WHEN SEEING WAS NO LONGER BELIEVING

CRAIG STACK AND JEFFREY MCGREGOR

For generations, photography has played a critical role in society. It was the only pristine way to relay truth and reality to the public, and its impact has been profound. For example, many scholars suggest that photography changed modern warfare, starting with the U.S. Civil War. Images taken on the battlefield carried enormous weight, as they humanized people and exposed the true carnage of conflict, no matter how distant. More recent technology—specifically the smartphone—has shattered what was society’s most trusted source of truth for more than 150 years. With today’s high-powered technology, cheap photo-manipulation programs, and the capture of one trillion images annually, seeing is no longer believing.

Both Jeff and I, and all members of Truepic, became concerned about the scale of societal disruption caused by digital-image manipulation. What once was novel had become a regular and frightening part of society. Consumers cheated online, social media users misled and duped others regularly, and thousands of businesses worldwide were defrauded by schemes that cost them billions of dollars—all of this resulting from the capture and online distribution of manipulated or purposefully misleading pictures.

Our realization of the magnitude of this problem was not instant. Over the course of several years, we saw how digital manipulation impacted our own orbits but could not clearly articulate a solution—until we dove in and developed Truepic. Our mission was, and still is, to help restore balance and public trust in digital imagery—perhaps the most used and most important information medium.

Truepic’s development was iterative. It began with encryption, computer vision tests, and Blockchain, and we continually built on this foundation to produce new technology and apply image authentication in a variety of industries. We were fortunate in that we assembled the right team and products to advance image-authentication technology significantly and to help address some of the world’s most pressing problems, such as disinformation, fraud, human rights protection, verifying humanitarian aid, and international accountability.
THE BIRTH OF TRUEPIC

Our story kicks off in 2014, when my wife launched a bespoke matchmaking company that was growing rapidly. She was aware of growing challenges in the industry, especially when it came to profile photographs. She regularly complained of the fake or manipulated images—usually taken on a smartphone—that her members were submitting to her company. Although she made an effort to protect against fraud by having someone from her company meet personally with everyone who submitted an application, many of these individuals still submitted manipulated photos—even though they knew they would soon be found out.

While this was surprising to us, we heard an increasing number of stories about serious financial and identity fraud on websites that did not use face-to-face verification. One friend complained to me about this exact issue—he had been duped by numerous fake profiles on a traditional dating website. It quickly became apparent to me that, while photo manipulation may be a nuisance for some, others were being seriously defrauded or even harmed by criminals using fake images. It was a serious problem that was only getting worse.

According to the Federal Trade Commission, reports of online dating fraud tripled between 2012 and 2016. In 2014, the FBI’s Internet Criminal Complaint Center (IC3) reported nearly $100 million in online dating fraud, the majority of victims being female; by 2017 this figure had grown to $230 million. IC3 reported that the average scam resulted in approximately $14,000 in losses. As I learned more about this problem, I became fascinated. Surely there had to be a solution to this issue, especially with the dramatic growth of smartphone technology. “There has to be a way to take a truly trustworthy picture with a smartphone,” I kept telling myself.

I spent weeks researching existing applications to find a solution to the problem but, to my surprise, nothing existed. The more I searched for a solution, the more obvious the problem set became. Digital-image manipulation was everywhere and there was nothing available to correct course. It was in December 2014, specifically on my birthday, that I decided put together a team to solve this problem. Although my skill set was in finance and I had no technical background, I had become passionate about this problem and wanted to create a solution. I was certain that, to attack this issue

ABOUT THE AUTHORS

Craig Stack is the Founder and COO of Truepic, the leading online photo authenticity platform. Prior to Truepic, Stack co-founded Life Credit Company and spent nine years as an Equity Trader for both Goldman Sachs and Spear Leeds & Kellogg.

Jeffrey McGregor is the CEO of Truepic. Prior to Truepic, Jeff was the CEO of Dash, a financial technology company that processed millions of transactions for restaurants across 50 markets prior to its acquisition by Reserve, the leading restaurant reservation and payment network in the U.S.

© 2018 Craig Stack and Jeffrey McGregor
effectively, we had to create a trusted brand that would be recognized for its authenticity. Knowing that traditional digital photo forensics was a largely manual and uncertain process of analyzing pixels in an image, I saw that we needed to take a different approach. By creating a controlled camera system that enabled us to be absolutely certain an image was unedited, we could build a trusted brand.

**PUTTING THE PIECES, TECH, AND FUNDING TOGETHER**

I spent much of 2015 working with our founding engineer, Jason Lyons, to develop a system that would revolutionize how digital images are taken and perceived. While Jason was hard at work developing Truepic v1.0, I focused on obtaining patents and trademarks, and on mapping out the different business cases for this technology—which clearly were rather broad. By the end of 2015, we had devel-
opened a unique process for verifying image data from the camera lens through distribution on a Blockchain, and we secured two patents for the technology. I knew that to take the company to the next level I had to find a dedicated CEO with a tech background. I looked specifically for a candidate who had bumps and bruises from past experiences but was still hungry for success. I was introduced to Jeff McGregor through a mutual friend.

Only months before we first spoke, Jeff had successfully sold his mobile payments company, Dash, to OpenTable competitor Reserve. Before selling, Jeff had noticed that online fraud was on the rise in his company, which processed millions of dollars in transactions between consumers and restaurants. To address the problem head on, Dash had to create its own fraud unit. In fact, Jeff told me that Truepic would have been an incredibly useful fraud deterrent tool at Dash, which was plagued by falsified accounts. Jeff also understood that photo editing was creating a complete lack of credibility online and that Truepic had the power to fight back against the rapid spread of disinformation. Jeff was the perfect fit for Truepic and he joined the company as CEO in early 2016.

One of Jeff’s first tasks as CEO was to take our business model from a consumer-facing application to something that could immediately be applied to industries and businesses for which photos were critical to success. At this point, our young company’s staff put their heads together and developed a software development kit that could be embedded in any existing application. By the start of 2017, we had developed our free consumer-facing application and a monetizable software development kit for industry-specific use. Our technology was simple to use and built to quickly capture sensor data, transmit them, run more than 20 image-forensics tests, and write a specific reference to the image on the Blockchain—all in just sec-
onds. Recent advancements in encryption, Blockchain, and increased cellular and high-speed Internet connections made this work possible. Blockchain was especially critical because it allowed us to close the chain of custody on a verified image, thereby creating immutability. The team leveraged modern hashing and encryption to securely transmit capture information to our servers, thus ensuring that the unique code seared into the Bitcoin Blockchain could only have come from one source—the very image captured with Truepic’s camera. Our controlled camera protected the integrity of the image from start to finish.

A key technical challenge was overcoming behavioral fraud at the point of creation, which is often referred to in image forensics as rebroadcasting. The most basic example is simply taking a picture of another picture. The team quickly developed multiple computer vision-based tests to help rule out this kind of fraud. The first and simplest of these was a test for the visible striations that often occur when taking a picture of a computer screen or smartphone. We have since evolved the technology to fully leverage our control of the accelerometer, focus, and flash apparatus in the smartphone during the image-capture process. By sweeping through the focal range of the lens, turning the flash on and off and measuring reflectivity, and requiring and recording movement during capture, we can foil most attempts to take a picture of a picture rather than of a real-life object.

We believed we were sitting on a game-changing product for a variety of industries, but we also knew we were in a race against time. Competitors surely would be developing products along the same lines and working hard to get one to market quickly. We clearly needed investors to scale our efforts and build a team. We had the good fortune to connect with Jeffrey Parker, former CEO of Thomson Financial, who was immediately interested and became our first seed investor. We also brought in other critical investors, such as Platinum Technology founder Andrew Filipowski and Harvard Business School professor emeritus William Sahlman. Truepic raised $1.75 million in seed funding during the summer of 2016.

**CHANGING THE GLOBE**

With enough cash to grow our team and start the hard work of turning our product into a company, we spent much of 2017 getting our core team in place. We knew our technology had a wide range of use cases and that we needed to assemble a team that had the ability to penetrate everything from the insurance industry to the sharing economy to authenticity in advertising. We also knew that digital-image authenticity was a global issue that permeated nearly all aspects of society. The 2016 U.S. presidential campaign was an eye-opening political contest that placed Internet and media veracity at the very heart of the election. Much of the controversy surrounding the election revolved around the malicious manipulation of images on social media and disinformation used to stir voters’ emotions and polarize society. In early 2018, the *Wall Street Journal* reported that doctored and manipulated photos were a significant part of the Russian cyberattacks on the U.S. presidential elections. According to the *Journal*, hundreds of Facebook and Instagram pages and groups were created and run by Russia-backed accounts with the aim of amplifying divisive social issues; nearly all of them relied heavily on “images that were doctored or taken out of context.”

At this point, we had not yet begun to think about how fake images might impact global issues such as conflicts, humanitarian work, and development.
Unexpectedly, we received an unsolicited email from a curious U.S. diplomat who quickly saw the value of image authenticity in the global arena. At the time, Mounir Ibrahim was a policy advisor to the U.S. permanent representative to the United Nations and had nearly a decade of foreign policy experience with the U.S. State Department. Mounir had specific experience working on the Syrian conflict, where he was posted at the start of the crisis. He wrote us a passionate note describing his foreign policy experience and how user-generated content from smartphones was changing how the international community reacted to world events. He also described another troubling trend—the ease with which any government or bad actor can undermine user-generated content and change global narratives by simply calling into question the veracity of digital images. He saw a direct correlation between image-authentication technology and the international reaction to conflict. After a few conversations with Mounir we were thoroughly convinced that Truepic could have a significant global impact, and by late 2017 he had left government and joined our team. His goal was to apply and adapt our growing technology to the world’s most difficult issues, including conflict, human rights violations and atrocities, election monitoring, humanitarian response, and development work. In all of these scenarios, authenticated images can save resources, increase accountability, and accelerate international action.

By the end of 2017 we had a functional technology, a core team, the resources to expand, and the right people to begin deploying our product. We were focused on improving our core technology and continuing to build a team that could scale our product to the world-changing technology we thought it had the potential to be. We also were engaged in heavy discussions with some of the world’s top venture capitalists and investors about Series A fundraising.

PROOFS OF CONCEPT

We knew that enthusiasm and even investment wouldn’t go far without actual evidence that our technology and assumptions about its use throughout society were validated. We sought to develop several proofs of concept to demonstrate Truepic’s utility in three wildly different areas—insurance, social media, and humanitarian efforts.

Insurance

At the start of 2018, we targeted insurance as our top priority. We knew that the insurance industry was going through a massive digital transformation and thus was ripe for innovation; we believed our...
innovations / Blockchain for Global Development II

Craig Stack and Jeffrey McGregor

One of the first authenticated photos taken in Syria. The image was captured by a citizen journalist in Tall Tamr, Syria, northeast of the former ISIS stronghold of Raqqa. Kurdish flags and leaders are shown in the image.

product would be highly disruptive of the traditional inspection process. The response to our technology was tremendous—far greater than we expected. Plug and Play, the world’s largest global innovation platform, selected Truepic as one of 15 insurtech companies for its 2017 summer accelerator, which gave us significant exposure within the insurance industry.

Our technology was correctly identified as a product that can replace costly inspections at a fraction of the price, as well as a fraud detection tool. Perhaps most important is that, by streamlining the inspection process with image-authentication technology, insurers would be able to compress the claim cycle and reimburse customers far faster than before. Claims Magazine featured Truepic as one of the nine technologies that can significantly reduce claims wait times for policyholders. This was a strong value proposition for insurers, who are well aware that natural disasters are occurring with increasing frequency and severity. In 2017, damage claims hit record levels because of a variety of natural disasters: earthquakes in Mexico, hurricanes Harvey, Irma, and Maria, and wildfires on
multiple continents. It was nearly impossible for insurers to keep up with the pace and cost of insurance claims. They clearly needed a way to digitize the process, but they did not trust images. Truepic was the perfect tool for them to bridge the trust gap, and to collect datasets associated with digitized-image fraud.

Our exposure and inroads in the insurance industry helped us realize our full potential and see just how significantly we would disrupt the market. As a result, we chose to further develop and adapt our technology to fit this market.

Social Media

Following our experience with the insurance industry, we were able to validate our assumption that Truepic was the right tool to bring authenticity back to the Internet and to push back against fraud and disinformation. One of our most impactful and validating partnerships was with Reddit’s IAmA team, which runs a leading subreddit on Reddit, the third most popular social media platform in the United States. JC Pratt, our VP of sales and partnerships, was a technology and startup veteran who was passionate about ethical business and was eagerly looking for the perfect way to use Truepic to inject truth and veracity into the digital world. He quickly identified Reddit’s IAmA subreddit as the ideal partner. With more than 17 million subscribers, the subreddit functions as a forum where readers can ask interesting personalities—who to date range from Bill Gates to celebrities to game developers to doctors to prison inmates—any question they want. However, an integral part of Reddit’s value is proving that the IAmA intervie-wee is legitimate and authentic. Pictures often are the most efficient way for Reddit moderators to corroborate identity, but they no longer could be trusted.

Truepic’s technology was the perfect solution to help Reddit’s IAmA moderators verify identities, and JC successfully put a partnership in place to help the massively popular subreddit. The team now has the ability to fully corroborate the identities of its interviewees. Truepic allowed Reddit IAmA moderators to quickly and safely verify the identity of a user without intruding on their privacy. Through a simple app and interface developed by Truepic, users can prove their identity easily. It also keeps the Reddit IAmA site safe and trustworthy and provides an authentic experience for everyone.

Humanitarian

We were adamant about leveraging Truepic to effect global change and to help humanitarians and civil society around the world. In Syria, digital images were one of the only vehicles the Syrian American Medical Society (SAMS) could use to convey the reality of events in the conflict zone to the international community. Almost daily, the brave SAMS doctors working in Syria presented to the world the horrific images they captured. These images documented the use of chemical weapons, the effects of torture, and appalling conditions. Unfortunately, these same images and many like them were regularly dismissed by critics, who claimed that digital-image manipulation made it impossible to consider photos of conflict trustworthy evidence of reality. While most credible actors were able to corroborate images with other information and to judge the credibility of the source, detractors and critics were still able to change critical narratives in the media and in international bodies like the UN Security Council by rhetorically questioning digital evidence.

SAMS was able to refute these claims by using Truepic in a number of its field hospitals throughout Syria to capture
authenticated and immutable images—the first of this type in any war zone. This powerful tool allowed SAMS to streamline its own due diligence on images captured in the field and to quickly disseminate those images to the international community with full confidence in their veracity. In early March 2018, we were alarmed and frustrated by reports of yet another possible chemical weapons attack outside of Damascus.10. Just minutes after reports of the attack began to surface, we learned that Truepic was being deployed to photograph the effects of the attack, and those images were submitted to members of the UN Security Council. It was a heartening moment for us and proof that our technology is a serious application for documentation and accountability. This example encouraged us to double down on our efforts to deliver Truepic to organizations working in difficult and closed societies around the world.

These partnerships were essential for Truepic’s growth and viability. We are proud of the organizations we have partnered with and thankful for the constant feedback loop they have provided. It was evident to us that Truepic would constantly need to innovate, adapt, and react to feedback if it was to become and remain the critical documentation tool we all envisioned it could be. We also learned that, while many industries need image authentication, it does not mean that one solution is applicable across all industries. We knew that we needed to take our foundational tech and customize it to meet the demands of each vertical.

CUSTOMIZING FOR THE FUTURE

With hard-hitting proofs of concept in a variety of verticals, lessons learned, critical feedback, and a keen understanding of how image authentication can and should be applied, we were ready to begin customizing our product. We sought to build on our foundational image-authentication technology by adapting it to specific use cases and industries in order to address specific problem sets.

In the insurance sector, we created Truepic Vision, the world’s first seamless insurance inspection system centered around authenticated images. This Truepic product gives insurance carriers around the world access to an immediate virtual inspection using authenticated images and videos. What used to be a cumbersome and costly process of sending human beings to inspect property is being displaced by technology, the result being a much more optimal and efficient process for insurers and customers. We believe that, with time, Truepic Vision will completely restructure the global insurance inspection process and help push the industry into the next century, which so many consumers have come to expect.

Feedback from our partners and experts in the humanitarian and global spaces was different from what we received from the insurance sector. Many operators and organizations in this arena work in complex environments and face unique challenges that an insurance company is unlikely to encounter. To identify exactly what Truepic needed to provide in these spaces globally, we worked with our partners to distill feedback from places like India, Syria, and Bangladesh. Based on this critical feedback, we began to build Truepic Global, a customized tool that we believe will become a staple for any organization monitoring goods, people, or events in difficult environments. We plan to release Truepic Global in late 2018 or 2019.

The road ahead will be long and challenging, and we will have to continually innovate and improve our technology to battle malicious actors. Technological
advancement often happens suddenly, and negative actors will immediately begin to exploit almost every innovation. In early 2018, for example, the world was taken aback by the mainstreaming of Generative Adversarial Networks (GANs) in the form of Deepfakes.  Not only is widespread use of fabricated videos frightening on an individual level, it also has serious national and global security implications. In response, Truepic has begun developing advanced facial feature, image, and object property analyses as a way to identify GANs-generated videos. Although GANs at the moment is more a hypothetical threat than a real one, this dynamic can change quickly. We believe we are uniquely positioned to develop the needed expertise and we plan to be ready with a solution.

IN IT FOR THE LONG HAUL

I am proud to say that, within approximately three years, we have been able to identify a significant global problem and do something about it. While we have not solved all the issues around digital-image authenticity, we have built a tool to capture images and prove they are real—and we have made it available free of cost to anyone around the globe. Although we are still a startup, we have gained quite a bit of experience in how industries will use image authentication and how it can be applied to root out fraud around the world most effectively.

We are grateful that we are becoming recognized as a leader in this space. In May 2018, we were proud to join the U.S. State Department’s Global Engagement Center technology demonstration series. The Global Engagement Center is leading the U.S. government’s efforts to counter propaganda and disinformation from international terrorist organizations and foreign countries. We are honored that the U.S. government recognized Truepic as central to this fight. Investors also have recognized and validated Truepic’s importance to both market efficiency and social cohesion.

We believe that image authentication will become a necessary part of nearly every aspect of society in the coming years. Truepic is innovating and developing new products and technologies to ensure that photography remains a trusted cornerstone of society, as it was for more than 150 years. Our goal is to make seeing believing again.

---

3. See https://www.huffingtonpost.com/entry/romance-scams-online-fbi-facebbook_us_59414c67e4b0d318548666f9.
5. “Facebook Inc. and Alphabet Inc.’s Google have systems set up to detect misinformation, but it is hard to detect falsehoods posted directly on their platforms, in particular through pictures. Secured Borders, a Facebook group which called for the deportation of undocumented immigrants, turned out to be one of 290 Facebook and Instagram pages created and run by Russia-backed accounts that sought to amplify divisive social issues, according to authorities. The group, along with many of the others, often relied on images that were doctored or taken out of context.” Available at https://www.wsj.com/articles/the-big-loophole-that-left-facebook-vulnerable-to-russian-propaganda-1519314265.
6. Remarks at the Plug and Play Tech Center, Summer Summit. 
https://www.youtube.com/watch?v=HLijb3tT-Y.


8. See 

9. See 

10. See 

11. “Generative adversarial networks are a class of artificial intelligence algorithms used in unsupervised machine learning . . . This technique can generate photographs that look at least superficially authentic to human observers.” Available at 
https://en.wikipedia.org/wiki/Generative_adversarial_network. A Deepfake is “an artificial intelligence-based human image synthesis technique . . . used to combine and superimpose existing images and videos onto source images or videos.” Available at 