PUBLISHING IS A PROBLEM.

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PUBLISHING IS A PROBLEM

The U.S. magazine industry prints an estimated 12 billion magazines each year. Many of these magazines are sent directly to subscribers, but of the ones that go to newsstands, the average sell-through rate is a paltry 30%—leaving 70% to go to a landfill, be incinerated, or in relatively low quantities, be recycled (Swartz 1). This indicates that at least 7% of all magazines produced will reach their final fate without being read (Swartz 1). This "push" distribution model leads to excess waste and cost to retailers, publishers, and the environment. While 7% seems like a small amount, it is equal to 2.45 million trees.

According to studies by Co-Op America, the magazine industry uses 35 million trees worth of paper annually. Based on data from Natural Capitalism, "one ton of paper requires the use of 98 tons of various resources" (Hawken 50). Magazine publishing disrupts the environment by chopping down trees and using a variety of reources in the intensive paper making process; the printing process, distribution process and end-of-life disposal process emit millions of tons of CO_2 and other greenhouse gas emissions every year (Alexander 4).

Due to the impact of paper waste on the environment, there are ongoing efforts to decrease the amounts of paper printed. One recent development being explored is printing-on-demand as a model to reduce the consumption of paper. With POD, items are printed only when there is intent to read them. Not only would this save, at a minimum, the 7% of all magazines that are never purchased; it could also positively impact the fact that not everyone reads every issue of a subscription. We would hazard a guess that not every issue in a subscription to "US Weekly Magazine" or even "The Economist" is read. The sustainability movement will hopefully lead to reduced consumption and the need for people to hoard. After all, libraries are the place to archive, not your bookshelf.

With these issues in mind, we use detailed data for Time, a weekly magazine, as a comparative baseline to examine MagCloud, a new print-on-demand magazine model. Working with existing sustainability frameworks our goal is to investigate an alternative to the current magazine distribution and production process.

FRAMEWORKS ARE FRUSTRATING

The sheer number of frameworks that have been developed for analyzing product sustainability speaks to the complexity of the task at hand. For this research, our intent was to choose a framework that would allow us to analyze both MagCloud and a traditional magazine, but unfortunately no such perfect model exists. In this paper, we draw from the following three sources to put the production of MagCloud magazines into context: Life Cycle Analysis, Natural Step and Total Beauty.

Early on in our research we found an extensive Life Cycle Analysis (LCA) conducted by Time, Inc. In their 2006 report, the company broke down the impact of two of their imprints: Time and InStyle. Having a LCA in hand for our product category gave us tremendous amounts of data and insights but LCA's are notoriously expensive and time-consuming to conduct. It is impossible for us to do a comparable study for MagCloud. As an alternative, we used Datschefski's Total Beauty system for a distilled picture of the environmental impact of both magazines. Using the data found in Time's LCA we were able to calculate Total Beauty scores with some confidence, but unfortunately we did not have enough information to generate equivalent metrics for MagCloud. Despite the fact that we are unable to fully define MagCloud under the terms of Total Beauty, we still believe the lens of Total Beauty adds to our overall understanding of the product. In the final phase of our analysis, we turned to The Natural Step to help us envision a more sustainable method for magazine publications.

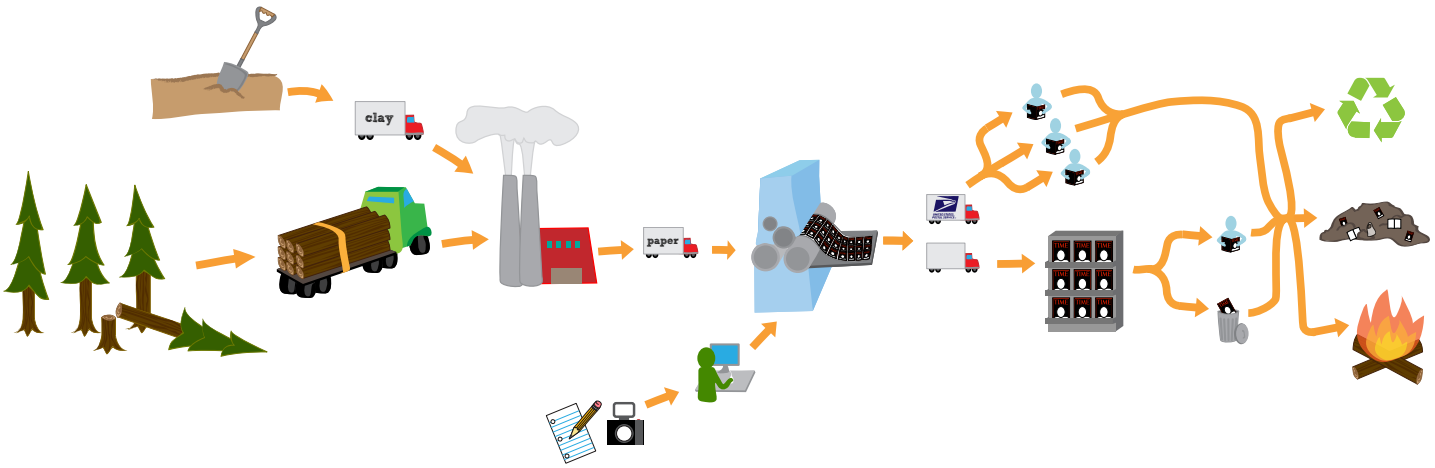

Figure 1: Production process of Time magazine

THE TROUBLE WITH TIME

Time magazine is a weekly news magazine with a circulation of 3,400,000 (Wikipedia). The popular magazine has been in production since 1923, and for the purpose of assessing MagCloud, we are using it as an archetype of traditional magazine production and distribution. In an effort to study their environmental impact, Time Inc. partnered with several other corporations to conduct a detailed life cycle analysis (LCA) of two of their popular magazine titles.

In 2006, The Heinz Center, on behalf of Time Inc., published a report entitled: "Following the Paper Trail: The impact of magazine and dimensional lumber production on greenhouse gas emissions: A Case Study." This document describes the life cycle of a magazine in detail and attributes the amount of CO_2-equivalent emissions (Gower) for each stage of the production process.

Based on the results of this study, for every metric ton of Time magazines produced, an estimated 1.17 metric tons of CO2-equivalents are released (Gower 17). These emissions are broken down by activity as follows:

Pulp and Papermill emissions: 61%
Final fate of magazines: 16% (Gower 18)
Forest Management and Harvesting: 2%
Transportation and distribution of magazines: 8%
Transportation of wood fibers and clay to the pulp/papermills: 8%
Magazine printing: 4%
Transportation of paper to printers: 1%

Although Time uses a variety of programs and incentives to encourage their paper producers to follow sustainable practices, the paper creation phase contributes the most greenhouse gas emissions of the whole production process. Total transportation for Time magazine production contributes 17% of the total emissions and the final fate of Time magazine contributes 16% to the total CO2-equivalent impact.

The lifecycle analysis conducted by The Heinz Center also shows the amount of excess magazines created each year. Of the 4,122 tons of Time magazines that go to the newsstand annually, only 1,443 tons are sold, or an approximately 35% sell through rate (Gower 83).

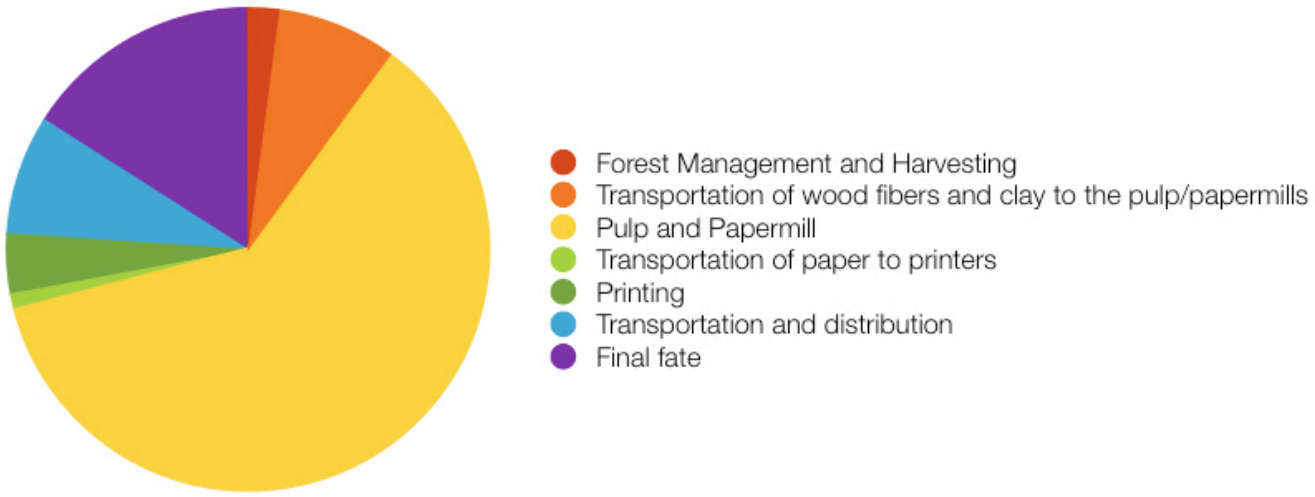

Figure 2: CO2 emission contribution from production of Time magazine

THE TROUBLE WITH TIME

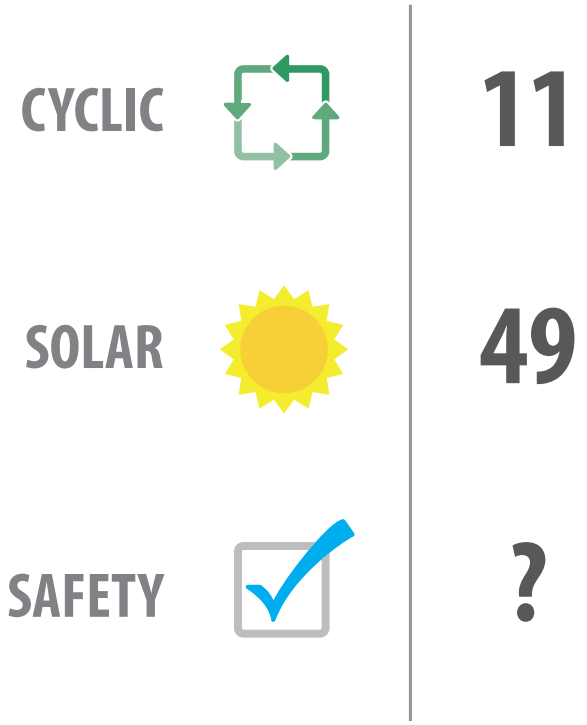

Figure 3: Total Beauty for Time magazine

Note: We found the data to calculate Cyclic and Solar, but we could not find accurate data to calculate Safety and Efficient.

While this is higher than the average magazine industry sell-through rate of 30%, it nonetheless indicates that many of these magazines are printed simply to be driven around and disposed of.

We inputted the values from Time's LCA into Edward Datschefski's Total Beauty sustainability framework. Datschefski's system measures the sustainability of a product in terms of a variety of factors: cyclic, solar, safe, efficient and social. While it is relatively challenging to convert other data, such as that found in an LCA, into this format, it can be used as a quick snapshot of the product as well as a simplified comparative baseline for other similar products. Due to this flexibility, we use Datschefski's framework to establish a baseline for the analysis of the sustainability of MagCloud.

In order to get these results, certain aspects of the framework have been modified. Datschefski recommends comparing data from today with data from 1990. The data from Time's LCA was gathered for the year 2001, so for the purpose of our study, all comparative figures are based on values from 2001. According to Datchefski's formula, the Total Beauty of Time magazine is Cyclic: 11, Solar: 49, Safety: ? (See Figure 3).

DOES MAGCLOUD MATTER?

MagCloud is a HP incubation project to evaluate new, online marketplaces for buying and selling custom and niche magazines with print-on-demand fulfillment. Their primary goal is to provide an on-demand service to magazine readers who want flexibility in what they read, how content is presented and how it is received. The cornerstone of MagCloud's online community is inventing new ways to bring publishers and readers together through a web-based marketplace.

MAGCLOUD: PUSH VS. PULL MODEL

Traditional magazine publishing is based on a push model where publishers send magazines to newsstands and other outlets for customers to purchase. As aforementioned, only 30% of magazines are actually sold; 70% are either sent to landfills, incinerated or in very rare instances, recycled. MagCloud operates a pull model in which they only print magazines once a customer places an order; they only respond to demand. As a result of this model, they do not print anything extra and theoretically, no magazines are wasted.

MAGCLOUD: PRODUCTION PROCESS

1. Publisher uploads magazine content in PDF format through the MagCloud website or a customer requests a magazine already on MagCloud's site.

2. PDF magazine content is held on the MagCloud servers.

3. MagCloud initiates the distribution process by manually notifying printers (who are partners with HP Indigo Printers) through proprietary software that there is a magazine ready for printing.

4. Printers are notified of new printing jobs only when they are logged into MagCloud's proprietary job-management software.

5. Once the printer receives the notification, they pull the PDF file from the MagCloud server and begin the printing process.

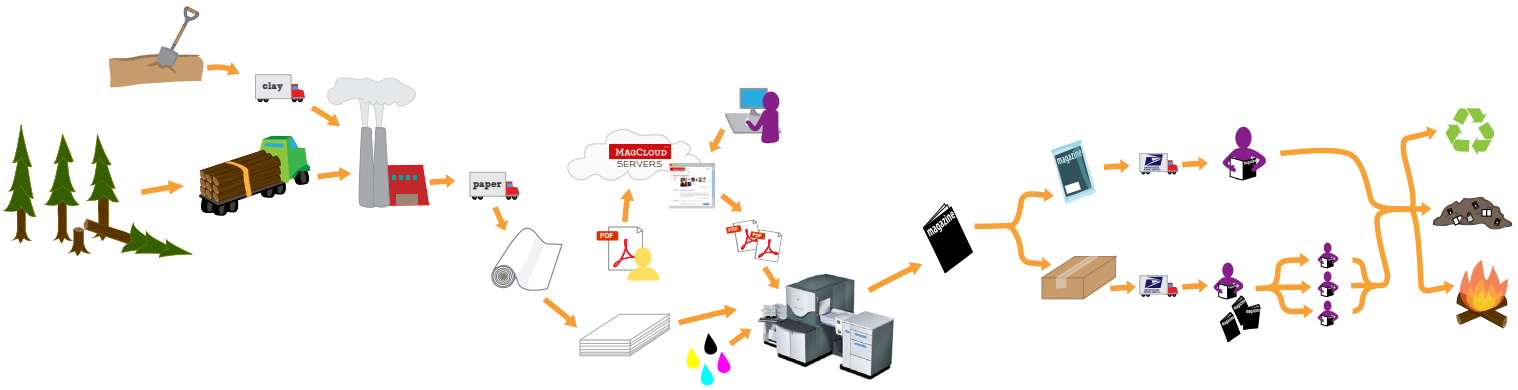

Figure 4: Production process of Time magazine

DOES MAGCLOUD MATTER?

6. During the printing process, the software indicates to MagCloud when the job is pulled, when the printing process begins and when the job is shipped.

7. Once the job is pulled from MagCloud's server, the printer has full control over the process.

8. Upon completion of the magazine, the printer sends single magazines to the publisher or customer in a polybag and bulk orders to the publisher or customer in boxes.

INDIGO PRINTERS

MagCloud prints magazines on the HP Indigo 5500 and 7000 printers. As discussed in the overview of MagCloud, the pull model significantly reduces the amount of paper consumed and wasted. While there is a significant environmental advantage to this model, there are some other environmental considerations for these printers. The printers were designed with the environment in mind. The printing process captures evaporated imaging oil and condenses it into a liquid for waste disposal – nothing is released into the air. There are no hazardous air pollutants (HAPs) and no particulate matter emissions. Neither model of the Indigo printer uses a material that requires the California Proposition 65 warning. The printers are compliant with Energy Star®, Germany's Blue Angel, Sweden's TCO label, and China's Energy Conservation program.

Waste generated by these printers include imaging oil, empty ink cartridges (typically made from recycled plastic and are recycled), used blankets, used photo imaging plates, binary ink developer, and cleaning rags. None are hazardous waste.

VOCs are released during the printing process; however, none of them are listed with the US Federal list of Hazardous Air pollutant. The Indigo printers produce ozone at low levels generated by the scorotron and charge roller that charges the photoreceptor; however, the ozone level is well below international occupational health standard of 100ppb for an 8 hour exposure level. The ozone is captured by charcoal absorber cartridges which need to be replaced after one million impressions.

PAPER

There are thousands of substrates approved for the HP Indigo printers. MagCloud prints on on paper from a variety of brands depending on the particular printer's stock on hand. While the brand varies, all of the paper used is 80# matte text stock, certified by the Forestry Stewardship Council, and 50% recycled (10% post consumer waste and 40% pre-consumer waste). Most papers available in the US come from US and Canadian paper mills, some of which use fibers sourced from other countries, usually China. There are some substrates that are manufactured elsewhere but these tend to be more expensive due to the shipping costs or are lower quality and are not widely used.

In order to compare MagCloud to Time we chose to base our calculations off of the information gathered from Mohawk Paper, one of HP's approve printing partners. Their paper is carbon neutral and the manufacturing is offset by 100% windpower. Mohawk purchases 100,000,000 kWh annually of wind-generated electricity RECs which represents 100% of the electric power required for all of Mohawk's operations in its New York and Ohio facilities.

DOES MAGCLOUD MATTER?

INKS

The ink used in the HP Indigo printers is significantly different from that in other digital printers. Unlike dry toner used in other printers, the HP Indigo Electroink is shipped in cartridges in a paste form and is diluted with imaging oil. The inks do contain lead, cadmium, mercury, and hexavalent chromium; however, the combined concentration does not exceed 100ppm in the dry state. In fact, the ink is in compliance with EU Framework Regulation Nr. 1935/2004 for food contact materials when printed on the non-food-contact side of polymeric multilayer food packaging (HP).

SUSTAINABILITY EFFORTS

If their website is to be believed, sustainability efforts are a part of the HP DNA; whether sustainability is a part of MagCloud is open to interpretation. When we talked to a representative from MagCloud, she indicated that no one person at MagCloud is particularly focused on sustainability as part of their job description. However, from the beginning, one of MagCloud's basic selling points has been that selling on demand is better for the environment than publishing stock before purchase. At this point, MagCloud has not conducted any of their own sustainability research, they currently rely on existing information about the industry. Their ultimate goal is to understand the environmental impact of MagCloud, but presently, their main objective is to just not print more magazines than are needed.

NATURAL STEP FOR MAGCLOUD

To analyze the impact of MagCloud, we examined the system conditions affected by the production and distribution of the product. We learned that despite their distribution model improvements to traditional magazine publishing, MagCloud still removes materials from the Earth's crust, emits manmade toxins into the system and degrades the surface of our planet.

Crusty Stuff

a. Metal
b. Ink – Pb, Cd, Cr(IV), Hg (all combined <<100 ppm by weight in the dry state
c. Oil (shipping, plastics (polybag))
d. Ink Cartridges (fossil fuel)
e. Photo Imaging Plate
f. Oil to transport printer
g. Metals to make container ship
h. Metals for staples
i. Materials for trucks to transport

Manmade

a. Plate Developer
b. Pollution from transport
c. Blankets
d. Rags
e. Foam packaging for crate
f. VOCs
g. Ozone

Degradation

a. Paper
b. Crate
c. Clay (for coated paper)

Human needs

a. Parts and supplies come from all over the world, some from areas with inhumane labor laws
b. VOC emissions and heavy metals affect people who work at the printer
c. physical conditions affect people who operate machinery with repetitive movements and lift heavy materials

TOTAL BEAUTY OF MAGCLOUD

	TIME	MAGCLOUD
CYCLIC	11	36
SOLAR	49	100
SAFETY	?	?
EFFICIENT	?	?

Figure 5: Total Beauty of Time Magazine vs. MagCloud

Cyclic

(50% + 22%)/2 = 36

Paper is 50% recycled content (10% post consumer waste and 40% pre-consumer waste) from MagCloud. Assuming 22% recycled at end of life to match Time magazine. Typically MagCloud magazines are more expensive (~$8 per issue) and are designed to have a longer lifetime. Consumer who purchases may be more likely to recycle.

Solar

Mowhawk paper is offset by 100% Windpower.

POTENTIAL IMPROVEMENTS

As previously mentioned, the US publishing industry prints over 12 billion magazines per year – of which 7% are never read. If a mass magazine such as Time transitioned to strictly a pull model, there would only be a small reduction in the amount of paper and waste produced by the magazine industry. Using the Natural Step method of backcasting, we envision a future where magazine publishing has a less detrimental impact on the environment, and recommend a variety of changes to reach this goal.

MagCloud currently provides a more sustainable model than traditional publishing, but there are still some modifications that could be made to dramatically decrease their environmental impact. Transportation plays a large role in the MagCloud production process: not only are Indigo printers manufactured in Israel and shipped around the world by boat, the actual magazines are shipped all over the world. As MagCloud's print-on-demand model gains success, transportation costs may be minimized if magazines are printed close to their final destination – similar to the NetFlix model. Currently, they have three printers in three locations on contract and are building their localized model.

Single magazines are sent out in vinyl polybags, which are non-biodegradable, require the removal of materials from the Earth's crust and lead to manmade emissions to the system. If MagCloud were to switch to a compostable polybag, they would reduce their environmental impact.

MagCloud is experimenting with a new model that could potentially pioneer a new way for publishing. The paradigm shift towards a pull model directly addresses the prime environmental impact of publishing–paper production and disposal–but as mentioned above, it is not a complete solution to the problems with publishing. Mohawk Paper has made great strides in becoming carbon neutral, but paper production and disposal still play a large part in the impact of MagCloud.

Since paper is the source of the major environmental impact of magazines, we decided to investigate whether switching to a digital-only format would be an improvement over the current printed model. In this case, the paper would be eliminated from the model; however, moving the entire infrastructure of publishing onto the compute cloud is not a panacea.

There is an active debate online as to whether digital publishing is more sustainable that print publishing. Many articles point to a landmark Swedish study from the Royal Institute of Technology (Mosberg) which reached the following conclusions:

- The main environmental impact of a newspaper is paper
- The main environmental impact of a web-based newspaper is caused by the energy of the screen
- The main environmental impact of a tablet e-paper newspaper was caused by the production of the tablet e-paper

This is all very dependent on the reading time of the newspaper, the power rating and lifetime of electronic devices (laptop, desktop, screen or tablet) and disposal of the electronic devices. As the energy consumption during the reading phase is decreased, the energy use from the editorial production of the content starts becoming significant.

OUR SOLUTION: THE DIGITAL NEWSSTAND

Increasing consumer consciousness, print-on-demand services like MagCloud and the use of e-reader technology may curtail unnecessary consumption of paper magazines in the future. Although these factors may make consumers think twice about buying a magazine, it will be hard to replace the role of the traditional newsstand as a provider for content on the go.

Leveraging the Indigo printer technology, newsstands could transform into print-on-demand content providers or "Digital Newsstands." Instead of stocking magazines in their back rooms, newsstands could have an Indigo printer that can replenish magazine supplies as people purchase them. The printers can output 124 letter sized pages per minute and this output is ready for finishing the moment it exits the printer. The magazine also comes out folded and saddle stitched similar to traditional magazines.

The shelves of the newsstand could feature one or two printed copies of each publication, and when one is sold, another one could be printed. Readers could also choose to print only particular articles or sections to further minimize waste. This would also reduce transportation costs by eliminating the need for regular deliveries to airports or other digital newsstand locations, and further eliminate the waste associated with unread periodicals.

DOES MAGCLOUD MATTER?

The U.S. magazine industry creates an estimated 14 million metric tons of CO2 equivalent emissions each year. Publishing is clearly a problem, and MagCloud represents a small step towards a solution. There is no easy way to fix this problem, but the emergence of innovative models, such as MagCloud, may reduce the damage done to the Earth by the magazine publishing industry in the future.

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