

EMERGENCE OF A KNOWING SOCIETY

The amount of data created every second is swiftly growing, creating an unimaginably vast ocean of information. To help individuals make sense of this information rich reality, new technologies are being developed. The Internet has already changed societies all over the world, but the next 15 years could be even more transformational.

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An Information-Rich Reality

Every day the Internet population grows; users discover new sites, apps or activities online; device performance is increased; platforms offer greater storage space; and users realize they want or need a faster Internet connection. Autonomous objects are now beginning to contribute to the information flow with the development of the **Internet of Things (IoT)**. Within the next few decades, data on nearly every measurable aspect of the planet and its inhabitants may be available in real-time. A new generation of technologies is emerging to help humans navigate this new ocean of information, helping them to select, perceive, and interact in ways that could transform human experience and human relations. Information and communication will continue to be at the heart of how we shape our lives. Our built environment will be equipped with computing power and become responsive, capable of summoning information and obeying commands.

- What could this new Knowing Society look like?
- What does it mean for individuals and for society?
- How might it transform privacy, social norms, perception, education and relationships?



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Drivers of Change

Information Explosion

Smartphones changed everything. Information today is current, abundant and accessible. Today, in mere moments, more information is created than had ever been written since the dawn of humanity up to the beginning of the Information Age. We moved from daily news, to morning and evening news, to minute-by-minute feeds today - tomorrow's information will be in actual real-time. Reading the entire local newspaper every day is a feasible task, but global daily content is so vast that no one could digest it all.

Our relationship with information is changing rapidly. Many are now accustomed to having their mobile device whistle the instant they receive new content. The advent of personal feeds leaves many with the challenge of inventing their own content narrative. Search algorithms, social networks, aggregators, data analytics and Artificial Intelligence are increasingly indispensable for making sense of all available information. Navigating the information available on the Internet has become less and less of a manual endeavour.



Intersecting Technological Advancements

New technologies, operating in concert with the Internet, are reshaping society. The resulting experience from all these technological advances will be a more fluid, intuitive and immersive experience with digital devices and applications.

These technological advancements are:

see page 4 for technology descriptions

- Practical, affordable **Artificial Intelligence**
- New digital display methods: **Virtual Reality** and **Augmented Reality**
- Technology introducing tactile senses to the digital experience called **Haptics**
- **Brain Computer Interface**: devices allowing users to interact with computers using their brain
- **The Internet of Things**: the integration of Internet and computing capabilities into every object
- The migration of the computation task from individual devices to mainframes referred to as the **Cloud**
- Devices capable of juggling multiple Internet connections achieving a faster, cheaper **Dynamic Internet** connection

What could these advancements offer?

see next page for technology descriptions

Enhanced Reality

IMMERSE YOURSELF

Blended reality will do away with screens, integrating digital menus, documents and avatars to the physical space, at times transforming surroundings into fantastic or far-off scenes.

Virtual Reality and Augmented Reality devices will eventually be merged into a single device, offering individuals a single feed of their virtual and physical worlds.

Personal Assistance

DELEGATE

People willing to fully embrace Artificial Intelligence (AI) will teach their AI agent how to facilitate their life and anticipate their needs. With the time saved from existing chores, new possibilities emerge and a new pace of life is discovered.

Individuals will gain access to affordable personal assistants in the form of AI agents. Smartphone apps will be powered by AI, affording them partial autonomy, allowing for self-coordination and initiative on behalf of their owner.

Effortless User Interfaces

THE WORLD AT YOUR COMMAND

Shedding screens and keyboards, the boundary between digital devices and the physical world erodes. More modern urban settings become an intuitive interactive interface.

Haptic devices and Brain Computer Interface technology will improve interactions with digital devices, removing much of the time needed to execute commands or receive information. Urban environments will come alive with connected devices, forming the **Internet of Things**. Rooms, buildings and cities will be capable of gathering and communicating information, listening to commands and executing tasks in concert with countless connected devices.

True Mobility

EVERYWHERE AT ONCE

Telepresence will be nearly indiscernible to presence, changing our relationship with geography and location.

Personal wearable devices will leverage the power of mainframe super computers via cloud computing and next generation connection speeds to allow individuals to be highly productive anywhere anytime.

Emerging Technologies

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Augmented Reality



AR devices worn over the eyes will display information, images or 3D animated objects over the user's physical environment. These devices will pull the digital experience out of traditional displays and merge it with the real world.

HoloLens
mixed reality
computing platform
Microsoft
tentative Q4 2015

Google Glass
wearable technology
Google
under development

Skully
Motorcycle Helmet
Skully Helmets
2013



Virtual Reality



Wearing a VR device over the eyes will allow the user to be immersed into a digital realm. The technology will trick the senses, allowing the user to forget that the experience is not real.

Oculus Rift
VR head-mounted
display
Facebook
2016

Project Morpheus
VR headset
Sony
2016

Vive
VR headset
HTC & Valve
2015



Haptics



Using ultrasound, vibrations and wearables, users will be able to feel and touch virtual objects. Devices will use virtual ultrasound textures and vibrations delivered on various parts of the body to quickly communicate information to the user.

4DFX
haptic gaming vest
KOR-FX
2014

Touchless
ultrasound tactile
feedback
Ultrahaptics
evaluation program
now available

Virtualizer
home VR system
Cyberith
tentative Q4 2015



Brain-Computer Interface



Also known as direct neural interface, these devices allow users to control digital devices with their neural activity. Along with voice command, touch and gesture control, BCI will afford users a flash rapid response time for certain commands.

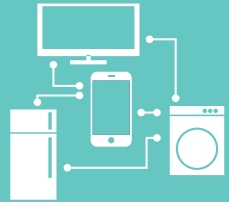
BrainGate
brain implant system
Cyberkinetics
clinical trials

Thync Vibes
electronic brain
stimulator
Thync
2015


OpenBCI
open source BCI
**J. Murphy &
C. Russomanno**
2014

Emerging Technologies cont'd

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Internet of Things

 Nearly any object will be available as an IoT connected device supplying the Internet with information on most aspects of life. Users will be able to command their environment just as they would functions on their computer today.


Nest
home automation system
Nest Labs
2011

Placemeter
real-time neighborhood data
Placemeter
2015

Metromile
pay-per-mile car insurance
Metromile Inc
2012



Cloud Computing

 Small personal devices (e.g. smartphone or wearables) will be able to access the computing power of large centralized computers. Computing power beyond what is achievable by the device will be a service accessible by Internet connection.

PSVita
mobile gaming device
Sony
2012

Structure Sensor
3D scanner for iPad
Occipital
2014

DNAexus
cloud genetic sequencing
DNAexus
2013



Artificial Intelligence

 Personal AI will accompany the user remembering and recollecting information and anticipating needs, curating information appropriate to every situation. AI will transform web platforms into proactive information collection and distribution hubs.


Watson
medical assistant
Microsoft
2013

Cubic
personal AI
Cubic Robotics
preorder on Indiegogo

Personal Robot
AI personal assistant
Robotbase
2015



Dynamic Internet

 The driving force of the creative economy, Internet connections will be faster, more stable and delivered through multiple service providers. With 5G widely available by 2025, high-performing Internet services will be the gateway to most services.

Project Fi
mobile Internet
Google
2015

Netrider
vehicular mesh network
Vieniam
2014

Open Garden
mesh networking app
Open Garden
2012

NARRATIVE

An Accompanied Existence

2030 - LIVING IN A KNOWING SOCIETY

Sarah was born in 2005 and is now 25. She has lived her life with the Internet and her young adult years accompanied by personal Artificial Intelligence (AI). The AI integrated software package acts as her personal assistant, mediating her interactions with a range of other technologies. Paia (Personal AI Agent) provides her with a seamless stream of suggestions and reminders to help her navigate the virtual and physical worlds. Along with Paia, Sarah is comfortable using reality enhancing technologies to allow her to persistently live both in the real and digital world.

“I AM ALWAYS CONNECTED, EVEN WHEN ASLEEP. IT’S NORMAL.”

— SARAH

A MORNING WITH FRIENDS

Every morning Paia wakes Sarah at a time optimized to her sleep pattern and day’s schedule. Paia helps adapt Sarah’s schedule to avoid public transit disruptions, capitalize on new business opportunities or finish her workload early to participate in fun events later in the day. Upon waking, Sarah’s user interface initializes and begins displaying information in front of her as she begins to get ready for the day. She chats with her parents via social apps empowered by her wearable devices. Her mother is in the kitchen and her father, away on a business

trip, is in his hotel room. The conversation is seamless as they move about their morning routine. The devices facilitate the conversation, running automatically in the background, needing no instructions from the users.

Sarah sits down at the kitchen table. She is joined by her father and some of her friends that appear and disappear as they join and leave the conversation. The experience is a virtual cafeteria where Sarah can choose to be accompanied by holographic friends or join others in a virtual world of avatars.

PRODUCTIVE ANYWHERE WITH ANYONE

Following instructions from her agenda, she heads out to meet her classmates on campus. Sarah is a university student and an independent designer. She usually works with clients and classmates via telepresence but still finds great comfort in spending some time face-to-face with colleagues. On the light rail system, Sarah does some reading, works on a 3D file for a project, prints the file at the campus lab, confirms work meetings for the day and makes evening plans.

On campus, Sarah and her colleagues tackle the daily class material summoning local professors and experts from the overseas campus. Studying design theory, Sarah puts into practice what she learns. Her tools allow her to make real objects, turn them into digital files, modify them, collaborate with colleagues across the globe, and bring them back to physical form. Students are encouraged to commercialize their homework via digital freelancing platforms, exploring how their work might be transformed into physical or digital products.

NARRATIVE

LIFE OPTIMIZED

After lunch, Sarah begins her afternoon workout walking around campus. Paia monitors what she eats, how much physical activity she does and many other data sets in order to inform her on how she might make healthier decisions. Her insurance company rewards the smart decisions she makes and her group of friends have joined fun competitive healthy lifestyle games. She walks at a fast pace as she talks to various other entrepreneurs to see how they might collaborate to make new products to win small contracts. Paia provides guidance to optimize her time, in order to either improve her learning opportunities or increase her profits.

PARTITIONED DIGITAL PERSONALITIES

During all the activities Sarah has done so far throughout the day, she has also been juggling a constant stream of curated information, personal messages from friends and media personality posts. Sarah is very present online and carefully manages various personal brands. Her main avatar is her most public facing digital self, where she interacts with corporate brands, various communities and the world at large. For a limited few, she shares all her personal life, unfiltered and honest. On other platforms, she presents a professional portfolio of her projects and ambitions.

With the help of Paia, Sarah is kept aware of how her data might be accessed by others. Privacy services help her protect her intimate moments while freeing her to confidently share on her own terms. Branding services help her capitalize on her digital personality. Sarah shares some of her information in order to enjoy a customized

experience with various companies, restaurants and entertainment venues. As social networks and AI allow Sarah and her friends the ability to compare and consider thousands of possibilities, their expectations are sky high. Access to companies' activities and product origins allow them to marry their values to their purchases and share their experiences with like-minded communities.

SETTING ONE'S OWN PACE

Being constantly connected to crowds allows Sarah to shape her social experience. Her relationship with information empowers her to make informed decisions. While she may request spontaneous or specific information, the majority of her information is presented to her by Paia. This pushed information can get dizzying. Sarah takes thinking vacations, deactivating some of her devices in order to concentrate on her inner thoughts. She often uses virtual reality to transport herself into a deep and calming forest or turns off nearly all her social apps to read a book. Being able to consider almost all pertinent information when making daily decisions and never being able to forget anything is empowering but also at times tiring.



Social Impacts

Privacy in a Transparent World

Increased transparency will alter the public dimension, forcing society to revisit the right to privacy.

With sensors and cameras carpeting our urban landscapes, big data, facial recognition, **deep learning** and **crowdsourcing** could potentially bring about the **end of privacy**. Many smartphone users today **unknowingly transmit** personal data. In most cases however, citizens might forego privacy in favour of the many services made possible via the new gained transparency. **Studies** suggest many people do not value privacy as much as they claim. The **quantified-self movement** and **reality mining** are creating up-to-the-second data about most aspects of an individuals' life. As the Internet of Things expands, nearly every service and product will seek to leverage data to improve value propositions.

Individuals will need to take control of their digital footprint in order to minimize risk while taking full advantage of new possibilities. Some may attempt to control their data or create digital **darkzones** to avoid the gazing eyes of social media. Darkzones could be controversial as they would be a natural destination for criminal activities and would require trust amongst patrons to keep them *dark*.

Lying could become harder and perhaps a greater social faux pas. Personal AI agents might be able to use data from varying

sources to catch a lie in a split second. Wearable devices capturing personal metrics offer great motivation potential. However, living in a society of **constant comparison** could be debilitating as it could lead to increased jealousy and depression. The **advertising** and **insurance** industries have already begun innovating in the use of personal information. Privacy could become an expensive luxury out of reach to many, but is living in a transparent world necessarily a bad thing?

TERMS OF SERVICE DIDN'T READ

tosdr.org is a user's rights initiative, attempting to rate website terms & privacy policies. Simpler ratings might empower users in managing personal information.

Here are a few ratings from tosdr.org
SoundCloud: B Google: C YouTube: D

ALIBI.

discoveralibi.com introduces a new app that continually captures audio, video and location data with your smartphone, allowing you to save the last hour of your life whenever you might need an alibi.

Social Impacts

Reputation Post Forgetting

With the decline of privacy comes the related phenomenon of a growing importance of online history and reputation in shaping one's life course.

Individuals are slowly realizing that everyone can see their **digital footprint**. In response, new laws are being enacted to protect citizens, such as the **right to be forgotten**. Also, **new tools** are being developed to educate children and adults alike on how to safely use social media. Already, lacking a digital footprint can be considered a **red flag**, which indicates that social media is becoming a way of establishing social credit. This may in turn promote the use of real identity online, reducing cyberbullying and **trolling** behaviour. Facebook has already implemented a **real name policy**. Parents will need to be increasingly mindful of their children's digital footprint, helping them to create social credit that will help them open doors for their professional careers. For those needing a reboot to their online presence, the missing years will always follow them, raising questions for the rest of their life.

Augmented reality displays digital content in the real world. This could erase the anonymity offered in urban centres by living amongst strangers. Facial recognition could place social media profiles, criminal records or embarrassing videos directly atop individuals. This could bring about a return to the emphasis

on character as opposed to superficial attributes. Products will also gain **digital labels**, advertising all available information on production, origins and mentions in the media. **Tools** are facilitating the task of aligning personal convictions with purchasing habits. Corporations will need to reassess the value of branding around corporate social responsibility in an un-forgetting world. The automation of recalling information will transform modern urban life, possibly bringing about something akin to a global digital village.



Social Impacts

The Truth in an Attention Economy

Access to an infinite stream of information could reinforce confirmation bias as publication becomes increasingly decentralized.

Content creators and advertisers have been seeking **new ways** of landing on our screens; the most coveted today being the **mobile home page**. One can only imagine how much advertising revenue might be generated from ads overlaid on top of life, embedded into content displayed by **enhanced reality** devices. Content creators will need to think of new ways of reaching audiences, often by convincing curators (human or autonomous) of the worthiness of their product. The net result could be high-frequency trading of reviews, ad space, recommendations and permission – a new high speed attention economy. As content curators try to reach the largest audiences, others may be trying to circumvent pay walls or advertising. From the previous legal battles we have seen around **piracy** and content **blocking**, attempts to embed and avoid advertising may continue to be difficult, even impossible, to control. This leaves individuals with the task of making sense of a rapidly changing information landscape. Using a personal AI agent could either help identify the signal from the noise, or generate a torrent of seemingly credible misinformation. Existing discrepancies in levels of education, wealth and digital literacy could be exaggerated as some either

lack context to be **savvy** to new digital dangers, or **actively seek out** information to reinforce **existing beliefs**.



Social Impacts

Redefining the Digital Divide

The global digital job market will require continual learning, leaving behind many unable or unwilling to adapt.

The Knowing Society presents an ease-of-use experience with digital content that is transformative. Co-creation, crowdsourcing, and **centaurs** (half-human, half-AI teams) are changing the skills needed to be competitive in many fields. The creative economy and automation will pressure many to rethink their role in an economy where menial tasks are automated. Just Google it; rote learning, memorization through repetition, becomes nearly obsolete once forgetting is essentially cured, requiring education to be re-imagined.

Those willing to play with new learning methods will gain a significant advantage; either through new **technologies** enhancing cognition, new **learning approaches** or simply by increasing one's ability to navigate relevant material. **Presentation smartphones**, easy **screen sharing** and **BYOD** programs (bring-your-own-device) are erasing the barriers of technology in classrooms and at work. Beyond overcoming simple technical difficulties, immersive enhanced reality resembles a visit to the museum while today's screen bound devices are more akin to reading a book. Similarly, the search bar allows one to quickly peruse an entire library, while

having a personal AI agent would be similar to navigating the library accompanied by the librarian.

These advantages will not be capitalized by all equally. Today's Internet offers slightly different content adapted for desktops and mobile devices. Enhanced reality and autonomous agents could widen the technology gap, leaving those using traditional devices left out of relevant learning experiences. Over exposure to these new technologies could however bring about adverse **health effects**. Digital literacy may become as important as languages and mathematics in compulsory education and learning how to learn will be the most important skill of all. Individuals, families and society at large will need to transform its relationship with learning as a daily part of life.

BEYOND SCREENS AND KEYBOARDS

From chalkboards to computers, tomorrows classrooms will offer truly intuitive computing.



Social Impacts

Techno....Philia, Phobia and Phrenia

Emerging technologies could be highly divisive, potentially creating large rifts in some societies.

When Google began testing its Google Glass device, the term **Glasshole** came to symbolize fear and annoyance of over-documentation and loss of privacy. While Google Glass never made it to market, taking selfies and sharing moments on social media has become the new normal for a large part of society. Opting out or falling behind could be a handicap in the digital job market. Similarly, becoming tech obsessed could be just as debilitating. There has been countless reports of individuals **losing themselves** in virtual reality, often forgetting the importance of the real world. Immersive enhanced reality could be significantly more mesmerizing, possibly increasing social issues around **digital addictions**. Social media as it exists today may be **isolating individuals**, diminishing their ability to engage in meaningful emotional relationships. Facebook friends could be just one way to substitute real life friendship as some individuals may seek companionship in **artificial intelligence** or **robotics**. **Diminished reality** offers the ability to remove unwanted sights from the world, potentially further alienating individuals from the realities of their society.

There are however many who successfully use digital technologies to forge deep **virtual relationships**. For those fully embracing new possibilities in the Knowing Society, **constant full immersion** will be available. This new form of relationship may be akin to being joined at the hip while also allowing the pair (**or group**) the freedom of geography. Those using artificial intelligence to remember quirks, pet peeves, or shared experiences may seem super human or transhuman to those rejecting technology. These new digitally immersed individuals will be early adopters at first but will likely transition to a majority. The transition period is likely to be highly disruptive to social norms. Table etiquette around the use of smartphones is just the tip of the iceberg.

PROBLEMATIC INTERNET USE (PIU)

"approximately 1% of the adult population may have narrow or 'severe' PIU with another 4% - 14% possibly having problems with Internet overuse."

*Non-substance-addictive behaviors in youth
Brezing, Derevensky & Ptenza*

<http://youthgambling.mcgill.ca/en/PDF/Publications/2010/non-substance.pdf>

The Knowing Society is one where individuals have harnessed the power of new technologies to easily navigate a rapidly expanding sea of information. Artificial Intelligence curates information from diverse sources, taking a range of actions on our behalf. Information is therefore often presented without request. Ubiquitous connectivity and live machine translation broaden the experience to all cultures around the globe. Individuals have their AI agents encounter countless other agents, mediating possible new connections, optimizing the social experience. Society is transformed to a more complex web of interactions in which the speed and direction of human collective action changes in unexpected ways.
