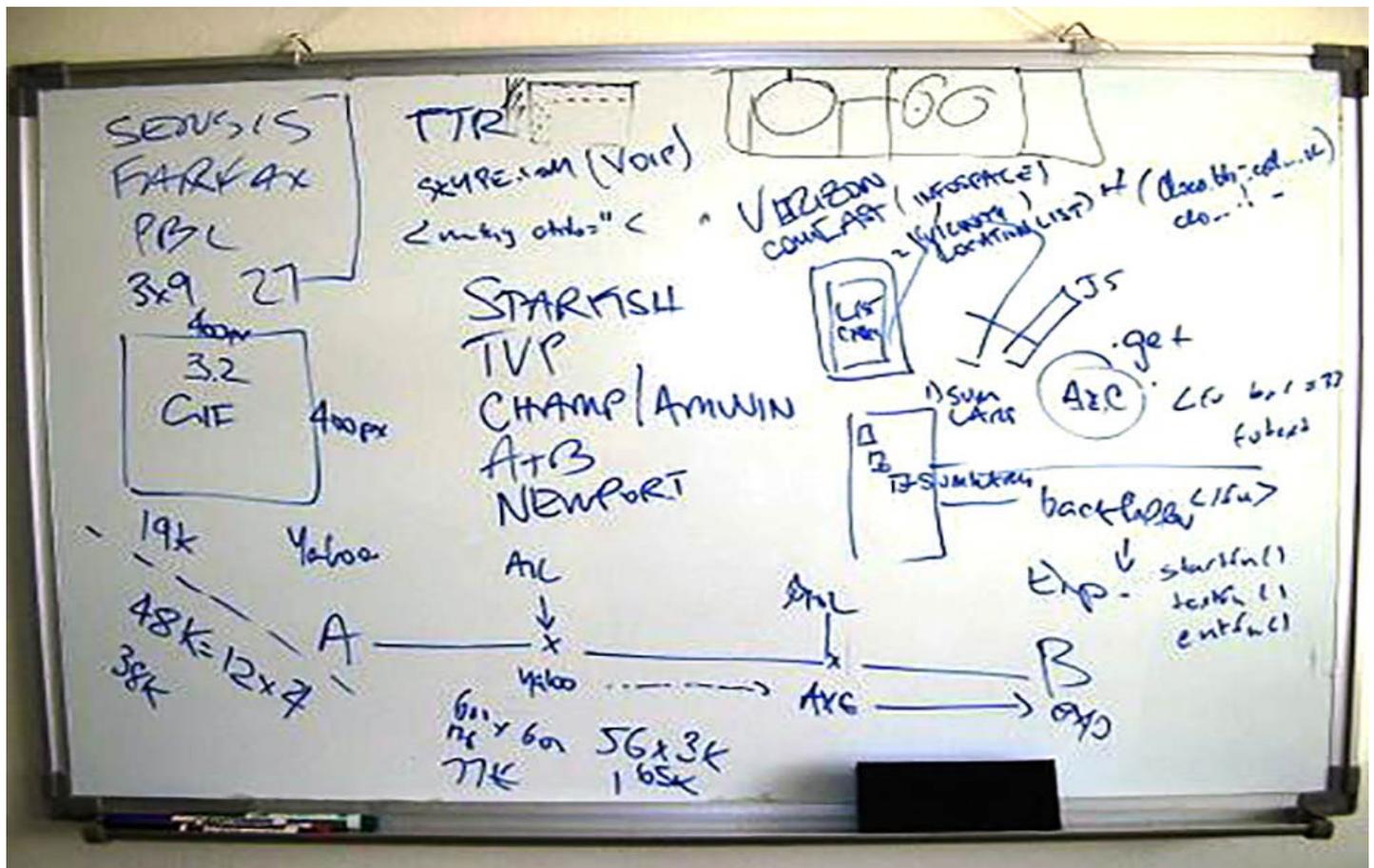




Data Driven: The Map is Not the Territory

On the 10th Anniversary of Google Maps

A dialog between Paul D. Miller and Noel Gordon



Data on the wall: Notations on a board made by Google Maps co-founder Noel Gordon as his start-up negotiated its sale to Google in 2004. Photo: Noel Gordon

Introduction:

Smartphones are seriously strange devices. They've disrupted almost everything that the 20th Century has bequeathed to us. TV, radio, maps, music, transportation methods, housing - they've all converged into one device that has taken over all other functions of our separate, silo like 20th century info habits. When you think about how much they've changed most of our basic habits, one of the most dominant aspects of smartphones is how they've reconfigured our sense of place and space. They're emblems of how a kind of metonymy is working out in present time: they are reflections of the way physical space is becoming a function of a virtual and data driven digital domain. Think of it this way: we refigure public space in a new kind of architecture of the virtual - it's kind of like remixing public space as an ideological platform of code versus culture. The purpose of physical spaces - rooms, roads, buildings - now depends less on where in the world the fixed place is, and what it was designed for, but more on what is being done with the screens that occupy the physical space, and how much they are being used to access other more virtual relationships.

The tyranny of the Timeline:

In 2015 something like over 1.5 billion people have used Google Maps. The data that billions of search queries has generated would encircle the Earth and probably a good deal of the solar system if you were to lay out all the different geographies the App has portrayed. In the world of search, your average Googlemap query is based on a metaphor. How do we get from Point A to Point B. When you think of a modern map, there isn't a better metaphor of how much things have changed in that simple question than Google Maps.

When people access the Internet with Apps on a phone rather than with a browser on a Pc or laptop, the whole experience is different. The Internet looks a lot less like a set of connected pages and more like a series of interfaces. It's a kind of timeless time. Your activities play out in a way that exchanges things in parallel (your life with a timeline condensed into every moment you've sent a message or used a map link route). That fluidity fits with other ways the effects of the revolution in smartphone computing has changed personal computing: this is the post PC world, live in real time.

Mechanical clocks allowed the days of the industrial revolution to standardized in new and novel ways: trains, planes, and cars changed the way people experienced landscape and extended new metaphors of geography into everyday life. Ditto with digital media. The printed book made human knowledge accessible in a way that no story could have ever been spoken, more easily built on, more layered and based on copies, more thoroughly examine lee, fixing it in bindings on shelves and archives. Today, it seems more and more that in its early, nascent phase, the smartphone has revolutionized knowledge in ways that are hard to really digest because they have happened so rapidly. The rise of the smartphone, while being drenched in every conceivable form of big data, still has an elusive and hard to quantify quality of disruption of norms.

This is the new map, the new topology of our contemporary world of infinite numeracy. This is where we look at new maps in exchange for old territories.

And that's what the interview with Noel Gordon focuses on. Maps are one of the primary windows into the new cartographic realms of digital 21st century culture. They, like floor charts of several centuries before really come into a new kind of coded terrain. They tell us simply, as the engineer, philosopher, and mathematician Alford Korzybski once said: The map is not the territory.

Known as the father of general semantics, Alford Korzybski once opined "A map is not the territory it represents, but if correct, it has a similar structure to the territory, which accounts for its usefulness". Basically this means that our perception of reality is not reality itself but our own version, our own protection of it, or our "map" is a logic structured on the way we put the variables of personal experience together.

The overall way we look at the landscape around us has never been more immediately accessible than through the Apps we use to access the data around us.



Paul D Miller: So, I'm here at Google's headquarters in Sydney Australia with an incredible but also intriguingly elusive character named Noel Gordon who as most people know is one of the co-inventors on Google Maps. So Noel, one thing I've always wanted to ask you is what is your first impression of a map?

Noel Gordon: I think my first impression of what a map is, it's just something that gives us our sense of place. The maps we invented were a digital version of things humans had already invented... paper maps for example. A map tells us where we are, where we're going, and how long it's going to take. A map is very utilitarian, at least that was the approach we took when building maps. We assumed users would want to know where they are, and how that fits into the story of place nearby, and they wanted to know that on desktops originally, but now on mobile phones as well.

PM: So, when we were talking earlier, one of the things you mentioned was some of the history of maps, like earlier Babylonian ideas of using etchings and, of course, Aboriginal Australian art which is actually much older. Do you want to riff on those two examples?

NG: I think in the case of Aboriginal art, the pictorial representations of something, an animal or animal spirit that they would draw on cave walls, were connected with their environment, to their land, to depict things physically there, such as a watering hole, a place of meeting, or a place of spiritual importance to the people. They used mapping, this pictorial mapping drawn on cave walls, that on later analysis turns out to be exactly correlated with the physical landscape in which they lived, and I think that's fascinating.

The Babylonians are another example of a people who understood the importance of place. They etched their location relative to other points on the landscape on clay tablets [1], which they exchanged for goods or to help others navigate the landscape. This pressing human need for knowing where we are at all times has been with us forever... and maps help provide that sense of place, and simply and elegantly solve the where-am-I problem.

PM: From my point of view with Google Maps, we're now on the 10th anniversary...

NG: Yeah. (smiles).

PM: And it's really radically changed people's sense of place. Most people refer to Google Maps as a kind of real-time reference point, a frame of reference that allows them to navigate and be able to arrive from point A to point B. But you come from a really eclectic background. One of the things that we were talking about earlier was you had initially been working on machines for cutting fabric when you left San Francisco. Tell us a little bit of the story of that.

NG: San Francisco... that was the Tech Wreck. I was working as an engineer, I'm an electrical engineer by training, in a company in Fremont, where I first meet Lars and Jens (Rasmussen) incidentally, and I was made redundant. I could recommend that to young people as one of the best things that can happen in your life...

PM: Your job getting outsourced or whatever?

NG: Yeah, because you then tend to have to refocus your life, strip the unnecessary, and maybe realize that the best experiences in life come from doing whatever is put in front of you. No good sitting on the couch at home waiting for someone to offer you a job. Better to get out there and try whatever comes your way.

There was no work in my field at the time. I started over in a job unrelated to my training, in a fabric cutting business, doing bulk manufacture of women's clothing, and at the lowest rung you could possibly start - sweeping the factory floor - and I worked up from there. My future father-in-law had bought a new machine for his cutting factory. It was a very expensive machine, it was all computer-driven and he asked, "Noel, you understand computers, come down and teach my people how to use this machine and make it work for me."

And what a wonderful experience that was. I was trained in quantum physics and maths. I knew zip about cutting fabric. But I learned how to do it. Because he works for himself, and it was the first time I ever worked in a family business, I began to listen and learn about running a business. The experience I gained was vital. And it encouraged me to work for myself too, later on, when the opportunity to do Google Maps presented. Being made redundant took me down an unexpected path that led to Google Maps itself, right? Had that path not happened, Google Maps might never have happened.

PM: Uh huh. Go back to one area, where you said you got a phone call and you were on a flight just soon right after. Tell the story.

NG: Well, I was working in an office, 3:30 in the afternoon in Fremont, and the Tech Wreck hit. By 4:30 I was on an outbound flight from San Francisco to Sydney. I mean it happened so quickly: a whirlwind, very abrupt and no mucking around. It was an incredible and upsetting experience to be made redundant so quickly. As I said, it was an important experience to have in hindsight.

PM: But you were able to improvise, get a new gig pretty quickly.

NG: Relatively quickly, yes, if you call eight months quick. The Tech Wreck, the dot-com bubble, decimated the industry. Rumour has it that Stephen (Stephen Ma) was pumping gas. Jens was let go the day after me, Lars not long after. We were all in the same boat, doing whatever to make ends meet. I cut fabric.

PM: And kind of reach out to a different field altogether, I mean cutting fabric versus maps is...

NG: It's totally different, right? You draw out some garment pattern on the material and line-up the material in bulk for cutting. That's \$110,000 worth of material, and you run a knife through it, so you had better know what you're doing there because you don't want any mistakes. And this computer cutting software was new and had bugs. So I started filing bugs on the software manufacturer. They started to wonder "Who is this strange person in this cutting factory filing bugs on our code?" but that is one thing I was doing in a previous life. So I said, "You've got bugs. If I do this and this, the software breaks. Can we fix that?", providing repro steps. That helped them improve their software. They eventually offered me a job and I gave it some serious thought, but Lars had contacted me around this time: we talked about maps.

PM: Maps for me, especially when you look at the 21st versus 20th century, come out of history of two dimensional paper and some of the things that you've been looking at with dimensional-zing or sort of optimizing routes between point A, point B, come out of a kind of deep sense of code and landscape. So tell me, when you're talking about API and other kinds of formats, free cultural reference points, and API is open. If you think about people for example taking Google Maps and being able to generate social network maps and being able to generate all sorts of other overlays. Tell me some of your philosophy of that because I'd love to hear, not just the practical, but we were talking earlier about, "What is a map" and how human social relations can be mapped and how landscapes can be mapped, what would be the common denominator between the two?

NG: Again, it all comes back to our sense of place. You mentioned social. I can share where I am with my group of friends, right? So I can work out where everybody is relative to me right now, and line up a place to catch up. Once I share my location, I can then ask via Voice, "Get me home now," or "Directions to the nearest coffee shop." All these different utilities come from just sharing my location, that sense of place again. Place-sensing.

We can draw maps of pretty much everything. I was just looking at a visual display showing “Languages of the World.”, drawn on a globe, drawn where the language is spoken, in native calligraphy. A language map. What is it that I can’t map given some data? I think the answer to that question is: nothing. I think humans can now map out the spatial relationships between any two or more sets of a data, and you often get really interesting results when you correlate them on a map.

NH: So a data set becomes something that can generate many, many things. So what you’ve done with Google Maps is look at not only the history of maps, because in general you had to figure out what are the more optimal ways, but I’m intrigued with the layering, from satellite to real-time to traffic, and so on. How did you get into that?

NG: Well I think I said to you earlier, that when we four were still deciding whether we were actually going to do this application or not, I got out a foolscap page and started writing down all the ideas that came to mind, all the layers I could put on a map. I filled that page up pretty quickly, the ideas just kept coming. It was the first time I realized, “Wow, this is a really capable tool.”

The possibilities seemed endless, but we needed to start somewhere. So I grabbed that page, screwed it up, and threw it in the bin, and then quit my job the next day to start on this endeavor. Because as you say, all the different layers... So you were coming here today and maybe you wanted to see traffic, or maybe you wanted to...

PM: Avoid accidents?

NG: Avoid accidents! Maybe you were going to cross a road bridge and you wanted to see how... it’s peak-time for traffic... how the bridge really looks. Is it congested or is the traffic moving well? That’s a layer you can query for and add to your map; the relevant layer type you need right now.

Weather is a layer. I don’t know if you know, but on at least the desktop version of Google Maps, you can zoom right out and see real-time weather moving across the globe, which is just another example layer that we didn’t have when we started but you can get to today on Google Maps. We now show you terrain, we show you... the layers are infinite.

PM: And on top of that the meteorological data, there’s the kind of interesting thing about the pin drop. I remember we were talking about graphic design, about those icons, how people not just frame the map that they’re using, but they need to give and share their location with other people. So the pin drop itself is usually kind of a drop. It looks like a drop of water maybe.

NG: Upside-down.

PM: Upside-down. Tell me some of the background of how you got into some of these icons and logos. Not only for religious spaces to share geography, to share links. Because I know you were really

into the graphic design component.

NG: Yeah “Jens-design”. He thought deeply about aspects of the Google Maps design, the iconography, including that Maps pin, which has itself become iconic [2]. When you think about it, he wants to indicate a location on the map, but he also doesn’t want to obscure that location. That’s why that little upside-down, teardrop shape is so important... because it says “Right here,” and you can see the thing that’s right there, without the pin getting in the way. A lot of thought went into that icon, once you see it from the practical, but it also had to have a pleasing design, one that fits with the rest of the Maps aesthetic.

Places of worship... there the question becomes, how do you represent those places with an icon that’s acceptable, and understood, by all people? We have to be careful to create icons that are visually meaningful, but they can’t upset belief systems. It’s a hard problem. So is drawing even simple things on a map like lines, country borders for example.

PM: There are other little subtle things like the layering of the shadow of the pin, and then the different thoughts, do you want to riff on that for a second?

NG: I don’t know if you recall how US maps looked before Google Maps. If you look at old paper street maps, they were all anemic straight lines with uppercase street names. When we drew maps for the world, the first place we painted was California, and we drew it in European map style. When we showed it to people in the United States, we were told, “This European maps style won’t work.” But now all maps in the US are drawn in the European stylee. Google Maps changed the way Americans think about map geography and style.

Also you’ll notice that we capitalize the place names, labels, and street names with precise mixed case on Google Maps... they’re not all caps. The source data was all caps and we needed to correct the capitalization per European map style. One of the wonderful things about Google is we could do that pretty much automatically. We didn’t need teams of people to correct the data capitalization.

Another subtle thing you might not notice in Google Maps... when we show a place name and you zoom in and out... have you noticed that the label stays in the same position the whole time?

PM: Yeah, there’s something that makes sure that it... I guess it must scale?

NG: Yes, and also the label position stays relatively put. Machines work out the appropriate labels for what you’re looking at, cull the unimportant, and ensure the resulting labels are in the right place no matter which zoom-level you’re on. It’s a subtle thing, but it makes Maps easier to use.

PM: Definitely. And the difference between some of the earlier rivals. So let’s talk about two things. I’m really intrigued with how you came up with the logo. We were talking about the street signs, which inspired the Google Maps logo, which you said was from a US route. I would love to get your

story on that. Could you riff on that for a second? Where's that from?

NG: The original logo wasn't that inventive. It was just a tiny snapshot of a piece of road network, including a prominent US route sign. I think it was route 101...

PM: From California?

NG: From California, yeah, shown on the Maps icon. Over time, the icon has become more stylized or abstracted. Currently there's a push pin and a European style road segment that looks just like a "V", a stylized version of the original Google Maps logo. It still says "Google Maps" to me, but it definitely has changed from the iconic road map representation to the abstract style we see today. So that's our album cover, as you would call it, and it's a work in progress.

PM: So let's get back to some of the rivals, because MapQuest was one of your early rivals.

NG: Yeah, MapQuest was number one at the time.

PM: Yeah and you guys were disruptive, precisely because you had different algorithms running in real-time. So let's compare, what made you guys stand out? What do you think?

NG: The thing that made us stand out was the moving maps in a web browser. Back in the day, you would go to a web site and type address terms into multiple boxes. You'd put your street number in one box, your street name in another box, and your locality in another. Enter all that correctly and you were presented with a map. Then if you wanted to go right on the map, you clicked a button, and then you made a cup of coffee. When the coffee was done, you'd come back to find the next part of your map had arrived, your web page had finally reloaded.

We did things differently. We made the maps move, interactively, by only loading the relevant parts of the map in your browser, the parts we needed to show. If you were looking at a location, a bunch of map tiles, and then moved to the right, we just had to slide all the tiles left, fetch new tiles to the right and add those to your page. We did this without reloading the page. That increased page speed. That made the page responsive. This fluid, real-time experience of using the map, zooming in and zooming out, going left and right, made for a completely different experience. That, and the single search box.

And I often say to people, when talking about Google Maps, that the product was really asking a rhetorical question, "If you could do this in a web browser, what couldn't you do in a web browser?" It changed the way developers built things in a browser. People started building word processors, spreadsheets, more complicated applications that needed speed and fluidity. All of a sudden, the Web2.0 movement had real examples to point at. That's what Google Maps brought forward - the web reloaded, Web2.0. Maps made Javascript fashionable, and important.

PM: Okay, well let's talk about the Semantic Web because we were talking about language earlier, and search queries, both in Google Talk and the way you can recognize different accents and so on. What algorithms were you thinking about from the point of, not only using language that's regional because for instance there's color, an American spells it with an "or," in Australia you guys use "our", things like that. How would that influence a map, so a map is responding to language, it's responding to context.

NG: Indeed, the context again is our locality, and from that we can work out most things. For example, when you're talking through the Google App on your phone, and you're asking Google to query with your voice, Australian English is a little different than UK English, is a little different to United States English, and Google works that stuff out automatically with our voice training systems. We retrain constantly and pump more input into those systems, to recognize human voices for different versions of English for example. Locality is important. Something like 1/5th of all queries are location-based, they have a location aspect. So when asking for whatever you're asking for, that aspect can influence the results. What do you mean when you say "Get me a coffee now." Does that mean: coffee shops near where I am right now? Yeah, Google's ability to learn: "Did you mean?" for example. Brain in the machine.

PM: Yeah, I'm always intrigued by feedback mechanisms that optimize a response to software.

NG: This is a mathematical model of things. Imagine we're looking at probabilities, that the answer we give you is correct versus the probability that it's incorrect. We want the amount of incorrectness to hit zero and we can build statistical models that can learn this over time.

PM: And so a mistake is actually interesting in that context.

NG: Indeed.

PM: And that's where the machine creates feedback and other ways of creating a legible space.

NG: Okay, well, we mentioned "our" vs. "or" spelling, right? And we can use locality. "Okay, these people want to spell it with 'our'. What's going on here? Oh, the locality is..." because the related search terms might indicate locality, or we can deduce that automatically. Did you mean the "our" version, versus the "or" version? Most of this can be worked out with machines. Feedback is a useful tool in systems that learn.

PM: Lets look at what's next. You've been working on the next batch of Google Chrome, which I don't want to reveal any top-secret data.

NG: (Laughs)

PM: For you, maps come from and then lead to browsers. I remember there was a very famous story

where you guys visited Larry Page and you had done something that was desktop-only, and he said, "We like the Web." A week or so later you guys had done it without much sleep. What's next, for Maps or for Chrome or just in the near future for you?

NG: Yeah, moving maps in a browser were invented in a quick sprint. In the near future? Well, I'm working on Chrome at the moment. That seems to be going quite well, though there's always room for improvement. Maps has continued to gain users, it didn't initially...

PM: What is it? One billion, two billion users?

NG: Something along that line, yeah, on mobile. It's very humbling for me to see so many people dependent on Maps. I actually don't walk around with a mobile...

PM: I noticed you don't have a phone. That was another question that was going to come up at the end of the...

NG: The thing I feel humbled by is when I'm out somewhere with my wife and we see... I'll bump her on the elbow, point, and say, "That person. They've got Google Maps on their phone," or when I'm sitting on a bus on the way to work and I see people using Maps...

PM: You take a bus? Cool.

NG: I do, yeah. It's actually nice think-time. We were talking earlier about not being interrupted. That's the time where I can just think through what I'm going to do for my day. I'm an engineer, so I have a to-do list. I tend to like putting things on it, and then start pushing them straight off as quickly as I can.

So I think now... What's going to happen next?

PM: 3D. There's the whole layers of everything, from Oculus Rift, to augmented reality gaming, tagging. Anything you're thinking about for that for the next wave of visuality for Maps?

NG: Nothing in particular. I'm seeing now that the mobile phone is becoming crucial to people's lives, and the killer application on mobile phones happens to be Maps. When you're out and about, you really do need to know where you are, and you can see that with Google Now, where we can potentially predict what you need to know when you, say, click Google Now, and you'll see how long it takes you to get home, and we'll present other info-cards that we think are relevant to where you are now, in your locality. I think that's something we're going to improve in the future, so that's one way Maps is going to move forward.

PM: So it's not just going to be mapping physical routes but also time to destination. I mean that's very robust. I mean, it's pretty solid.

NG: Like I want to know when my bus is coming, instead of just standing at the stop, uniformed.

PM: Bus schedules, subway schedules. All of which could be maps because those are public databases.

NG: Indeed, but very hard to get them into the public domain, or at least it has been in Australia, for example. But over time people have realized the importance of allowing free access to this public information. I'll give you an example. In Boston there was an experiment where they had interactive maps on screens showing information about where the bus was right now, and they put them in some bus stops, but not others, and recorded the amount of use in each stop. They found that at the stops with the interactive maps, the use of public transport went up by about 20%. So people had opted-out, put the car away. So that real-time information might start appearing in outdoor places more, and in different ways, to help people figure out "Where am I going and how long have I got."



PM: I guess by way of wrapping up: to me, one of the things that has come out of our conversation in general is not only are you looking at the history of mapping in general from Babylon to Aboriginal but currently satellites and cell phones are the two really, revolutionary... there's a huge revolution with almost ubiquitous computing, the way you do a search query, it goes to routers, then the routers go to a computer farm some place. Where do you see the near future of computing and processing? Because I don't know if doing a map query is intensive as a search query for example. A lot of people were talking about how much power it consumes to make a search query, you could boil a cup of water for example with one Google search query. What do you think is going to be the next couple years of computation and mapping in general? I'd love to get a prediction from Noel Gordon, here we go.

NG: Well, at least in the sense of, you mentioned servers... so when you say a query costs the energy used to boil a cup of water, you've got to remember that most of the energy comes from a solar source or a hydro source, which is totally renewable. So I think on Google's part, we will increasingly improve our data center technology so we make computing as efficient as possible. Google is investing in renewable energy resources. We're even experimenting with driverless cars.

PM: And those are running on maps as well.

NG: Once you know your location, all these other things can become possible. I see a future where people won't own cars anymore. Perhaps there will just be driverless cars running down the street, and everybody won't be waiting at bus stops. I have a lot of hope that driverless cars will actually make our society better.

PM: Alright that's I think the imaginary app interview. Any closing remarks?

NG: I'm glad we finally got together. You called me an elusive character. It has been hard, you've been travelling a lot, but I'm just so glad we got together and had this chance to talk.

PM: I've got a couple more questions. You mentioned earlier: the Google Maps fundamental code - You can't open it. You don't own it and people simply wanting to own it by appropriating your code and utilizing it so you've allowed it to be dealt into a product that they can platform off. So Google Maps is a product that other people are developing application based around Maps.

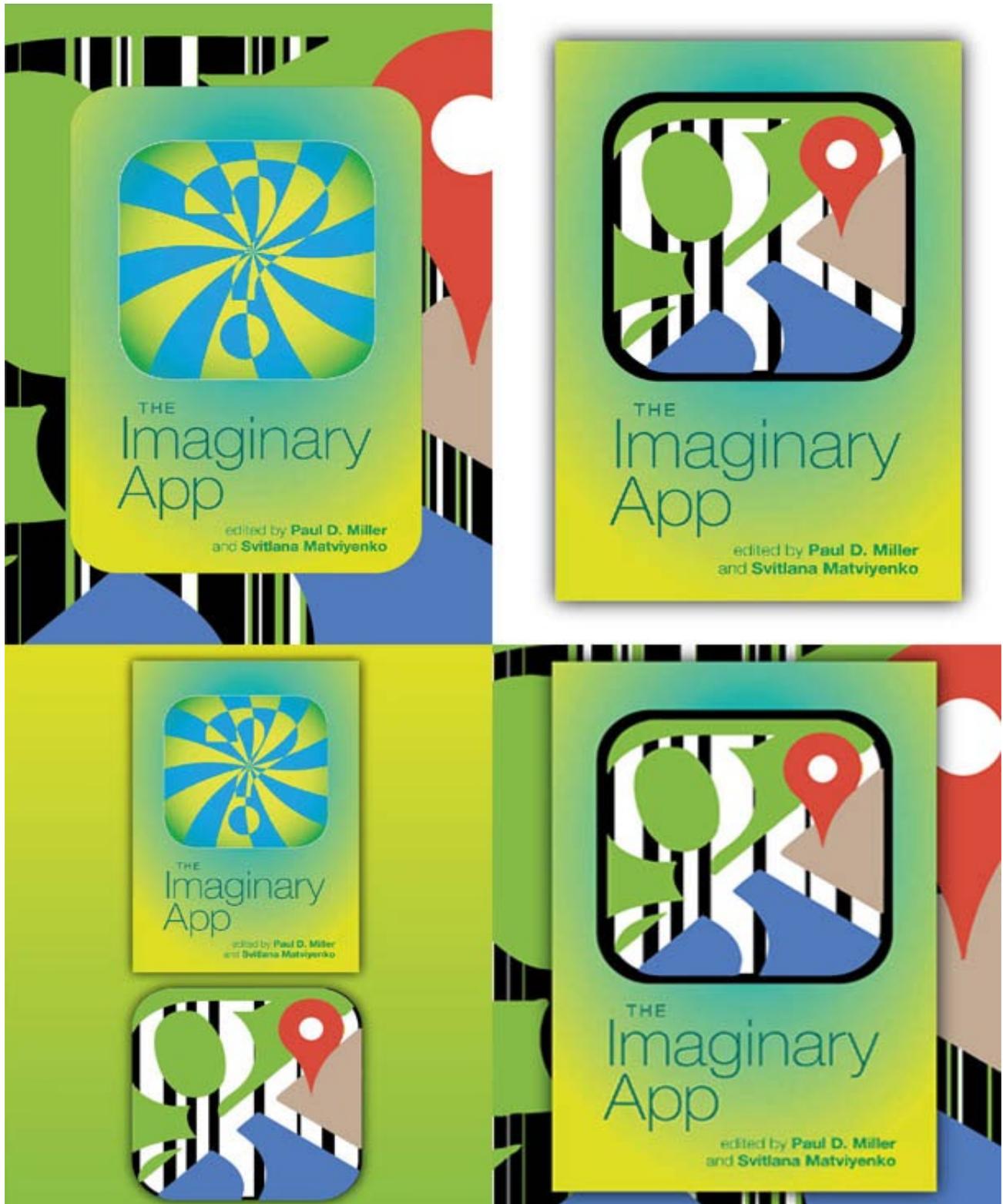
NG: Well when we first launched Maps, one of the things that we noticed was that because you can view-source in a browser, people could see the code we actually used. We knew that when we launched, and we weren't worried about it because the Internet has this history of sharing... that helps build community.

Other people could see what we'd done, and learn from it, and new applications appeared straight away. That was one of the things that prompted us to build the Google Maps API. Our code was out in the open, we shared it with people, and they mashed it up and made great new applications for Google Maps.

I don't know if you've been to Google Maps Mania, a collection of all sorts of map applications. An app for Switzerland where I can see the trams moving around on the streets in real-time because somebody made a little application that shows how to do that. People can use Maps, with the work we've done, in ways we might not think of. That sharing aspect has been incredibly important. That's one of the things that's powerful about the Web - the ability to share information so easily and with low friction. We don't have to ask permission to do it, we're allowed to do it, there are no gatekeepers. That fosters creativity.

I think that sharing aspect is one of the things I love most about the Web. URLs linking that whole great big soup of information that people can re-imagine, re-map and remix in their own way. I think that's the power of the Web.

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THE
Imaginary
App

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