Introduction

Becoming, Cognifying, Flowing, Screening, Accessing, Sharing, Filtering, Remixing, Interacting, Tracking, Questioning, and then Beginning.

I think the computer age did not really start until computers merged with the telephone. Stand-alone computer were inadequate.

Inevitability - the momentum of an ongoing technological shift

Massive copying is here to stay. Massive tracking and total surveillance is here to stay. Ownership is shifting away. Virtual reality is becoming real. We can't stop artificial intelligences and robots from improving, creating new businesses, and taking our current jobs.

Technology is humanity's accelerant.

Processes are now more important than products.

Becoming

I now see upgrading as a type of hygiene: You do it regularly to keep your tech healthy. Continual upgrades are so critical for technological systems that they are automatic for the major personal computer operating systems and some software apps. Behind the scenes, the machines will upgrade themselves, slowly changing their features over time. This happens gradually, so we don't notice they are "becoming." Technological life in the future will be a series of upgrades.

No matter how long you have been using a tool, endless upgrades make you into a newbie. We will be newbies forever.

The average lifespan of a phone app is a mere 30 days.

I celebrate the never-ending discontentment that technology brings.

Protopia is a state of becoming, rather than a destination. It is a process. In the protopian mode, things are better today than they were yesterday, although only a little better.

In constant motion we no longer notice the motion. [...] We are constantly surprised by things that have been happening for 20 years or longer. [...] Sometimes we didn't see what was becoming because we didn't want it to happen that way.

Any promising new invention will have its naysayers, and the bigger the promises, the louder the nays.

(Meeting with ABC in 1989) I offered one tip before I left. "Look," I said, "I happen to know that the address abc.com has not been registered. Go down to your basement, find your most technical computer geek, and have him register abc.com immediately. Don't even think about it. It will be a good thing to do." They thanked me vacantly. I checked a week later. The domain was still unregistered.

Until 1991 commercial enterprise on the internet was strictly prohibited. There was no selling, no ads.

The total number of web pages, including those that are dynamically created upon request, exceeds 60 trillion. That's almost 10,000 pages per person alive. And this entire cornucopia has been created in less than 8,000 days. [...] What we all failed to see was how much of this brave new online world would be manufactured by users, not big institutions.

65,000 (videos) per day are posted to YouTube, or 300 video hours every minute in 2015.

In 2014 the average age of a user was 44 years old.

The web will more and more resemble a presence that you relate to rather than a place. [...] By 2050 we'll come to think of the web as an ever-present type of conversation.

Cognifying

It is hard to imagine anything that would "change everything" as much as cheap, powerful, ubiquitous artificial intelligence. To begin with, there's nothing as consequential as a dumb thing being made smarter. [...] The advantages gained from cognifying inert things would be hundreds of times more disruptive to our lives than the transformations gained by industrialization.

Each AI would be a bounded entity. We would know where our thoughts ended and theirs began.

The first genuine AI will not be birthed in a stand-alone supercomputer, but in the superorganism of a billion computer chips known as the net. It will be planetary in dimensions, but thin, embedded, and loosely connected. It will be hard to tell where its thoughts begin and ours end. Any device that touches this networked AI will share -- and contribute to -- its intelligence.

Is it our memory, or a consensual agreement? Are we searching it, or is it searching us?

We can say with certainty that cognification is inevitable, because it is already here.

Private investment in the AI sector has been expanding 70 percent a year on average for the past four years.

The AI on the horizon looks more like Amazon Web Services -- cheap, reliable, industrial-grade digital smartness running behind everything, and almost invisible except when it blinks off. This common utility will serve you as much IQ as you want but no more than you need. You'll simply plug into the grid and get AI as if it was electricity.

The business plans for the next 10,000 start-ups is easy to forecast: Take X and add AI.

Rather than use AI to make its search better, Google is using search to make its AI better. [...] By 2026, Google's main product will not be search but AI.

In the next 10 years, 99 percent of the artificial intelligence that you will interact with, directly or indirectly, will be nerdly narrow, supersmart specialists. In fact, robust intelligence may be a liability -- especially if by "intelligence" we mean our peculiar self-awareness, all our frantic loops of introspection and mess currents of self-consciousness. [...] What we want instead of conscious intelligence is artificial smartness. [...] Our most premium AI services will likely be advertised as consciousness-free. Nonhuman intelligence is not a bug; it's a feature. The most important thing to know about thinking machines is that they will think different.

Facebook has the ability to ramp up an AI that can view a photo portrait of any person on earth and correctly identify them out of some 3 billion people online.

Our most important mechanical inventions are not machines that do what humans do better, but machines that can do things we can't do at all. Our most important thinking machines will not be machines that can think what we think faster, better, but those that think what we can't think. [...] Humans are for inventing new kinds of intelligences that biology could not evolve.

An AI will think about science like an alien, vastly different than any human scientist, thereby provoking us humans to think about science differently. [...] The alienness of artificial intelligence will become more valuable to us than its speed or power.

We'll spend the next three decades -- indeed, perhaps the next century -- in a permanent identity crisis, continually asking ourselves what humans are good for. [...] AIs will help define humanity. We need AIs to tell us who we are.

Robots are already here, quietly. The disruption they cause will touch our core.

It's hard to believe you'd have an economy at all if you gave pink slips to more than half the labor force. But that -- in slow motion -- is what the industrial revolution did to the workforce of the early 19th century. Two hundred years ago, 70 percent of American workers lived on the

farm. Today automation has eliminated all but 1 percent of their jobs, replacing them (and their work animals) with machines.

Before the end of this century, 70 percent of today's occupations will be replaced by automation. [...] By 2050 most truck drivers won't be human. Truck driving is currently the most common occupation in the U.S.

To demand that artificial intelligence be humanlike is the same flawed logic as demanding that artificial flying be birdlike.

We aren't giving "good jobs" to robots. Most of the time we are giving them jobs we could never do. Without them, these jobs would remain undone.

In a very real way our inventions assign us our jobs.

This is not a race against the machine. If we race against them, we lose. This is a race *with* the machines. You'll be paid in the future based on how well you work with robots.

Flowing

If something can be copied -- a song, a movie, a book -- and it touches the internet, it will be copied.

The instant reduplication of data,ideas, and media underpins the major sectors of a 21st-century economy.

Tags have replaced links.

The industrial age was driven by analog copies -- exact and cheap. The information age is driven by digital copies -- exact ad free.

The only things truly valuable are those that cannot be copied.

"Generatives" - Uncopyable values that are "better than free.
1. Immediacy
2. Personalization
3. Interpretation
4. Authenticity
5. Accessibility
6. Embodiment
7. Patronage
8. Discoverability

Screening

We were People of the Word. [...] Mass-produced books changed the way people thought. The technology of printing expanded the number of words available, from about 50,000 words in Old English to a million today. [...] We are now People of the Screen.

The People of the Book today are the good hardworking people who make newspapers, magazines, the doctrines of law, the offices of regulation, and the rules of finance. They live by the book, by the authority derived from authors. The foundation of this culture is ultimately housed in texts. [...] People of the Screen make their own content and construct their own truth. [...] People of the book favor solutions by laws, while People of the Screen favor technology as a solution to all problems.

The amount of time people spend reading has almost tripled since 1980.

Ordinary citizens compose 80 million blog posts per day.

Screening includes reading words, but also watching words and reading images.

Some scholars of literature claim that a book is really that virtual place your mind goes to when you are reading. It is a conceptual state of imagination that one might call "literature space."

Think of a book i all its stages as a process rather than artifact. Not a noun, but a verb. A book is more "booking" than paper or text. It is a becoming.

Reading becomes social. With screens we can share not just the titles of books we are reading, but our reactions and notes as we read them. Today, we can highlight a passage. Tomorrow, we will be able to link passages. We can add a link from a phrase in the book we are reading to a contrasting phrase in another book we we read, from a word in a passage to an obscure dictionary, from a scene in a book to a similar scene in a movie. (All these tricks will require tools for finding relevant passages.) We might subscribe to the marginalia feed from someone we respect, so we get not only their reading list but their marginalia-highlights, notes, questions, musings.

From the days of Sumerian clay tablets until now, humans have "published" at least 310 million books, 1.4 billion articles and essays, 180 million songs, 3.5 trillion images, 330,000 movies, 1 billion hours of video, TV shows, and short films, and 60 trillion public web pages.

The link and the tag may be two of the most important inventions of the last 50 years.

Today a serious nonfiction book will usually have a bibliography and some kind of footnotes. When books are deeply linked, you'll be able to click on the title in any bibliography or any footnote and find the actual book referred to in the footnote.

Every object, event, or location on earth would "know" everything that has ever been written about it i any book, in any language, at any time.

In the future it will seem weird to watch a screen without some part of our body responding to the content.

Screens are instruments of the now.

Propaganda is less effective in a world of screens, because while misinformation travels as fast as electrons, corrections do too.

The status of a new creation is determined not by the rating given to it by critics but by the degree to which it is linked to the rest of the world. A person, artifact, or fact does not "exist" until it is linked. #

Screens will be the first place we'll look for answers, for friends, for news, for meaning, for our sense of who we are and who we can be.

Accessing

Every year I own less of what I use.

Since the 1970s, the weight of the average automobile has fallen by 25 percent.

Digital technology accelerates dematerialization by hastening the migration from products to services.

"Software eats everything" - Soft things, like intelligence, are thus embedded into hard things, like aluminum, that make hard things behave more like software.

By 2025 the bandwidth to a high-end driverless car will exceed the bandwidth into your home.

The more we embed intelligence and smarts into the objects in our households and offices, the more we'll treat these articles as social property.

To access a service, a customer is often committing to it in a far stronger way than when he or she purchases an item.

Unless something runs in real time, it does not count.

If smartly connected, a crowd of amateurs can be as good as the average solo professional.

For better or worse, our lives are accelerating, and the only speed fast enough is instant. Minting money is one of the last jobs left for a central government that most political parties agree is legitimate.

When everyone "owns" it, nobody owns it.

A cloud is a colony of millions of computers that are braided together seamlessly to act as a single large computer.

The web is hyperlinked documents; the cloud is hyperlinked data.

If I re-google my own email (stored in a cloud) to find out what I said (which I do) or rely on the cloud for my memory, where does my "I" end and the cloud start? If all the images of my life, and all the snippets of my interests, and all my notes, and all my chitchat with friends, and all my choices, and all my recommendations, and all my thoughts, and all my wishes — if all this is sitting somewhere, but nowhere in particular, it changes how I think of myself. [...] The cloud is our extended soul. Or, if you prefer, our extended self.

Google's cloud platform was down only 14 minutes in 2014. The cloud is the Backup. Our life's backup.

Sharing

While old-school political socialism was an arm of the state, digital socialism is socialism without the state.

Social, social action, social media, socialism. When masses of people who own the means of production work toward a common goal and share their products in common, when they contribute labor without wages and enjoy the fruits free of charge, it's not unreasonable to call that new socialism.

There is a whole list of subjects that experts once believed we modern humans would not share -- our finances, our health challenges, our sex lives, our innermost fears -- but it turns out that with the right technology and the right benefits in the right conditions, we'll share everything.

Altogether, crowdfunding platforms raise more than $34 billion each year for projects that would not have been funded in any other way.

Filtering

Every 12 months we produce 8 million new songs, 2 million new books, 16,000 new films, 30 billion blog posts, 182 billion tweets, 400,000 new products.

The total number of songs that have been recorded on the planet is 180 million. Using standard MP3 compression, the total volume of recorded music for humans would fit onto one 20-terabyte hard disk. Today a 20-terabyte hard disk sells for $2,000. In five years it will sell for $60 and fit into your pocket. Very soon you'll be able to carry around all the music of humankind in your pants.

Netflix has 300 people working on its recommendation system, with a budget of $150 million.

Our attention is the only valuable resource we personally produce without training. [...] Since it is the last scarcity, wherever attention flows, money will follow.

In 2014, 21 percent of Google's total revenue, or $14 billion, came through AdSense ads.

"The average US rate for babysitting is $15 per hour, twice the minimum wage. In big US cities it is not unusual for parents to spend $100 for child care during an evening out."

Remixing

"Flickr offers more than half a million images of the Golden Gate Bridge alone. Every conceivable angle, lighting condition, and point of view of the Golden Gate Bridge has been photographed and posted. If you want to use an image of the bridge in your video or movie, there is really no reason to take a new picture of this bridge. It's been done."

What we do now with words, we'll soon do with images.

TV news was once an ephemeral stream of stuff that was never meant to be recorded or analyzed -- merely inhaled. Now it is rewindable. When we scroll back news, we can compare its veracity, its motives, its assumptions. We can share it, fact-check it, and mix it. Because the crowd can rewind what was said earlier, this changes the posture of politicians, of pundits, of anyone making a claim.

In our near future we'll have the option to record as much of a conversations as we care to. It will cost nothing as long as we carry (or wear) a device, and it will be fairly easy to rewind. Some people will record everything as an aid to their memory. The social etiquette around recall will be in flux; private conservations are likely to be off-limits. But more and more of what happens in public will be recorded—and re-viewable—via phone cams, dashboard-mounted webcams on every car, and streetlight-mounted surveillance cams. Police will be required by law to record all activity from their wearables while they are on duty. Rewinding police logs will shift public opinion, just as often vindicating police as not. The everyday routines of politicians and celebrities will be subject to scrolling back from multiple viewpoints, creating a new culture where everyone's past is recallable. Rewindability and findability are just two Gutenberg-like transformations that moving images are undergoing. These two and many other factors of remixing apply to all newly digitized media, such as virtual reality, music, radio, presentations, and so on.

In 30 years the most important cultural works and the most powerful mediums will be those that have been remixed the most.

Interacting

Within a decade, when you look into a state-of-the-art virtual reality display, you eye will be fooled into thinking you are looking through a real window into a real world.

A person mumbling to herself while her hands dance in front of her will be the signal in the future that she is working on her computer.

If a thing does not interact, it will be considered broken

Tracking

"Recording a diary is considered admirable. Recording in a spreadsheet is considered creepy."
-- Gary Wolf

The kind of tracking an average person might encounter on an ordinary day in the United States:

- Car movements
- Highway traffic
- Ride-share taxis
- Long-distance travel (planes and trains)
- Drone surveillance
- Postal mail
- Utilities
- Cell phone location and call logs
- Civic cameras
- Commercial and private spaces
- Smart home
- Home surveillance
- Interactive devices (Siri, Now, Cortana, Kinect, Echo, smart TVs)
- Grocery loyalty cards
- E-tailers (Amazon et al)
- IRS
- Credit cards
- E-wallets and e-banks
- Photo face recognition (Facebook, Google)
- Web activities (cookies)
- Social media
- Search browsers
- Streaming services (Netflix, Spotify, YouTube)
- Book reading (public libraries, Amazon
- Fitness trackers

Information is accumulating faster than the rate we pour concrete.

Ubiquitous surveillance is inevitable. [...] If today's social media has taught us anything about ourselves as a species, it is that the human impulse to share overwhelms the human impulse for privacy.

Questioning

A Wikipedia is impossible, but here it is.

It is not necessary that we invent some kind of autonomous global consciousness. It is only necessary that we connect everyone to everyone else -- and to everything else -- all the time and create new things together. Hundreds of miracles that seem impossible today will be possible with this shared human connectivity.

One day in the next three decades the entire internet/phone system will blink off for 24 hours, and we'll be in shock for years afterward.

Ironically, in an age of instant global connection, my certainty about anything has decreased. Rather than receiving truth from an authority, I am reduced to assembling my own certainty from the liquid stream of facts flowing through the web. Truth, with a capital T, becomes truths, plural.

Perhaps we are tapping into our collective unconscious as we roam the web. Maybe click-dreaming is a way for all of us to have the same dream, independent of what we click on.

For some folks, this is the worst of the net -- the loss of contemplation. Others feel that all this frothy activity is simply stupid busywork, or spinning of wheels, or illusionary action. But compared to what? Compared with the passive consumption of TV? Or time spent lounging at a bar chatting? Or the slow trudge to a library only to find no answers to the hundreds of questions I have?

Beginning

Thousands of years from now, when historians review the past, our ancient time here at the beginning of the third millennium will be seen as an amazing moment. This is the time when inhabitants of this planet first linked themselves together into one very large thing. Later the very large thing would become even larger, but you and I are alive at the moment when it first awoke. Future people will envy us, wishing they could have witnessed the birth we saw.

This very large thing (the net) provides a new way of thinking (perfect search, total recall, planetary scope) and a new mind for an old species. It is the Beginning. [...] At its core 7 billion humans, soon to be 9 billion, are quickly cloaking themselves with an always-on layer of connectivity that comes close to directly linking their brains to each other. [...] By the year 2025 every person alive -- that is, 100 percent of the planet's inhabitants -- will have access to this platform via some almost-free device. Everyone will be on it. Or in it. Or, simply, everyone will be it.

[Amazon](#)