WHITE PAPER

Photo courtesy of TechnoFrame

Digital Paper in a Post-Pandemic World.

Written and produced by: Captains of Industry®

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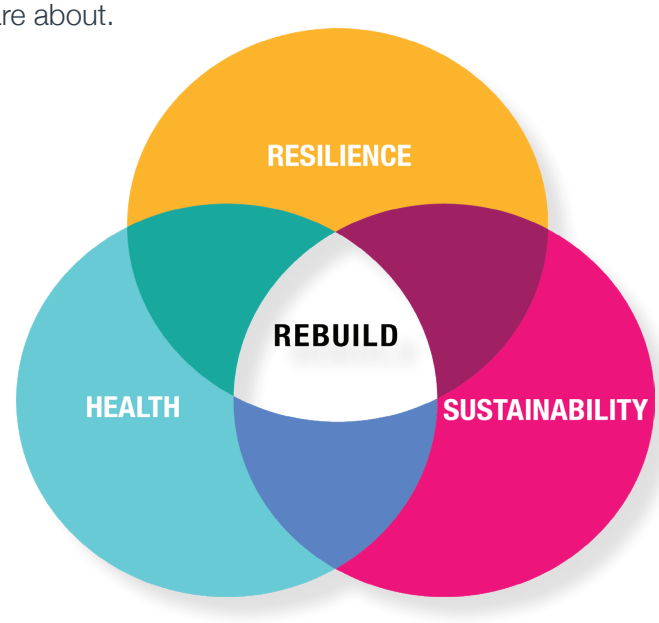
Some have called the pandemic of 2020 the "great accelerator," speeding transformations already under way such as digitalization, remote work and distance learning. This may be true, but there's a larger movement emerging based on the idea that we should not seek to achieve some accelerated version of the old normal.

Our world has changed radically, in some ways creating enormous challenges, but in many ways making life better: Clear skies over cities like Los Angeles for the first time in decades. Fewer cars on the road, freeing up space for walking and biking. Families spending time together. Nature sent us a strong signal, and it's time to listen. As the cellist Yo-Yo Ma has said, "How do we do everything possible to rebuild toward the world that we really want to live in?"[1]

For businesses, there are three core pillars of rebuilding to consider when planning for the future: Resilience. Health. Sustainability. Achieving all three in tandem can help protect against future shocks, safeguard lives, build a more robust economy, and support the values that today's consumers care about.



Innovation in a time of crisis.

"Constraint is a powerful source of inspiration used by engineers, designers, and artists alike," says Steve Brown, futurist and author of "The Innovation Ultimatum." "It all begins by asking 'How can we?' questions."[2] The sponsor of this white paper, E Ink, posed their own version of this question: How can E Ink's digital paper play a role in rebuilding an improved world? It turns out that a whole range of system integrators are already adapting their technologies using E Ink to invent the future we want to live in. In this paper, we look at these innovations through the lens of different industry sectors.

First, a quick primer on digital paper.

E Ink spun out of MIT in 1997 and pioneered the development of digital paper (also known as ePaper). This unique technology provides the comfortable, sunlight-readable look of paper with all the advantages of digital media, yet without the waste and pollution associated with traditional paper. Cutting down trees, processing wood into pulp, shipping paper and recycling it are all carbon pollution intensive processes that can be avoided.

How does digital paper work?

The technology features particles within microcapsules or microcups that are coated onto a thin film layer and act as a form of ink. Instead of ink being pressed permanently upon paper, however, the ink particles in digital paper are automatically recycled to form new letters and images when the display image is updated.

Screens made with digital paper require only a tiny fraction of the power required to run other types of screens. In fact, an E Ink display uses about 99 percent less power than the liquid crystal displays (LCD) used in television screens and many types of mobile devices. One key reason for this is that power is only used when the digital paper screens refresh with new text and images. In other words, zero power is required to show a static image indefinitely, completely upending what it means for a screen to be "ON."

Digital paper is also ultrathin, flexible and shatterproof, allowing product designers to build it into a wide range of devices.

Smart retail that protects employees.

The retail sector faced serious challenges before the pandemic, and today is wracked by a major wave of high-profile bankruptcies including J.Crew and Neiman Marcus to name a few. Some premier brands are reopening, including the New York flagship of Saks Fifth Avenue — now boasting Purell stations along with escalator handrails sterilized by ultraviolet lighting. Not all types of stores, however, have struggled.

Grocery stores experienced a 25.6 percent jump in business in March 2020 over previous year sales[3] as consumers rushed to stock up. Progressive Grocer, a leading industry trade magazine, reports that "Those grocers that have teamed dynamic price optimization with electronic shelf labels (ESLs) were the biggest winners of all, as they were able to remove the store labor constraint and execute a far greater range of price recommendations."[4]

Electronic Shelf Labels (ESLs) made with E Ink allow retailers to automate price changes, helping keep at-risk employees away from the front lines of the pandemic.

ESLs made with E Ink allow retailers to rapidly update product pricing, versus having employees manually attach paper price labels to shelves. ESLs use so little power all they require for approximately six months of operation is a small coin battery. And they can be designed with color to create eye-catching promotional displays.

"Electronic Shelf Labels have gone from being a nice-to-have to being a fundamental consideration for the future of store retail."

— Charles Jackson, head of the Americas, Pricer.

While pricing automation enhances profitability, it's the laborsaving aspect of ESLs that may provide the greatest value. Close to one quarter of the entire retail workforce is age 55-plus, those most vulnerable to the virus.[5] Many are retirees in their 60s and 70s earning extra income to make ends meet. By eliminating the grudge work of changing price labels by hand, retailers can help keep these at-risk employees away from the front lines of the pandemic. And when the pandemic finally ends, retailers will continue to benefit through greater efficiency, while allowing employees to focus on serving customers.

Occupancy sensing to manage social distancing.

Visionect's Joan Sign occupancy control display is Wi-Fi connected to sensors to enable real-time updates on the number of people allowed into a space.

Retailers and other businesses are looking for ways to control the number of people in any given space, whether inside a shopping mall or a restroom. In the past, an employee had to be stationed at a store entrance to count the number of people entering and leaving, a manual process prone to error. Visionect, a leading developer of ultralow power digital display solutions, found a better way to manage occupancy.

Launched in April of 2020, Visionect's Joan Sign incorporates an E Ink display combined with third-party sensors, updating in real-time to show how many people are in a space and how many more are allowed in. The signs also display safety information regarding masks and handwashing. Running off a battery, the signs can be quickly and easily deployed without having to be near an outlet.

Visionect's solution can be adapted to work with AI-based sensor technology to determine if customers are wearing masks, or even if they may have a fever.

The signs carry important messages in a time of crisis, yet they have the comfortable look of natural paper. And the fact that E Ink signs look just like paper, but update digitally, helps grab attention in busy retail environments. "The first reaction of people who have never seen a digital paper display before is mind blowing," reports Matej Zalar, Visionect's CEO, "They say oh wow, look at that."

Making transportation smarter, safer and more sustainable.

As the pandemic swept across the globe air travel virtually halted. In New York, the “city that never sleeps,” the subway system took a long nap for the first time in 115 years, closing down each morning between 1 a.m. and 5 a.m. As reopening gradually progresses, transportation managers are seeking ways to build greater flexibility, resiliency and sustainability into their operations.

Two companies that are rapidly innovating to make transportation better post-pandemic are UK-based TechnoFrame and their Smart City Displays subsidiary. Simon Johnson, TechnoFrame’s co-founder and CEO, saw an opportunity embedded in a problem: Airport, bus and rail stations needed ways to quickly adapt to changing circumstances. Travelers arriving at an airport gate from a particular country might need to comply with specific restrictions, requiring customized communications in the moment.

Photo courtesy of TechnoFrame.

TechnoFrame’s battery-powered signage for transport hubs can be easily located anywhere, versus having to be near a plug.

TechnoFrame’s solution? A mobile battery-powered sign made with 32**"** or 42**"** E Ink screens. The signs, which are available on wheels, can be updated instantly with new information in any language. They can also be quickly collapsed and stored in a small case for transport to a new location. And because the signs run off a small built-in battery, they can be located where they are needed versus where there’s a plug. “It’s the ultimate in flexibility,” says Johnson. The units keep operating even if the LED-based displays in transit stations lose power, keeping passengers informed in an emergency. This not only provides valuable resilience and redundancy, but also helps transport hubs avoid fines for failing to keep passengers up to date.

In addition to their mobile signage, TechnoFrame provides solar-powered signs used in outdoor areas of train and bus terminals. Passengers receive up-to-the-minute arrival information connected to a central database. Many transit stations are able to use excess electricity generated from the solar panels to run their other operations.

As with other changes resulting from the pandemic, the move toward flexible and sustainable signage that keeps the public informed will bring long-lasting benefits. Once municipalities see how easy and low cost it is to deploy sustainable signage anywhere in their transport hubs, they won't want to go back to "normal."

Making education better, whether in-person or remote.

Universities have shifted rapidly to remote learning, but students have their doubts. In one recent survey,[6] only 25 percent of students agreed they felt prepared for a remote freshman year of college. Universities competing for the best students will need to provide technology solutions that demonstrate to students and parents that a remote college education is worth it.

QuirkLogic, a Canadian company, believes they have the solution — an integrated platform for learning during and after the pandemic. Central to their approach is the need for formative assessment, the continuous process of interacting with students to see if they're mastering subjects.

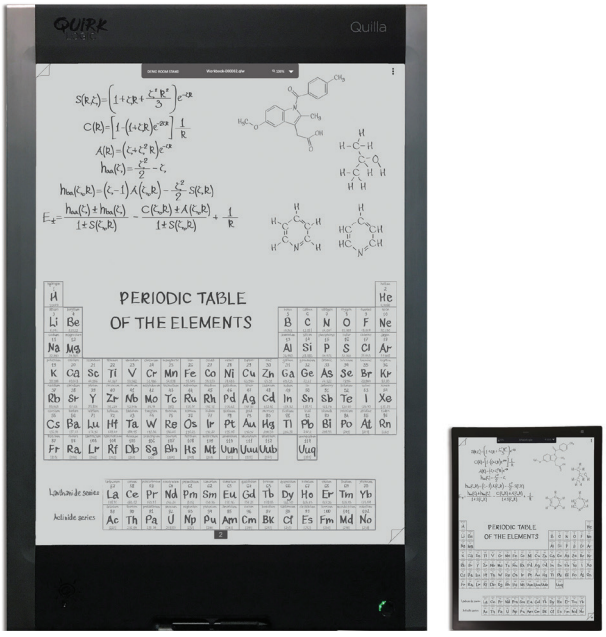


Photo courtesy of QuirkLogic

QuirkLogic provides an integrated system for remote learning.

There are two main components to QuirkLogic's system. The first is the Quilla whiteboard for teachers, the second is Papyr — a personal eNote device for both students and teachers. Quilla, with a 42-inch E Ink screen, lets teachers write on it with a digital pen just as they would on an analog whiteboard. Everything the teacher writes and sketches appears in real-time on the students' Papyr devices, which are made with 13-inch E Ink displays. This allows teachers to pose questions to students to keep them engaged. Students can write answers on their Papyr devices, which the teacher can see instantly displayed on their Quilla device — regardless of distance.

The QuirkLogic system will provide universities with a high level of flexibility for future operations. After all, some schools may fully open for the fall 2020 semester, some will be closed, and some may be open with limitations. Or, schools may reopen and suffer a COVID-19 flare-up and need to switch back to being remote again. QuirkLogic's system will work in every scenario to make education better.

Remote work with less distraction.

Visionect launched Joan Home, an E Ink-enabled sign for home offices that lets family members know your schedule and availability.

Working from home used to be the exception. Now it's the norm, with many companies vowing to permanently change their work from home policies. Tech giants including Facebook and Twitter have made announcements about permanent work from home, while even conservative firms such as Nationwide Insurance are shutting some of their offices for good. For many employees, their long commute through heavy traffic has shifted to padding downstairs to the rec room/home office in slippers with their morning cup of coffee.

There's just one problem: distraction caused by family members. It's not a small issue. In one study on distraction, researchers found that when people are interrupted by a task not related to their current work it can take up to 23 minutes to regain focus.[7] Both employees and their employers need better ways to maintain focus and boost productivity in home environments.

Visionect rapidly adapted their technology to help reduce home office distractions. Developed in partnership with E Ink, Visionect's Joan Home displays an employee's current availability and schedule for the day. Home workers can stick a magnet to any clean surface and place Joan Home onto it without having to use a drill or nails. Wi-Fi connectivity enables the device to automatically sync with calendars. And with its ultralow power consumption Joan Home can run on a battery for up to a year without recharging. Now when a pesky family member wants attention they'll be able to clearly see if someone is available or not.

Joan Home can also double as a digital picture frame, a task list, or display any content the user wants to add. If and when workers return to traditional office spaces they can easily take Joan Home with them.

Smarter cities everywhere the sun shines.

SolStreet benches shown here in Times Square prior to the pandemic.

SolStreet's solar-powered bench, made with E Ink signage, helps keep citizens stay plugged in to community events. The benches have another feature that makes them attractive to municipalities and citizens alike: Each bench has outlets that let users charge up their phones free of charge. This matters more in a post-pandemic world because so many buildings are limiting the number of people inside. With SolStreet benches, more people can be outside in the fresh air for greater safety and have a convenient spot to sit and recharge. SolStreet's benches require no connection to electrical grids, and hence no digging for installation. "I think communities are looking at solutions that are not the old normal," says SolStreet founder Lisa Smith.

Expanding access to digital books.

Bookstores and libraries may have been closed during the pandemic, but our love of books didn't end. If anything, being stuck at home enticed more people to read. Kobo, the number two eBook retailer after Amazon, signed on 2 million new users during the pandemic. While OverDrive, the leading digital lending platform for libraries and schools, experienced a 30 percent increase in the use of its Libby app.

In a survey conducted by the American Library Association, 74 percent of libraries reported that they had expanded online services like eBook lending.[8] "Even after everything opens up a lot of people will continue to use the service for convenience," says David Burleigh, OverDrive's director of Brand Marketing and Communication, "Libraries will serve more people with more content."

eReader devices made with E Ink's digital paper, like Amazon's Kindle, will only grow in popularity as a broader group of people discover how easy it is to borrow a digital book.

Conclusion.

Clay Christensen, the late Harvard professor, popularized the concept of “disruptive innovation” in his groundbreaking 1997 book, “The Innovator’s Dilemma.” Disruption has become an oft-repeated mantra in global business, something at once feared and sought-after as companies struggle to compete in an era of accelerating technological advancement. It is perhaps ironic that the biggest disruptor of modern times was not a hot startup company, but a virus. Within a three-month period old business models crumbled and our lives changed in ways nobody could have anticipated. Rebuilding will not happen overnight. It will require careful planning, listening to customers and continuously rejecting the “old normal” status quo.

The inventions featured in this white paper are just a small representation of the wave of innovation to come. The world we used to live in, for better or worse, is gone. But with a thoughtful focus on resilience, health and sustainability, the world we invent in the coming years will be far superior.

FEATURED SOLUTION PROVIDERS (Click company name to visit their website.)

Pricer

Visionect

TechnoFrame

Smart City Displays

QuirkLogic

SolStreet

OverDrive

About the Author

Ted Page is a Co-Founder and Principal of Captains of Industry. Page has created content and marketing for a wide range of global companies including Apple, Microsoft and Starbucks.

About the Sponsor

E Ink is the originator, pioneer and commercial leader in digital paper technology. The company delivers its advanced display products to the world's most influential brands and manufacturers, enabling them to install extremely durable, low-power displays in previously impossible or unimaginable applications and environments.

E Ink encompasses the combined E Ink Corporation, which was spun out of the MIT Media Lab in 1997 to commercialize electronic ink and EPD technology, and Prime View International, which was established in 1992 as the first TFT LCD company in Taiwan, focusing on high-quality small-to-medium-sized TFT LCDs. In 2009, Prime View acquired E Ink Corporation to further integrate and expand the EPD supply chain and the new combined companies were branded as E Ink.

SOURCES

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3. U.S. Census Bureau
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5. Washington Post
6. McKinsey & Company
7. Thrive Global
8. American Library Association