a precise option for colour matching is the Pantone Color Bridge chip book. The idea is that if a designer wishes to see how a colour will look when printed, she simply goes to her chip book and looks at the colour as it is

printed in Pantone ink. Color Bridge can be bought in different paper options for increased precision. If our designer plans to print on coated paper, she may wish to buy a coated version of Color Bridge. A coated version of Color Bridge will cost our designer $119.00 US (Pantone). What's more, Pantone suggests that, to maintain precision, a new copy of Color Bridge should be purchased every year.

Each colour in a Pantone Color Bridge book is formatted as follows: The left column of colour represents the Pantone pigment colour. The column on the right represents the CMYK process equivalent of the Pantone colour. Below the Pantone column, the Pantone number is written. It consists of four numbers and a C or U to represent coated or uncoated. Underneath the Pantone number, there are RGB values and a hex value for use in HTML. Underneath the CMYK colour swatch, the same Pantone number as the other swatch appears, except with two letters after the number. First, a C or U, as before, followed by a P for process. Below the Pantone number are CMYK values.

On the non-proprietary end of the scale, Pantone also sells swatch books showing the range of CMYK colours, along with mixing instructions.

As mentioned above, Pantone provides mixing instructions to print professionals. These instructions provide the direction necessary to create any colour in the Pantone range from a set of base colours (these colours include process yellow, process magenta, process cyan, process black, orange, red, blue, yellow, warm red, rubine red, rhodamine red, purple, violet, reflex blue, process blue and black). These instructions are laid out in a similar fashion to paint mixing ratios.

Very few companies in the graphics industry choose not to use Pantone colour, despite the existence of other viable palettes such as Focoltone, Trumatech,

Munsell (the rights to which are currently owned by X-Rite, Pantone's parent company), Toyo, HKS, RAL and so on. Notable among the rebels is Letraset, which has chosen to end its dependence on Pantone, at least when it comes to markers. Letraset Tria markers have abandoned Pantone in favour of their own colour system, based on the HSL (hue, saturation, lightness) colour space (Letraset). Different applications employ different colour spaces and systems. Paint companies (house paint, as opposed to artist paint) employ their own systems for mixing colour.

Even though there are some outlying examples, Pantone still enjoys a de facto monopoly when it comes to colour specification. A search on Google Scholar for the words "Pantone" and "color" yields scores of scientific papers describing everything from plants to bacteria in Pantone colours. The department of Canadian Heritage even specifies the Pantone number for the red of the Canadian flag ("National Flag of Canada"). These uses are, of course, in addition to the previously mentioned spot colour in offset printing.

Pantone does not restrict itself to printing ink. It enjoys privileged status in fields other than graphic design. Pantone releases colour trend forecasts for upcoming seasons in fashion and housewares. These forecasts are used by manufacturers and designers to determine in which colours they should produce their future products. To that end, Pantone sells sets of cotton colour selector swatches (full swatch sets retail for $3400.00 US) for fashion and homeware designers and producers. To that end, Pantone also offers custom dyeing services so that any fabric can become properly Pantone. For $1995.00 US, the colour conscious product designer can purchase a colour selector set for opaque plastics ($1575.00 US for the transparent set). These are merely swatch sets.

On the technical end of things, Pantone supplies design professionals with spectrometers (used to measure the wavelengths of light), display calibration software and hardware, palette management software, digital colour chips and innumerable other colour related items, all of which are sold at a premium.

For end consumers, Pantone has a licensed line of housewares, fashion items and house paints. These products, sold under the Pantone Universe name, run the gamut from dishes to chairs to eyeware, purses and notepads. Pantone Universe products leverage the equity attached to the Pantone name. Pantone has become shorthand for design precision. Pantone Universe mugs are even available in mass merchandisers such as Chapters (a Canadian chain of book stores).

QUESTIONS RAISED ABOUT COLOUR

The above look into the technical, historical and commercial aspects of colour has raised several questions. Among these question:

Will digital always be the second to print and other physical manifestations of colour? Is it possible or even feasible to create a physical colour system based on the capabilities and limitations of sRGB?

How can complex physical colours be paired with their hex counterparts for ease of digital to print colour matching?

With the mass move to digital, is it sensible to leave parts of the visible light spectrum out of the sRGB colour space?

OPEN SOURCE ORGANIZATION

"play is the most economically efficient mode of creative work."
(Raymond)

In the context of this report, Open Source is defined as anything of or relating to the principles of Free/Libre Open Source Software (FLOSS). Open licenses, when referred to, are those like the GNU General Public License, Copyleft or Creative Commons. They are licenses that grant privileges to users instead of taking them away. They are meant to strike a more equitable balance between the interests of the creator and the interests of the user. Open Source refers to the Open Source movement and framework. It refers to software projects created using collaboration and released under permissive licenses such as those listed above. Open Source is, above all, acts of creation realized within a framework that seeks to make works of creativity and invention open, accessible and manipulable for as many people as possible. With this in mind, below is a review of various methods of Open Source organization, distribution and mobilization.

ERIC RAYMOND'S DECREES ON OPEN SOURCE ORGANIZATION

In his essay, "Homesteading the Noosphere," Eric Raymond outlines several different management structures used in Open Source projects. These structures are:

- sole maintainer
- multiple maintainers under one benevolent dictator
- democracy with developers as voting members
- rotating dictatorship among senior developers

A sole maintainer generally implies a smaller project. It implies that one person has responsibility for all of the technical tasks involved in the realization of a project. The maintainer may (and often does) have other developers working under her.

In the Open Source community, the term "benevolent dictator" refers to the leader/overseer of a project. The benevolent dictator effectively acts as a gatekeeper for the project, providing vision and oversight. The most notable example of a benevolent dictator is Linus Torvalds, who safeguards the integrity of the Linux kernel, which is widely viewed as the largest and most successful Open Source software project. He holds veto power over modifications to the Linux Kernel.

A maintainer is less managerial and more technical. Instead of dealing with the vision of a project, in models with both dictators and maintainers, maintainers are tasked with responsibility over one section of the project. In a model that has both maintainers and a benevolent dictator, multiple maintainers work under the benevolent dictator at individual tasks with the goal of fulfilling the vision as set out by the benevolent dictator.

Democracy is exactly what the label says: democratic management of a project. In this model, the developers of the project are the voting members, each taking responsibility for the future of the project by voting on questions of direction and development.

The rotating dictatorship model offers the vision and direction of the benevolent dictator model while turning the structure into something more of a democratic meritocracy. Because the rotation encompasses senior developers, it ensures a dictator with a good understanding of and heavy investment in the project. At the same time, rotation means that multiple different viewpoints can be entertained and that resentment towards one dictator has less chance of growing.

More important even than management model is community. Community involvement is what makes Open Source successful. Important factors in community building around software development, according to Raymond, are having "something runnable and testable to play with" to offer your contributors, as well as having a "plausible promise."

Worth quoting in full, on the topic of what contributors like to do:

> "Human beings generally take pleasure in a task when it falls in a sort of optimal-challenge zone; not so easy as to be boring, not too hard to achieve. A happy programmer is one who is neither underutilized nor weighed down with ill-formulated goals and stressful process friction. Enjoyment predicts efficiency."
>
> (Raymond)

Based on Raymond's writings, it is worth advancing the idea that having a stake in a project is what makes developers interested in Open Source. The feeling of power, worth and ownership involved in working on an Open Source project is unmatched by commercial, top-down, do-as-I-say development models. This seems to work well for software developers who already have the skill set necessary to create programs.

OPEN SOURCE AND DESIGNERS

One of the biggest questions catalysing this project is: Why aren't designers interested in Open Source? In personal experience, very few designers, both professionals and students, use or are interested in using Open Source alternatives to their current software and systems. Why? Below are some possible factors preventing designers from going Open Source.

Familiarity: Closed source software and products/processes, like Adobe Creative Suite and Pantone are already ingrained in the heads of designers. Designers are willing to upgrade their skills when new versions of familiar software are released, but they do not wish to learn something entirely new.

Usability: Even if they wish to try Open Source alternatives, many designers lack the skills required to do so. They may find programs difficult to install, with technical issues they aren't used to dealing with.

Industry Standards: Closed source software and processes are the industry standards. Unlike in many industries, these standards are not administered by the International Organization for Standardization (ISO), but are instead de facto standards based on their ubiquity. Designers are reluctant to use software and processes that have not been adopted by their peers and the other parties in their production chain. Pantone is an attractive system for spot colour because designers can count on their print shops having it and can also count on Photoshop supporting it.

Education: Because closed source software and processes have become the industry standards, they are what is taught in design schools. Young designers learn about Pantone and not about any alternatives. They then take this knowledge

into their professional lives and become market forces promoting the continued Pantone reign.

Employability: Designers and print shops use certain software and certain processes. Savvy employers know that those are the industry standards. Because they know that those are the standards, those are the programs and processes that they use. They must, therefore, employ designers who know how those programs and processes work.

Open Source Limitations: Designers may not adopt Open Source software because it lacks certain required functionality. At the moment, for example, both The GIMP and Inkscape lack the ability to convert to CMYK. This means that print professionals will find those programs sorely lacking. If they believe that Open Source options lack basic functionality, they will not use those options and will not become the catalysts needed to make those options more professionally viable. The major limitation in Open Source colour, of course, is that a system does not currently exist to rival Pantone.

Open Source Optics: Designers who are set in their ways can be shortsighted. A designer trained on Adobe Creative Suite and Pantone might look at Open Source alternatives as clones and copycats. The GIMP may be seen as a cheap alternative to Photoshop, Inkscape as a knockoff of Illustrator. Because designers view these Open Source options as poor imitations for amateurs, they are unlikely to adopt them.

Awareness: Some designers may simply not know that Open Source alternatives exist. Of course, when they find out that there are Open Source options, they may find that they have some of the other problems listed above.

In short, Open Source is faced by a cyclical problem: Everyone learns Creative Suite and Pantone in school because the whole industry uses Creative Suite and Pantone. Printers use Pantone because their clients do and their clients use it because the printers do. Because Creative Suite and Pantone are industry standards, snobbish or blinkered designers continue to perceive Open Source alternatives as tools for amateurs. If designers never start using Open Source alternatives to closed source programs and processes, it will be a self-fulfilling prophecy: Open Source graphics programs and processes will be for hobbyists.

Without designers as a critical professional mass, Open Source graphics software faces a difficult path towards large scale adoption. Unfortunately, since spot colour is somewhat more specialized, an Open Source alternative to Pantone may never gain traction. Software may have hobbyist users to support it. There are no colour space hobbyists.

QUESTIONS RAISED ABOUT OPEN SOURCE ADOPTION

How can designers be convinced to try Open Source alternatives to their current habits?

What will it take to break into the closed source loop of design? Do designers need to ask their printers to support a different sort of ink? Can a new system be pushed on designers through print shops and software? If a new option for colour were added to existing software, would anyone use it?

How can designers be encouraged to take ownership of their industry?

Is there a fundamental difference between software developers and graphic designers that prevents designers from adopting an Open Source framework?

Could cost be a motivating factor in changing the habits of designers? Would it be enough of a factor to build community around Open Source design alternatives, or would it simply grow a community of non-contributing users?

BIBLIOGRAPHY

Birren, Faber. *Principles of color : a review of past traditions and modern theories of color harmony.* West Chester, PA: Schiffer Pub. Ltd., 1987.

Bustanoby, Jacques H. *Principles of color and color mixing.* 1st. New York: McGraw-Hill, 1947.

Letraset. 2006. Letraset <http://www.letraset.com>.

"National Flag of Canada." *Canadian Heritage.* 29 NOV 2008. Department of Canadian Heritage <http://www.pch.gc.ca/pgm/ceem-cced/symbl/df11-eng.cfm>.

Pantone. 2009. Pantone <http://www.pantone.com>.

Raymond, Eric S.. "Homesteading the Noosphere." 2000 <http://www.catb.org/~esr/writings/cathedral-bazaar/homesteading/>.