OPTIMIZING YOU

GET THE GIST ON EMERGING WEARABLE INFORMATION TECHNOLOGIES

A Foresight Gist brought to you by:

SHAPING TOMORROW
MAKING BETTER DECISIONS TODAY

Edited by Dennis D. Draeger

THE PREFACE

2014 was meant to be the year of wearables, and certainly online sources produced several articles on the topic. Below is a chart from Google Trends that shows the worldwide publication of articles relevant to the search term over the last few years. Note the marked increase since mid-2013.

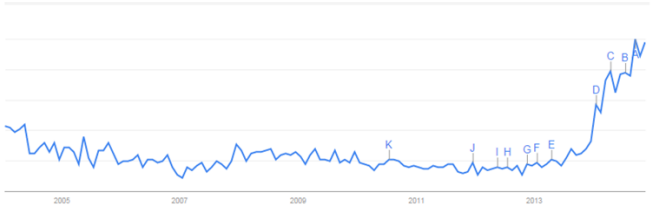

FIGURE 1 GOOGLE TRENDS CHART: WEARABLES

Shaping Tomorrow has also noticed the increase in publications. Below is a chart showing the percentage of total Insights by publication date of Insights that were posted using the tag wearable—a broader term that is still focused more on wearable computing than fashion due to the nature of Shaping Tomorrow.

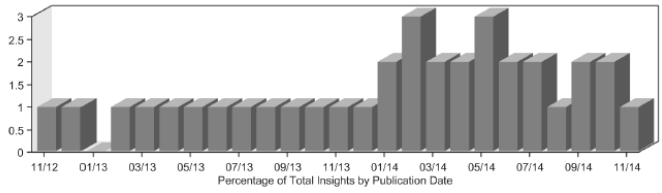

FIGURE 2 PERCENTAGE OF SHAPING TOMORROW INSIGHTS: WEARABLE

Shaping Tomorrow has also produced a useful word cloud showing the words associated with the search term, wearable. The size of each word correlates to how often it is used in related Insights.

FIGURE 3 SHAPING TOMORROW WORD CLOUD: WEARABLE

What is a Foresight Gist?

Gists provide a brief overview of the current and future status of each monthly topic and are intended to help readers quickly and conveniently appraise the future of an issue. Across the year, they will keep you and your organization abreast of issues important to a variety of industries. Each 5-10 page Gist includes an introduction to the topic, a literature review using our Indicators, and a suggested method of analysis. For this Gist, a baseline scenario is provided as a starting point for building other scenarios and strategies more specific for your organization.

The Methodology

Using the latest technology, Shaping Tomorrow has extracted more than 19,000 Indicators (one sentence forecasts) out of Shaping Tomorrow's 85,000+ Insights. These Indicators were summarized to indicate the future of this month's topic, wearables. The Indicators were then paraphrased and edited for reader convenience.

The editor added 15+ pdf reports and 50+ online articles about wearables to Shaping Tomorrow's database to increase the data for this Gist. These same sources and those previously on Shaping Tomorrow were also used for the introduction and to develop the baseline scenario.

The Subscriptions

Shaping Tomorrow offers clients the service of searching these Indicators at their convenience for a fee. Searching the Indicators gives clients greater flexibility for strategy development. Please contact us to find out more.

The Gists can be subscribed to or purchased individually for a more modest fee. Gists are published 12 times per year at $40 per issue. You may subscribe for the full year for $400, and you may order a custom gist for $4000.

The Future Gists

We endeavor to make each Gist a launching pad for organizations to facilitate their own strategic development. Future Gists will include many changes to better accomplish this goal, but feel free to tell us what you think would improve this Gist and which topics would interest you.

THE ABSTRACT

Wearable web devices, simply known as wearables, provide an evolution of current mobile technology to optimize wearer performance of everything from athletics and gaming to shopping and stock trading. These wearables accelerate access to information using more intuitive methods, and they increase the types of information made practical to a variety of industries. Wearables will help ramp up the changes spurred by the advent of the internet, but they will also intensify the existing questions surrounding privacy, security and society's definition of humanity.

As the devices enter the mainstream, the cost for R&D will drop, and more organisations will be able to utilize the devices to their full potential. Employees will also want to wear their devices to work, and organisations will have to decide how to regulate their use.

If you need help making sense of wearables or any other potential issues for your organization, please contact us at Shaping Tomorrow for a no-obligation strategic conversation.

THE PRESENT

Wearables are entering the consumer market thanks to the emerging convergence of seven primary trends which act as functions of the wearables—each at a different stage of development:

1. Mobile: One Among Many The mobile industry has grown from phone conversations and text messages to cloud based app usage. The current role of the smartphone is evolving beyond one small screen to a web of wearable information technologies that could interact with a larger screen (e.g. tablet, computer, TV) at home, the office, or public spaces.
2. Measuring Myself Self-tracking or quantified self refers to the many methods—especially via wearable electronic devices—consumers can use to gather data about their activities and behaviour (e.g. exercise, interest levels) to make better decisions and improve their lives.
3. Immersive Experiences Immersive technologies (e.g. 3D audio, holograms, virtual reality, augmented reality) improve realism in virtual interactions for telepresence, conferencing, gaming, etc.
4. Spying on Myself Sousveillance is the wearing of audio or video recording devices used to document the wearer's activities throughout the day with a first person perspective—the reverse of surveillance. The technique has been adopted by those in a variety of occupations for legal protection and professional gain.
5. Thinking Outside the Brain Brain-computer interaction has broken out of the lab and medical sector and entered the consumer market. The current products are simplified and struggling to find a viable application, but they also present a new method for interfacing with devices as well as measuring physical activity.
6. Wearing My Password Biometric authentication is the manner of identifying a person through their unique physical or behavioral traits. Fingerprint authentication has been common in recent years for laptops and phones. Measuring a person's unique brain waves and heart rate are two of the leading methods for wearables which

may combine to provide multi-step authentication methods for improved security and convenience.

7. Feeling the Data Tactile displays have been used for decades by people with sensory impairments, but researchers have been looking to use haptic feedback for fully capable people. Currently vibrations can communicate the receiving of message notifications and GPS directions, but they may be effective in communicating text for increased multitasking and private messaging.

These seven functions collectively offer seven core benefits that will evolve as the technology advances. Wearables will offer more benefits than these seven, but these core benefits represent the applications upon which the current market is focused:

1. Immediacy—Because wearables are not hidden in a pocket, they will accelerate access to information thereby improving efficiency and reducing lost time.
2. Consistency—Wearables will also constantly monitor and communicate with the wearer and their environment to create a consistent stream of data.
3. Freedom—Wearables are hands-free and time saving devices that will liberate the wearer for greater multitasking or reducing stress during down time (i.e. no more checking for notifications that aren't there or aren't relevant).
4. Awareness—Wearers will be more immediately aware of their location and surroundings for local events, shopping specials, social networking (both on screen and off), security concerns, etc. Much of this benefit is already available on current smart phone apps, but they are under-utilized and often ignored due in part to smartphones being hidden in pockets or bags.
5. Security—Bringing the technology closer to the body will frustrate (though certainly not completely deter) thieves. More importantly, wearers will also pay more attention to nearby hazards as they gain greater awareness of their immediate surroundings. Wearables will also increase the number of authentication steps required for various accounts while being more convenient to sign in—expanding the application of automated preference settings to the real world (e.g. brightness of lights, music playlists, product wish lists for in store advertising).
6. Memory—Wearables will not only access information from outside sources more conveniently, thereby playing the role of memory for the wearer, but wearables can record and archive all the data wearers produce. And they will record the actions the wearer took to produce that data allowing the wearer to remember and gain insight from their activities.
7. Optimization—All of these benefits will combine to help wearers live their lives at peak performance and optimize the wearers' interaction with data's ever expanding volume, variety and velocity. Whether the data is personal, professional or educational; wearables will provide an edge to exploit the data.

THE NUMBERS

- The Global 1000 will garner 5% of their sales from the data collected from wearables.
- Roughly 2/3 of consumers plan to purchase an Internet of Things device for their home in the next 5 years.
- Wearables ownership will increase from 7%in 2014 to 14% in 2015.
- 14% of consumers want to buy smart clothing and 16% want to buy a head mounted display.
- By 2017, 64 million wearables will be shipped to the global market and double to 130 million by 2018 to gross close to $6 billion.

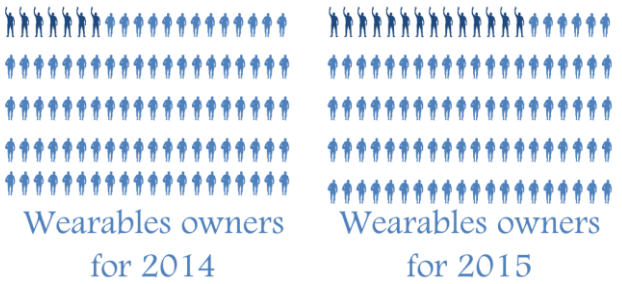

FIGURE 4 PERCENTAGE OF WEARABLES OWNERSHIP WILL DOUBLE IN 2015 (IMAGE SOURCE: EDITOR)

THE GIST

Smartwatches

- 25% of consumers plan to buy a smartwatch in the next five years.
- The success, however modest, of smartwatches indicates that the electronics industry and their target demographic are keen for ever more portable and convenient electronic devices.
- In the future, flexible displays will supplant current smart watches to be more practical by displaying more information and more fashionable with a greater versatility of style.

Head Mounted Displays (HMD)

- Only 3% of surveyed consumers expect to adopt heads-up displays or smart clothing despite offering the most potential benefits.
- Google Glass will be "the next iPhone," says new report.
- Head mounted displays may become more valuable to users than smartwatches as research progresses into eye tracking that could reveal subconscious reactions in users and lead them to data that is more relevant for them amid the enormity of today's ever increasing datasets.

Internet of Things

- Wearables will play an integral part in the internet of things and enable an internet of nearly everything.
- 83% of respondents to a recent survey and study done by Pew Research Internet Project believe that wearables and the internet of things will provide significant benefits by 2025.
- Ownership of wearables is expected to reach 14% by the end of 2015, and Internet of Things in-home devices will increase from 4% to around 60%.

Health and Wellness

- Juniper forecast that fitness/ sports wearables along with healthcare devices will combine for a market share of over 80% by the end of 2017.
- Wearables will help health conscious individuals make more informed decisions thanks to the increase in personal data, and wearables will prove even more valuable as leading brands combine their systems with the wider health industry.
- Wearables and their sensors will need to become more robust for consumers to use them in every aspect of their lives as manufacturers are clearly pushing for.

Applications

- Fitting workers with wearables can boost their efficiency by up to 8.5%, according to a new study from Goldsmiths, University of London.
- Marketing will improve significantly with increasing data collection and advanced consumer insights.
- Mobile payments will be more convenient and potentially more secure due to wearables—Apple is already making strides to advance the technology.
- Wearables will provide an evolution of current mobile technology to optimize wearer performance of everything from athletics and gaming to shopping and stock trading.

Gist from Shaping Tomorrow's Wearing IT Report

- Google will be able to analyze and potentially measure the effects of real world advertising on billboards and in magazines.
- Mobile data and the sensors on wearables will provide apps with greater context for displaying information that might seem tedious and uninteresting on a standard smartphone.
- Apps could notify wearers immediately of nearby emergencies, construction zones, statistically high risk neighborhoods, and the social media interactions of people they meet.
- Brands could use similar techniques to advertise to consumers while they are in a store where the brand's product is stocked.
- iBeacons and similar technology could expand beyond marketing to management (notifying employees of important communiques at an optimal time and place for the wearer).

- Consumer wearables will move from preventative medicine toward more methods
- Consumers and professionals will take the internet with them not just in their pockets but directly in front of their eyes.
- Eventually multiple biometric authentications (i.e. bone conduction coupled with heart rate and brain waves) could be performed simultaneously thereby maintaining their convenience and their security.
- Professionals in a variety of sectors (e.g. trading, journalism, security) could find tactile displays invaluable especially if they must monitor a range of data sources and be alerted to information at a moment's notice.
- SMS messages could be sent using speech recognition apps such as SIRI and Google Now and received through tactile displays.
- that medical professionals can use to monitor and even treat patients.
- Tourists could connect tactile displays to GPS directions via a smartphone to help them navigate strange cities while being less conspicuous to criminals.
- Personalization of wearables data will help advertisers improve the immersive experiences in their ads and the information displayed to a wearer using augmented reality.
- Sensors will detect a range of data to communicate to wearables—dangerous chemicals, oxygen levels, and hazardous emissions.
- Games and simulations will also help users adapt to less accessible wearables like the tactile displays and BCIs that require more practice to master

THE BASELINE SCENARIO

The benefit of organizational efficiencies will drive the wearables market for the next 5 years, but soon after mainstream consumer adoption will catch on to further spur innovation into the next decade.

No modern technology has needed to focus on aesthetics more than wearables, but even if the user experience can be perfectly designed, wearables pose an assortment of other concerns that could crush mainstream adoption even in the workplace. Two of the most significant barriers to adoption are questions about the true convenience of wearables and privacy concerns.

If we look at the plausible extremes these two barriers to adoption are likely heading, we can provide a foundation upon which to develop scenarios for strategic planning purposes. Within the expected public perceptions of these barriers, we include pre-existing socio-cultural representations for how society may view the technology within the next 5-10 years. These representations explain the unconscious or emotional motivations for consumers with these perspectives, and many journalists and bloggers are already using similar metaphors when discussing these technologies. The representations are: Terminator/ Darth Vader, Star Trek, Little Red Riding Hood, and The Odyssey.

In Figure 1, we define four extreme perspectives of both convenience and privacy according to likely public perceptions. Perspective 1 sees wearables as having extremely low convenience because the devices are bulky and appear to drive antisocial behavior according to the technology's detractors. They believe too many wearables are on the market, and that wearers look like cyborgs from science fiction horror films.

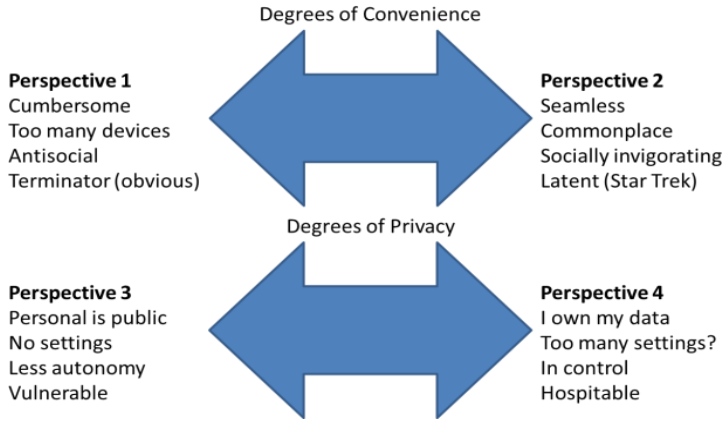

FIGURE 5 DEGREES OF CONVENIENCE AND PRIVACY

Perspective 2 sees wearables as having extremely high convenience

because the devices enable a seamless connection for users to family, work, and the wider world while invigorating their social interactions through suggested topics and commonalities. These people see the devices as commonplace, even mundane, and the optimism of science fiction stories such as Star Trek is more likely to drive their attitudes to these devices.

Perspectives 3 and 4 focus on the public perceptions about the degrees of privacy that these devices will eventually offer. Perspective 3holds that the devices cause some consumers to fear that their personal lives would become too public with few settings to control what aspects of their measured lives are published to the internet. Therefore, they have little autonomy and these devices make them feel as vulnerable as Little Red Riding Hood.

Perspective 4 shows an alternative scenario where privacy settings abound and the consumer rests assured that they own their personal data and are able to control that data as they see fit. Therefore, they share that data according to a deep seeded need to be hospitable—a trait of great value in ancient Greece as seen in The Odyssey.

In Figure 2, we map the four perspectives on these two barriers according to a cross-impact matrix. It shows the intersection of the optimistic tech community, Perspectives 1 and 2, with the equally vocal pressure groups advocating privacy, Perspectives 3 and 4 from Figure 1. These perspectives are at extreme ends, and the future is likely to unfold closer to the center with society experiencing paradigm shifts regarding both wearables' practicality and concerns over their privacy. The arrows at the edge of the circle represent these fluctuations between the four combinations of the four different perspectives. The lower right quadrant of Figure 2, Perspective 1+4, is where we believe the industry currently rests. Although wearables already have a variety of applications, they are still cumbersome due to a lack of standards, questionable interconnectivity and a failure to achieve fashionable status. However, they are mostly private because consumers have control over who they share their data with—although not necessarily how they share that data.

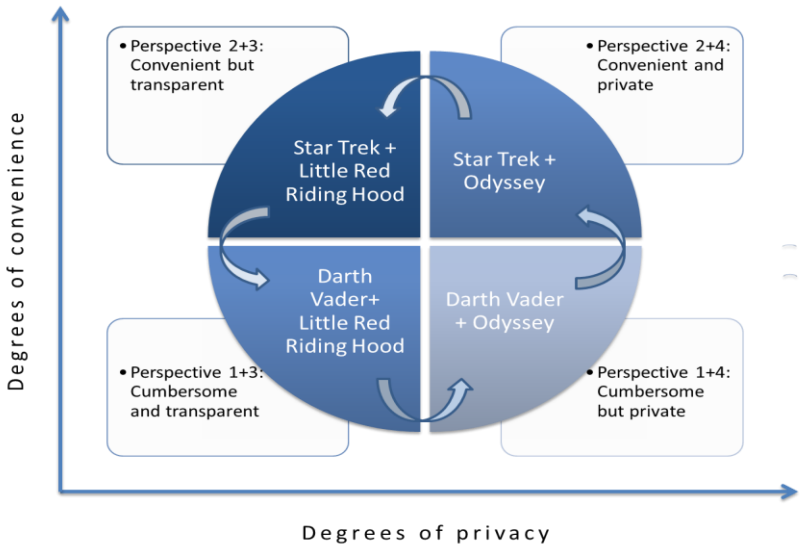

FIGURE 6 CONVENIENCE AND PRIVACY IN A CROSS IMPACT MATRIX

For the baseline scenario, we see Perspective 2+3 arriving within the next 5 years as tech companies hash out the standards and interconnectivity issues. Whether any wearable can be made truly fashionable in that time would be irrelevant if they take hold at work first. Fashion is not a concern for work related wearables as long as they accomplish their intended purpose, but the data will then be inherently transparent. As mainstream wearables continue to evolve, most consumers will likely sacrifice more of their privacy for the benefit that wearables and their apps bring. During this transitional period, organisations—whether using wearables internally or providing a wearables related service to consumers—will need to consider security above all else to maintain trust and ensure stakeholder adoption.

Once consumers grow accustomed to seeing employees and athletes wearing these devices, they will slowly filter to the rest of society. By that time, we expect the tech community to sort out the killer application of the devices and grasp the interaction of privacy and benefit effectively. Therefore, we believe the baseline scenario leads to Perspective

2+4 as dominant within the next 10 years albeit in a less idealized manner. Consumers may only have limited control of their data with most apps, but the IoT and other peripheral technologies will catch up to provide greater benefit for wearers less concerned about their privacy. Although, wearables may never be truly fashionable, they will likely appear conventional for the casual consumer and the workaday world. However, many of the sensors will be incorporated into clothes and traditional fashion accessories so that wearers can maintain their connections during while being fashion conscious.

Perspective 1+3 is the basis of a plausible alternative scenario if wearables are unable to capture a mainstream audience through a lack of practical application and an abundance of unfashionable stigmas—a persistence of terms such as glassholes. Indeed glassholes could become a generic term applied to anyone wearing any such devices.

Although, we are confident that Perspective 2+4 will win out, we also believe that some demographics will inflexibly maintain Perspective 1+3 for the duration of the next ten years. However, exploring such a scenario could reveal opportunities for your organization that you might not recognize otherwise.

THE NEXT STEP

This Gist is just part of the story. How will wearables affect your industry? How could they enhance your organization? Will these devices be successful with your stakeholders? What concerns do wearables raise? What other future trends will wearables interact or converge with?

Contact us for a customized and comprehensive product. You may also want to buy our report, Wearing IT: Trends expanding the wearable web. To monitor future developments in wearables, follow Shaping Tomorrow's wearables Insights.

THE SOURCES

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48. Google's Tango phone has human-like understanding of space
49. Google's 'Pay Per Gaze' Patent Paves Way for Wearable Ad Tech
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69. WEARING IT: Trends expanding the wearable web

THE EDITOR

Dennis Draeger is an innovation manager and foresight researcher working as a senior researcher at Shaping Tomorrow, and he is the head of Aiglatson Foresight Research (AFR). Dennis' expertise lies primarily in horizon scanning, scenario planning, and qualitative technology forecasting.

He has consulted with local SMEs, global corporations, and government agencies in North America, Europe, Asia, and Australasia. He has focused on technology's place in social change and consulted on the social implications of various technologies from 3D printing's potential invasion of the retail and manufacturing sectors and EHS concerns of nanotechnologies to legal issues surrounding transhumanist enhancements.

Dennis believes that today's solutions become tomorrow's problems unless organizations optimize their innovation strategies through constant maintenance. He uses Strategic Foresight to provide organizations with a clearer perspective of their external environment and its implications for their sector to sustain growth, manage risks, and find competitive opportunities.