CREDIT SUISSE

Technology

Connections Series

The Next Big Thing - Wearables Are in Fashion

- **Bottom Line:** Jointly the Credit Suisse TMT and Retail Teams conclude that we are at a potential inflection point in market adoption for wearable technology driven by: (1) a growing installed base of Smartphones, (2) component cost/performance improvements, (3) an established software ecosystem and (4) new apps/business models. Wearables are rapidly evolving from single function, hard to connect, dumb devices, to what we believe will increasingly become multifunction, always-connected, smart/aware devices. We estimate a potential ten-fold increase in TAM over the next 3-5 years from $3-5bn to $30-50bn – still only 6% of total CE spent and only a 15% attach rate to the Smartphone installed base. Wearables will have a significant and pervasive impact on the economy in coming years – profoundly altering how we interact with our technology, our environment and each other; providing context to location, and evolving the Big Data paradigm from the unstructured to what has been to date, uncollected data. While early, it's a Mega-Trend with far reaching implications.
- **Technology – AAPL, GOOG, and BRCM in the Pole Position.** The dominant installed base of Android/iOS place GOOG/AAPL in the pole position to leverage this new opportunity. We estimate that an AAPL iWatch could generate $10bn/$3.30 rev/EPS assuming 25% attach rates at a $250 ASP, and BRCM's strength in Connectivity/GPS could drive 30% share of Wearable Semi content, and $2bn/$0.70+ in rev/EPS. While trends are still early – we have identified three clear winners: AAPL, GOOG and BRCM.
- **Retail Impact – Nike, Adidas, Under Armour Early with Customer Engagements.** Apparel has been an earlier adopter of Wearable technology – first in the form of the wristwatch, but more recently with fitness monitors like the Fuelband and FitBit. The primary purpose to date has been to increase customer engagement with athletic/fitness brands with the potential to begin to cannibalize the $56bn watch market. We would highlight Nike, Adidas and Under Armour as early adopters who have leveraged Wearables to enhance the fitness experience/efficacy of their product.
- **Internet Impact – More Touch Points For Content and Services**. For internet providers, Wearables increase the number of channels through which providers can deliver content/services, provide a more granular profile of the user, and offer the ability to more seamlessly integrate their services in the normal flow of the users daily activity. We highlight Google Now, Yelp Monocle, and eBay Milo as use cases that would significantly benefit from a proliferation of the Wearables market.

The Credit Suisse Connections Series leverages our exceptional breadth of macro and micro research to deliver incisive cross-sector and cross-border thematic insights for our clients.

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Executive Summary

- **Key Conclusions:** A rapidly growing installed base of mobile computing devices and a confluence of hardware/component innovation, software ecosystem maturation and emerging business models should drive significant growth in "Wearables" (smart watches, glasses, monitors etc.) over the next several years from an estimated $3-5bn in 2013 to what could be well over $42bn in the next 3-5 years – assuming 15%/25% attach rates to Smartphone installed base/shipments and $100 ASPs; this would represent 6% our expected CE spend. While it is still too early to assess how much of the spend on "Wearables" will be incremental versus cannibalistic, the Credit Suisse TMT and Retail Research Teams have identified the following key trends: (1) Hardware/component innovation: Low power connectivity and processing, sensors, and touch and voice interfaces could represent a greater than $5-8bn semi TAM over time, (2) Software Ecosystem: The dominance of Android and iOS place GOOG and AAPL in the pole position to leverage this new opportunity – for example we estimate that an AAPL iWatch could generate $10bn/$3.30 rev/EPS assuming 25% attach rates at a $250 ASP, (3) Business Model Leverage: Multiple permutations including deeper customer engagement (Nike, Under Armour), new applications, mobile payments, medical monitoring, e-commerce, location based service and big data evolution from unstructured to un-captured data. Wearables will have the potential to add context to location – greatly deepening our understanding of how we interact with our surroundings. While trends are still early – we have identified three clear winners: AAPL, GOOG and BRCM.
- **Why Now: Right Time, Right Place.** Wearables are not new – they can trace their history back to the 15th Century when Peter Henlein first crafted ornamental time pieces worn as pendants. Five hundred years later, in 1968, the Hamilton Watch Company designed the first digital watch for Stanley Kubrick's "2001: A Space Odyssey" and in 1975 both Hamilton and Hewlett Packard introduced the first calculator watches. Over the last decade, incremental functionality has been added including altimeters, thermometers, barometers, pulse and head-mounted displays mainly for the enthusiast market. We currently count over 50+ "Wearables" in the market today including products from Nike, Jawbone, Motorola, Sony, BodyMedia, FitBit, GoPro, and others. We see an extremely fertile environment for a significant leap in "Wearables" over the next several years from what has been limited function/connectivity, to what is going to be truly smart/aware devices with ubiquitous connectivity. The foundation of this Wearables revolution is the rapidly growing installed base of Smartphones (from 1.1bn to >3.0bn units in 3-5 years) combined with significant improvements in low power connectivity, sensors, battery life, interfaces and displays. Along with Google Glass and the much rumored AAPL iWatch, we see multiple entrants including: Samsung, LG, Metawatch, Misfit, Martian, Allerta, I'm Spa and CooKoo, among others.
- **Sizing the Opportunity – It's Bigger than You Think.** The Consumer Electronics market is approximately $690bn, of which compute (PCs, Tablets, Smartphones) is approximately $380bn. Looking at markets tangential to Wearables, the current watch market is approximately $56bn, while the current market for sunglasses is $20bn. Looking at the CE Wearables market to date, we estimate that Nike has sold between 1-2 mm FuelBands and we estimate the entire fitness/health Wearables market to be between approximately $2-3bn. Sizing the Wearables market over the next 3-5 years is not easy – new applications/functionality or business models are as likely to push attach rates up, and disappointing applications are likely to drive attach rates down – of note we estimate that BT headsets have less than a 15% attach rate to handset shipments. Our methodology in estimating the size of the market assumes attach rates around Smartphone installed base/shipments and corresponding ASPs – reflecting our view that Smartphones will become the "personal cloud" for Wearables compute,

dictated by size constraints on battery life – hence our view that low power connectivity is a key enabling technology for the Wearables market. Our analysis suggests that a 15%/25% attach rates of Wearables to Smartphone installed base/shipments would yield a $42.5bn TAM over the next 3-5 years. Further, assuming that semiconductors tend to represent 18-22% of BOM in CE devices, would generate a chip market that could be $5bn-$8bn TAM.

- **Retail and Internet – Wearables Increasing Engagement.** Apparel has been an early adopter of Wearable technology – first in the form of the wristwatch, but more recently with fitness monitors like the Fuelband and FitBit. The primary purpose to date has been to increase customer engagement with athletic/fitness brands with the potential to begin to cannibalize the $56bn watch market. We would highlight Nike, Adidas and Under Armour as early adopters who have leveraged Wearables to enhance the fitness experience/efficacy of their product. For internet providers, Wearables increase the number of channels through which providers can deliver content and services. While not unlike the mobile experience, Wearables also provide an incrementally more granular profile of the user and offers the ability to more seamlessly integrate services in the normal flow of the users daily activity. We would highlight Google Now, Yelp Monocle, and eBay Milo as use cases that would significantly benefit from a proliferation of the Wearables market.
- **A Brave New World – Adding Context to Location.** While it is unlikely that the Wearables market will move the dial in the next 6 months, our TMT and Retail Research Teams see the potential for a sizable and consequential market over the next 3-5 years. The unintended consequences or yet-to-be envisioned opportunities are perhaps even more exciting than the tangible, easy to define opportunities. While we live in a more connected world today than we did yesterday, connectivity is still mainly one dimensional – it has the ability to say where the user is, but not what the user is doing – the next wave of Wearables will be able to add context to location – providing a deeper understanding of how we interact with our surroundings. In addition, we see a significant broadening of the sphere of influence Wearables could have on the economy – take for example the health potential for the Wearables market or insurance implications (i.e. Progressive Snapshot Discount) or mobile payments as a few incremental examples. Wearables could also provide the backbone for the next evolution of Big Data Analytics from unstructured data to un-captured data. It was not the intent of this report to explore all the facets of this market, as much as lay a foundation for future discussion. As Bill Gates once said – "We tend to overestimate the next three years, and underestimate the next five."

Wearables: Right Time, Right Place

The invention of the most common Wearable technology, the modern watch, has been generally credited to Peter Henlein through his invention of the mainspring – the battery of the 16th century timepiece. Innovation over the following several hundred years improved the timekeeping and form of the watch – the balance spring (1657) made possible the addition of a minute hand, then the cylinder escapement (1695), temperature compensation (1765), lever escapement (1759), mass manufacturability (mid-1800s) and lastly, the quartz movement (1969). These timekeeping advances not only gave a previously useless ornament a more practical use (lack of accuracy meant early watches were more ornamental for the aristocracy than functional), they also ultimately enabled a broader market availability for what has become the modern day watch. Today, nearly 500m watches per year are consumed globally, both mechanical as well as quartz-powered, with both digital and analog displays.

Exhibit 1: Early Mechanical Watch (c. 1530)

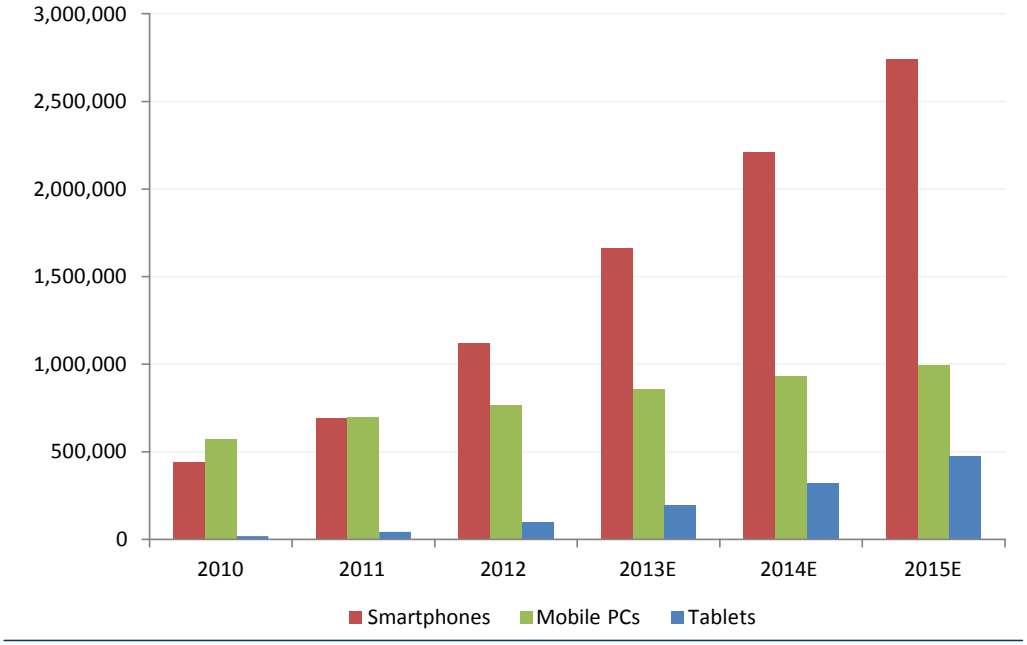
Source: Wikipedia

Exhibit 2: Junghans' Mega 1 (c. 1990) Syncs Time via RF

Source: Wikipedia, Junghans

From a device perspective, we believe the rapid adoption of mobile compute products, principally by consumers, means that the environment is ripe for small, highly portable mobile computing products. CS HW analyst Kulbinder Garcha estimates the Smartphone install base is some 1.1 billion today, and is expected to reach some 2.7 billion by 2017. By 2015, he sees the tablet install base rising to some 475 million and notebook installed base swelling to some 1 billion. The growth of each of these categories in his eyes makes the environment ripe for the adoption of Wearable computing products as the average consumer will have at least one, if not two of these products close by at all times. This means that whether the Wearable computing device is a wristband for fitness like the Nike Fuelband, or whether it is a smartwatch like the Pebble, or augmented reality glasses, the compute function for heavy applications can be handled by the cloud – a personal cloud i.e. tablet or smartphone via Bluetooth, or larger cloud via WiFi.

Exhibit 3: Installed Base of Computing Products Can Support Wearables Adoption



Source: Company data, Credit Suisse estimates

Exhibit 4: Current Smartwatch Product Portfolio

Vendor	Samsung	LG	Sony	Motorola	Pebble	NIKE	Garmin	Metawatch	I'mwatch
Model	Samsung S9110	GD910	SmartWatch	MOTOACTV	Pebble Watch	NIKE+Sportswatch GPS	Approach S1	Strata	I'mwatch
Image									
Technology	GSM	HSDPA/GSM	NA	NA	NA	NA	NA	NA	NA
Announced	Jul-09	Jan-09	NA	NA	NA	NA	NA	NA	NA
Shipping date	Nov-09	Aug-09	NA	NA	NA	NA	NA	NA	NA
Memory	40 MB	NA	NA	NA	NA	NA	NA	NA	4 GB
Pixels	176 x 220	128 x 160	128 x 128	176 x 220	144 x 168	NA	64 x 32	96 x 96	240 x 240
Dimensions (w x h x d) (mm)	57.5 x 41.1 x 12	49 x 39 x 13.8	36.0 x 36.0 x 8.0	46 x 46 x 9.6	NA	NA	45.72 x 68.58 x 15.24	NA	52.9 x 40.60 x 10
Weight (g)	91	84	41.5	35	NA	66	52	NA	90
Volume (cc)	28	26	10	20	NA	NA	48	NA	21
Screen (in)	1.76	1.43	1.3	1.6	1.26	NA	1	NA	1.54
Camera	No	VGA	NA	No	NA	NA	NA	NA	No
Bluetooth	Yes	Yes	Yes	Yes	Yes	NA	NA	Yes	Yes
Bluetooth Version	2.1	2	3	1.5	2.1	NA	NA	4	NA
GPS	No	No	NA	Yes	NA	Yes	Yes	NA	No
Talk time (hrs)	4.3	2.0	NA	NA	NA	NA	NA	NA	NA
Standby time (hrs)	300	247	NA	325	NA	NA	504	168	NA
Price $	Past offering at 640	Past offering	115	149	150	169	180	179	275

Source: Company data, Credit Suisse estimates

Technology Has Evolved

Improving battery life through higher energy density (more mA/cm^3), reducing/optimizing power consumption, and efficient power conversion is the core concern for mobile products. We also view connectivity as a core function for the Wearable market – especially as battery constraints might force more compute intensive activities to run off-device (i.e. compute on your Smartphone, transmit to your Wearable). Chief among the connectivity standards is Bluetooth Low Energy (LE), a feature within the BlueTooth 4.0 standard, which has a lower overall power consumption profile vs. BT4.0. Secondarily, WiFi (likely 11n), NFC and GPS will likely be included in Wearables depending on the application and dependence on external devices. Processing will most likely be handled both on and off device to reduce the power consumption of compute intensive applications. Sensors, accelerometers, and other measurement devices also have a significant place in Wearables, as would interface technologies associated with touch, voice, or motion.

Exhibit 5: Key Enabling Technologies for the Wearable Market

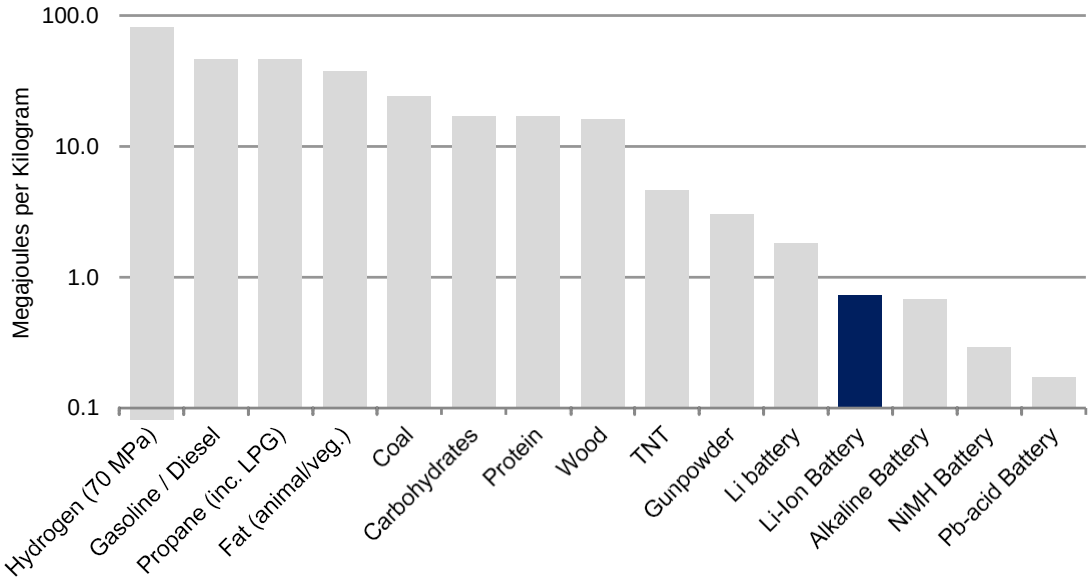
Function	Technology	Reason	Problem Solved	Solution Providers
Battery	Battery Composition	Limited form factor of mobile devices means longer battery life is only possible through increasing size or increasing energy density of battery - size growth not likely	Increased function and operating use time, eliminate battery rigidity, reduce lithium hazard	Sony, Samsung, BYD, multiple private startups
Connectivity	Bluetooth 4.0/LE	Wireless connection consumers significant battery power. Also, offloading data and processing to other devices/the cloud depends on the connectivity data rate	Wearable-to-smartphone data connection	BRCM, CSR, Mediatek
Connectivity	WiFi	Higher data rate applications will benefit from the throughput of 11n or 11ac WiFi	Wearable-to-WiFi hotspot and smartphone connectionn	BRCM, CSR, NXPI, TXN
Connectivity	GPS	Wearable products will likely include location based features/functions, requiring GPS	Enable location based content and services	BRCM, CSR, NXPI, TXN
Processing	Low Power MCU/CPU	In smaller devices with less battery power, minimizing the processing power requirement on-board is critical for product battery life	On board compute will need to be as low power as possible to preserve the reduced battery energy. Nonetheless, small amounts of control and device management will need to be done on-board. Low active, low standby and rapid response to wake commands are important	FSL, MCHP, TXN, NXPI
Power	DC Conversion	Converting battery power into the correct voltage/current is not without energy loss - conversion is 80-95% efficient.	Inefficient conversion wastes battery life, thus increasing the conversion efficiency lowers the effective battery consumption vs. a lower efficient system	MXIM, TXN, SWKS, ONNN
Sensors	Motion, Environmental, and Body Monitors Sensors	Wearables will be used to measure activity levels, distance traveled, vital statistics, etc. to be processed and/or communicated to other devices/the cloud	Wearables will be used for a host of health and fitness functions, requiring sensing/monitoring and tracking of changes in measured inputs	ADI, INVN, STM, TXN, MXIM
Interface	Touch Display	Wearables with displays will likely be enabled with touch. The ability to have touch function independent of powering the display could help reduce battery life	Wearables with large enough displays will need user interface. By not powering up the display to engage touch, it further reduces the average active power of the device	SYNA, BRCM, CY, ATML
Interface	Voice	Wearable products may not have physical inputs, directing by voice activation becomes the default	Contact-less control of wireless devices will likely be voice driven. Isolating voice relative to ambient noise will be important	ADNC, CRUS

Source: Company data, Credit Suisse estimates

The Constraint of Mobile Technology – Power

The primary limitation to any mobile technology on any scale is the practical size of its power source – if fuel were no limit, a modern airline jet engine could run for 10-20k hours (~2 years), powering an airliner roughly 5-10 million miles. Three factors determine the operating time of any mobile machine, (1) the energy density of the power source (i.e. the amount of energy that can be mobile), (2) the efficiency in converting energy from the storage form to a usable form, i.e. getting the potential energy to do work, and (3) the rate of energy consumption by the machine. In the above jet engine example, A-1 jet fuel contains 34.7kJ/cm^3 or 9.6Wh/cm^3 of energy, (2,526mAh/cm^3 at 3.8v) – by comparison the Li-Ion battery in iPhone 5 has an approximate energy density of 142mAh/cm^3, or 1/18^h the energy density of jet fuel. Put another way, if an iPhone 5 battery had the same energy density as jet fuel, all else equal, the talk time would be 6 days and standby time would be 5+ months.

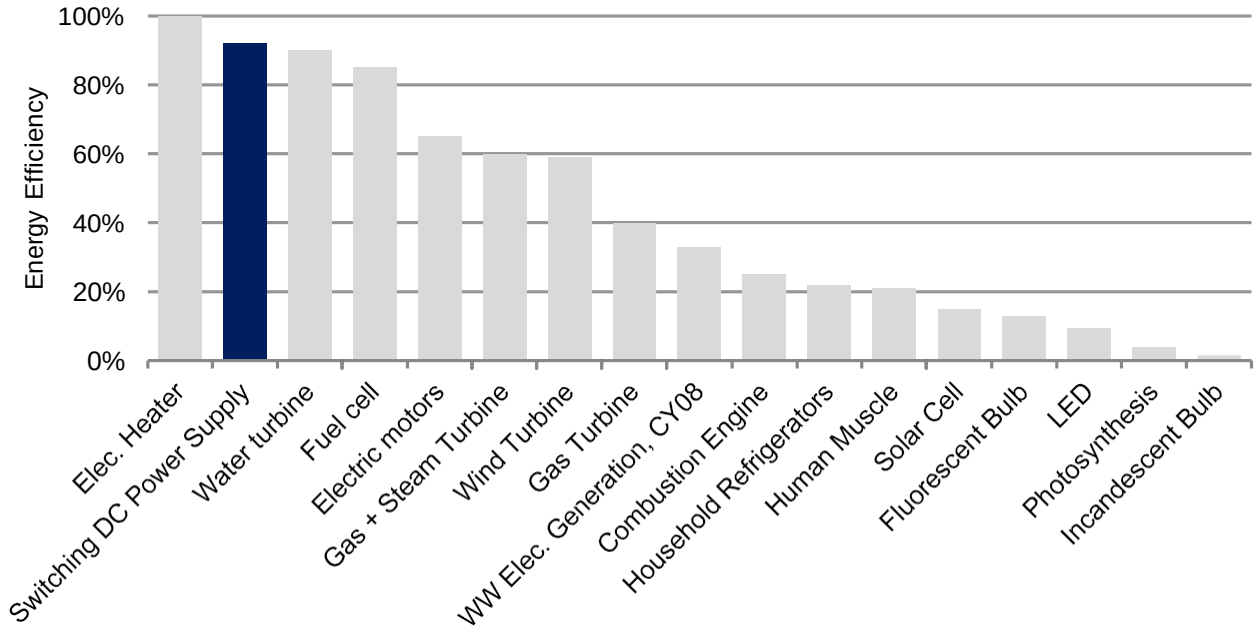
Exhibit 6: Energy Density of Common Sources of Power



Source: Wikipedia, Credit Suisse

Another part of the equation is converting the stored potential energy into work. In the above example, jet engine efficiency is ~30%, implying the effective energy density as generated via the engine is 2.9Wh/cm^3 (758mAh/cm^3 @ 3.8V). Typical high performance DC converter technology is able to operate at >90% efficiency, but assuming an overall system efficiency of 75% would imply the effective density of the iPhone 5 battery is 107mAh/cm^3 – effective energy density disparity with jet fuel is now only 7x vs. gross energy density difference of 18x. An iPhone 5 with similar effective energy density would have a 57hr talk time and 66 day standby.

Exhibit 7: Energy Efficiency of Common Machines and Devices



Source: Wikipedia, Credit Suisse

Options for Increasing Battery Life for Wearables

In addressing the Wearables market, four factors contribute to increasing the use time of the product; (1) increase the battery size (more cm^3), (2) increase the energy density (more mAh/cm^3), (3) reduce overall device energy consumption and (4) increase the conversion efficiency.

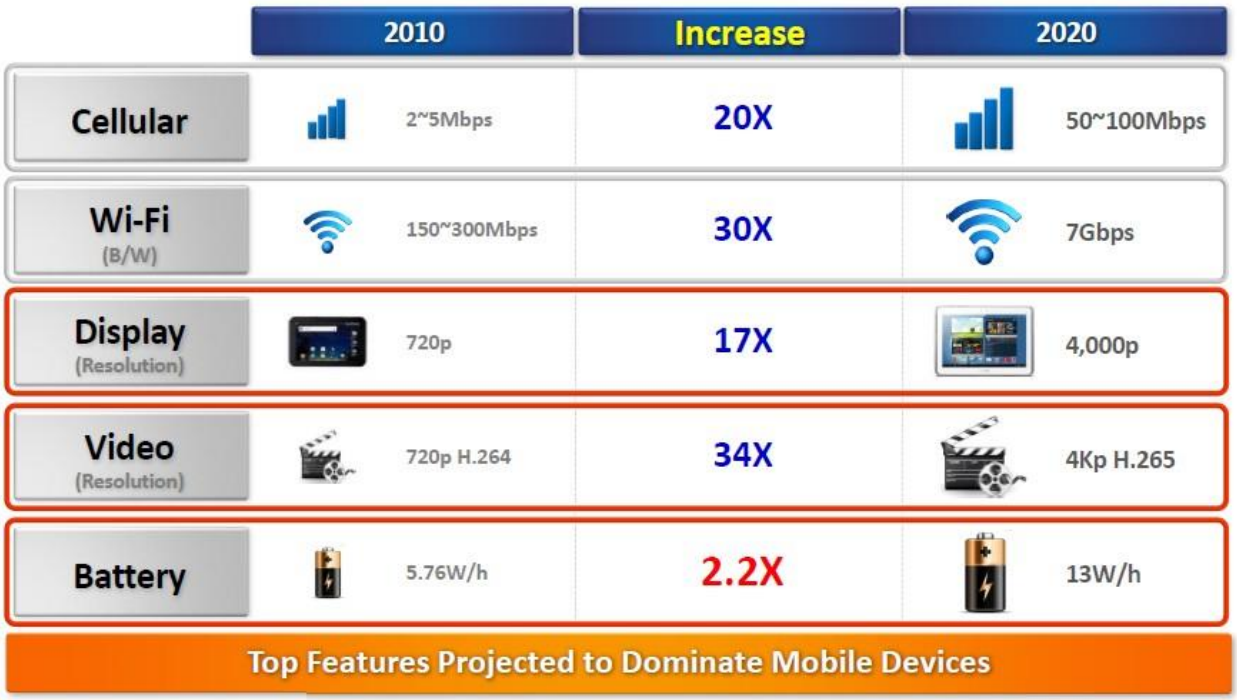
- **Form Factor Limits Battery Volume Growth.** Wearables are physically constrained from increasing battery volume (cm^3) given the small form factor – battery volumes will likely be much smaller in Wearables than current Smartphones. A form factor approximately the size of a standard men's wristwatch of 3.8cm x 3.8cm x 1.3cm, assuming a battery consumes half the thickness and battery density of $142mA/cm^3$, would translate to a battery capacity of ~1000-1200mAh – by comparison the iPhone 5 is 1440mAh and the Samsung S4 is 2,600mAh. While current Li-Ion batteries are rigid and bulky due to the need to protect the lithium from exposure to air/water, new innovation in battery composition could enable denser and even flexible batteries. Imprint Energy, a Silicon Valley startup, is developing a Zinc-based flexible battery technology which could both enable Wearables to be filled with battery even in flexible parts of the product, and offer considerably higher energy density as the zinc would not need the same insulation as lithium, thus, reducing the volume of the battery.

Exhibit 8: Imprint Energy is developing Zinc-based flexible batteries, with an eye on the Wearables market

Source: Gigaom, Imprint Energy

- **Battery Energy Density Slow Growth.** Battery energy density for Li-Ion batteries, the predominant chemistry for mobile devices, has grown only modestly for the last decade. The Palm Treo 600 launched in C4Q03 with a 1,800mAh battery measuring roughly 5.9cm x 3.4cm x 1.0cm – the approximate 20.1cm^3 battery boasted a density of ~87mAh/cm^3**.** While primitive in features by today's standards (3G, 144MHz CPU, 32MB memory, VGA camera, etc.), it did boast 4 hours of talk time and 240 hours of standby. By comparison, the iPhone 5 has a 3.8V 1440 mAh battery measuring roughly 9.2cm x 3.2cm x 0.35cm – the iPhone 5 battery energy density of 142mAh/cm^3 is roughly 63% higher than the Li-Ion battery from 9 years ago – modest compared to CPU, cellular data, WiFi, capacity or camera improvements. Going forward, expectations are for battery improvement to significantly underperform the expected increases in other related mobile technologies through 2020.

Exhibit 9: Battery Improvements Are Expected to Lag Connectivity, Display and Video Improvements



Source: ARM Holdings, Samsung Electronics

Our sensitivity analysis points to an iPhone 5 talk time (i.e. 180mA draw) power consumption range of 5-9hrs flexing both efficiency and battery energy density and assuming a battery volume of 10.1cm^3 (typical Li-Ion battery energy density is 0.9-2.2MJ/liter). By projecting a 2.2x battery energy density growth through 2020, we see it possible to achieve an all-day battery life assuming similar power consumption.

Exhibit 10: Current Range of iPhone 5 Battery Life
Units in hours of use at 180mA, box indicates AAPL spec

Efficiency \ Li-Ion Battery Density (MJ/litre)	1.1	1.3	1.5	1.7	1.9	2.1	2.3
50%	2.9	3.4	4.0	4.5	5.0	5.5	6.0
55%	3.2	3.8	4.4	4.9	5.5	6.1	6.6
60%	3.5	4.1	4.8	5.4	6.0	6.6	7.2
65%	3.8	4.5	5.2	5.8	6.5	7.2	7.8
70%	4.1	4.8	5.6	6.3	7.0	7.7	8.4
75%	4.4	5.2	5.9	6.7	7.5	8.3	9.1
80%	4.7	5.5	6.3	7.2	8.0	8.8	9.7
85%	5.0	5.9	6.7	7.6	8.5	9.4	10.3
90%	5.3	6.2	7.1	8.1	9.0	9.9	10.9
95%	5.6	6.5	7.5	8.5	9.5	10.5	11.5
100%	5.9	6.9	7.9	9.0	10.0	11.0	12.1

Source: Company data, Credit Suisse estimates

Exhibit 11: Projected Talk Time with 2.2x Battery Growth
Units in hours of use at 180mA

Efficiency \ Li-Ion Battery Density (MJ/litre)	2.5	2.9	3.4	3.8	4.3	4.7	5.1
50%	6.4	7.6	8.7	9.9	11.0	12.1	13.3
55%	7.1	8.3	9.6	10.8	12.1	13.4	14.6
60%	7.7	9.1	10.5	11.8	13.2	14.6	15.9
65%	8.4	9.9	11.3	12.8	14.3	15.8	17.3
70%	9.0	10.6	12.2	13.8	15.4	17.0	18.6
75%	9.7	11.4	13.1	14.8	16.5	18.2	19.9
80%	10.3	12.1	14.0	15.8	17.6	19.4	21.2
85%	11.0	12.9	14.8	16.8	18.7	20.6	22.6
90%	11.6	13.7	15.7	17.8	19.8	21.8	23.9
95%	12.2	14.4	16.6	18.7	20.9	23.1	25.2
100%	12.9	15.2	17.4	19.7	22.0	24.3	26.6

Source: Company data, Credit Suisse estimates

Based on both existing battery power densities and efficiency (using iPhone 5 analysis above as a baseline), we can hypothesize on the estimated use time for Wearables. Relative to the above iPhone 5 analysis, by assuming a Wearable battery volume of 7.5cm^3 (3.8cm x 3.8cm x 0.5cm) and similar battery energy density (1.93MJ/liter), a Wearable could achieve battery life of 8hrs at 400mW assuming 80% efficiency.

Looking forward with a 2.2x increase in battery energy density, we see 16-20hr battery life possible at 80% efficiency for 350-450mW power consumption.

Exhibit 12: Wearable Talk Time with Current Batt Density
Units in hours of use at 180mA

Efficiency	Power Consumption (mW) 250	300	350	400	450	500	550
50%	8.1	6.8	5.8	5.1	4.5	4.1	3.7
55%	8.9	7.4	6.4	5.6	5.0	4.5	4.1
60%	9.7	8.1	7.0	6.1	5.4	4.9	4.4
65%	10.6	8.8	7.5	6.6	5.9	5.3	4.8
70%	11.4	9.5	8.1	7.1	6.3	5.7	5.2
75%	12.2	10.2	8.7	7.6	6.8	6.1	5.5
80%	13.0	10.8	9.3	8.1	7.2	6.5	5.9
85%	13.8	11.5	9.9	8.6	7.7	6.9	6.3
90%	14.6	12.2	10.4	9.1	8.1	7.3	6.6
95%	15.4	12.9	11.0	9.6	8.6	7.7	7.0
100%	16.2	13.5	11.6	10.2	9.0	8.1	7.4

Source: Company data, Credit Suisse estimates

Exhibit 13: Wearable Talk Time with 2.2x Battery Density
Units in hours of use at 180mA

Efficiency	Power Consumption (mW) 250	300	350	400	450	500	550
50%	17.9	14.9	12.8	11.2	9.9	8.9	8.1
55%	19.7	16.4	14.0	12.3	10.9	9.8	8.9
60%	21.4	17.9	15.3	13.4	11.9	10.7	9.7
65%	23.2	19.4	16.6	14.5	12.9	11.6	10.6
70%	25.0	20.9	17.9	15.6	13.9	12.5	11.4
75%	26.8	22.3	19.2	16.8	14.9	13.4	12.2
80%	28.6	23.8	20.4	17.9	15.9	14.3	13.0
85%	30.4	25.3	21.7	19.0	16.9	15.2	13.8
90%	32.2	26.8	23.0	20.1	17.9	16.1	14.6
95%	34.0	28.3	24.3	21.2	18.9	17.0	15.4
100%	35.7	29.8	25.5	22.3	19.9	17.9	16.2

Source: Company data, Credit Suisse estimates

- **Device Power Consumption.** Beyond changes to the battery itself, the best way to increase battery life is to reduce the amount of energy consumed by the device. We know iPhone talk power drawn is roughly 684mW (1440 mAh battery x 3.8V / 8h), assuming 100% efficiency for illustration purposes. At the current battery volume (10.1cm^3) and energy density (1.9MJlitere), we observe that for every 50mW change in power consumption translates into roughly 0.5 hours longer use time. Relative to a potential Wearable product, we would expect both battery volume and energy consumption to be less than the iPhone 5. Based on our 7.5cm3 Wearable battery volume assumption, at similar power consumption to the iPhone 5 (684mW), the battery would last 5.9 hrs.

Exhibit 14: iPhone 5 Baseline
Units in hours of use, assuming 1.93MJ/liter battery energy density

Battery Volume (cm^3)	Energy Consumption (mW) 534	584	634	684	734	784	834
7.6	7.7	7.1	6.5	6.0	5.6	5.3	4.9
8.1	8.2	7.5	6.9	6.4	6.0	5.6	5.3
8.6	8.7	8.0	7.4	6.8	6.3	5.9	5.6
9.1	9.2	8.4	7.8	7.2	6.7	6.3	5.9
9.6	9.7	8.9	8.2	7.6	7.1	6.6	6.2
10.1	10.2	9.4	8.6	8.0	7.5	7.0	6.6
10.6	10.8	9.8	9.1	8.4	7.8	7.3	6.9
11.1	11.3	10.3	9.5	8.8	8.2	7.7	7.2
11.6	11.8	10.8	9.9	9.2	8.6	8.0	7.5
12.1	12.3	11.2	10.3	9.6	8.9	8.4	7.9
12.6	12.8	11.7	10.8	10.0	9.3	8.7	8.2

Source: Company data, Credit Suisse estimates

Exhibit 15: Range of Wearable Battery Life
Units in hours of use, assuming 1.93MJ/liter battery energy density

Battery Volume (cm^3)	Energy Consumption (mW) 384	434	484	534	584	634	684
5.0	7.1	6.2	5.6	5.1	4.6	4.3	4.0
5.5	7.8	6.9	6.2	5.6	5.1	4.7	4.4
6.0	8.5	7.5	6.7	6.1	5.6	5.1	4.8
6.5	9.2	8.1	7.3	6.6	6.0	5.6	5.1
7.0	9.9	8.7	7.8	7.1	6.5	6.0	5.5
7.5	10.6	9.4	8.4	7.6	7.0	6.4	5.9
8.0	11.3	10.0	9.0	8.1	7.4	6.8	6.3
8.5	12.0	10.6	9.5	8.6	7.9	7.3	6.7
9.0	12.7	11.2	10.1	9.1	8.3	7.7	7.1
9.5	13.4	11.9	10.6	9.6	8.8	8.1	7.5
10.0	14.1	12.5	11.2	10.1	9.3	8.5	7.9

Source: Company data, Credit Suisse estimates

- **Efficiency Improvement a Marginal Battery Life Impact.** Applying the previously mentioned 7.5cm^3 volume of a Wearable battery, roughly half the volume of a standard wristwatch, we ran a sensitivity analysis on expected battery life across various efficiencies and power consumption estimates. Efficiencies could be anything from improvement in the conversion of volumetric energy to the point of consumption – examples include more battery volume spent on battery than packaging and improvement in DC conversion efficiencies. On average, every 100bps improvement in efficiency equates to 0.24 hours longer battery life. This is the least impactful driver of battery life, and perhaps the most difficult to achieve especially if our assumption of 80% efficiency today is too low – incremental efficiency starting at 90% vs. 80% makes incremental efficiency gains exponentially more difficult to achieve (law of diminishing returns).

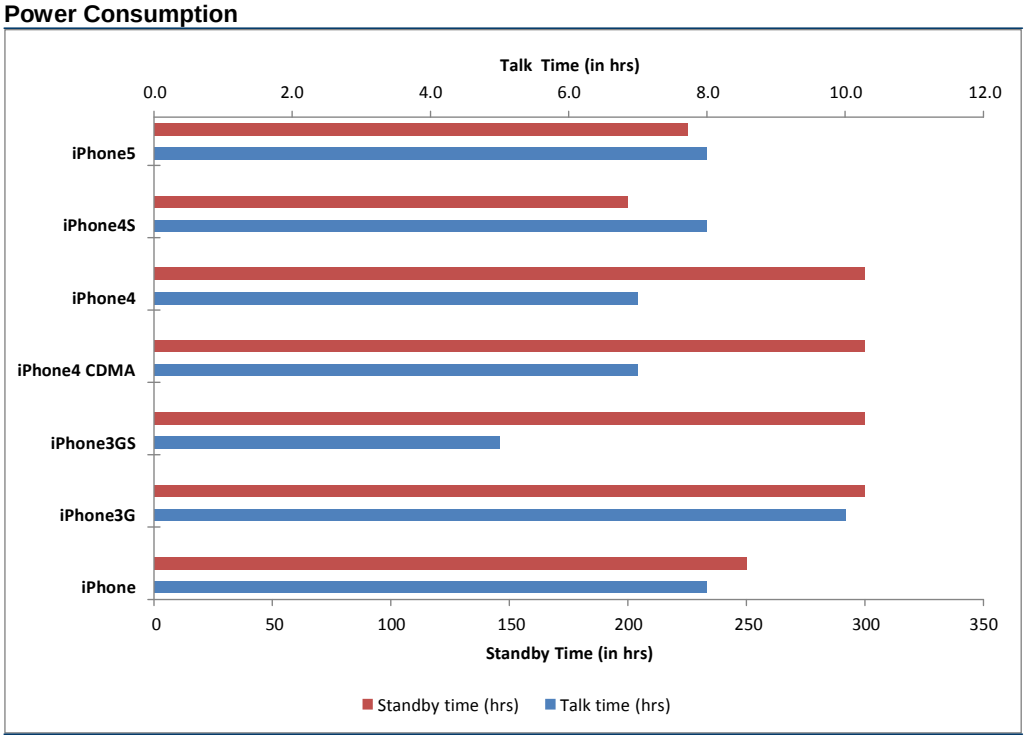
Exhibit 16: Wearable Battery Life of 7.5cm3 Battery Increases 0.16-0.36hrs for Every 100bps Improved Efficiency
Units in hours of use at 180mA

	Power Consumption (mW)						
	250	300	350	400	450	500	550
80%	13.0	10.8	9.3	8.1	7.2	6.5	5.9
81%	13.2	11.0	9.4	8.2	7.3	6.6	6.0
82%	13.3	11.1	9.5	8.3	7.4	6.7	6.1
83%	13.5	11.2	9.6	8.4	7.5	6.7	6.1
84%	13.6	11.4	9.7	8.5	7.6	6.8	6.2
85%	13.8	11.5	9.9	8.6	7.7	6.9	6.3
86%	14.0	11.6	10.0	8.7	7.8	7.0	6.4
87%	14.1	11.8	10.1	8.8	7.9	7.1	6.4
88%	14.3	11.9	10.2	8.9	7.9	7.1	6.5
89%	14.5	12.1	10.3	9.0	8.0	7.2	6.6
90%	14.6	12.2	10.4	9.1	8.1	7.3	6.6

Source: Company data, Credit Suisse estimates

The iPhone's battery life has not decreased since the original iPhone, despite increased capability and technological enhancements – higher performance CPU, more memory, 4G vs. 3G Baseband, 11n vs. 11b WiFi and more 4G/LTE bands.

Exhibit 17: iPhone Battery Life Has Remained Relatively Constant Despite Increase in Power Consumption



Source: Company data, Credit Suisse estimates

Connectivity: Providing Data and Processing Offload

The two functions of a Wearable device are data input and data transmission. Data input (addressed later) can take the form of user input or collected input (via sensors, accelerometers, etc.). Once collected, the data needs to be processed and moved, not necessarily in that order, onto and off of the Wearable device. Some devices in the market today do this via physical interface, primarily USB, to a host PC. Other devices use any number of wireless connectivity protocols – lead among them BlueTooth LE, BlueTooth, WiFi, and NFC.

Exhibit 18: Wireless Connectivity Technologies Likely to Appear in Wearables

Technology	Range (m)	Throughput (Mbps)	Set-up Time (ms)	Problem Solved	Solution Providers
BlueTooth Low Energy (LE)	50	<1.0	0.3	Short setup time allows link to be made and then disconnected, dramatically reducing overall operating power consumption	BRCM, CSR, Nordic, TXN
BlueTooth 4.0	100	2.1	<600	Higher data throughput and ability to handle voice traffic	QCOM, CSR, BRCM, TXN
NFC	0.04	0.424	1	Close range solution, high level of security (requires encryption)	BRCM, NXPI
802.11n WiFi	60	600	500	Very high data throughput, enables direct internet access via AP	BRCM, QCOM, MRVL, and others
802.11ac WiFi	50	1,000-6,930	500	Ultrafast data communication possible (multiple HD streams), limited application in wearable given power required	BRCM, QCOM, MRVL, and others

Source: Company data, Credit Suisse estimates

BlueTooth Low Energy the Leading Option for Wearable Connectivity

The leading candidate for connectivity in Wearable products is BlueTooth Low Energy (LE). A specification within the BlueTooth 4.0 spec, though differing in HW implementation, BT LE has shorter reach and lower throughput than typical BT 4.0 connection and does not support voice communication. What distinguishes BT LE is its ability to rapidly pair to peripheral devices – typical link setup time is less than 0.3ms vs. typical BT of 300-600ms. This feature allows BT LE to quickly set up and tear down the communications link between the host and the peripheral device, meaning the connection is not an "always on" link as is the case with BT, but an "active when needed" link. By eliminating the need to power the RF portion of the solution when not in use, total power consumption is significantly reduced – degree of savings depends on use case – with burst-data applications (ex: updating a pedometer every 5 minutes) benefitting more so than steady state data applications (ex: real time vital monitoring). Several vendors offer BT solutions which can operate in both BT LE and BT4.0, giving the flexibility of both low power and full feature operation.

WiFi Enables High Performance Data Links, Cloud Connectivity

Also a likely connectivity technology, WiFi potentially enables a Wearable device with tens if not hundreds of Mb/s of throughput between the host and client – the host could be a wireless access point connected to the internet, or an ad hoc network created by smartphone, tablets or PCs. With this level of throughput, Wearable devices could stream audio, and video content at the higher end of the throughput range, the downside of WiFi is that it consumes more power and requires connection to an ad hoc network or access point which may require additional user input for access and/or security – the Google Glass product is believed to incorporate 802.11 WiFi. Initial products incorporating WiFi will likely roll out with low power versions of 802.11n – the downside to WiFi.

NFC – Fewer Applications, though Possibly Incremental to Existing Ones

Near Field Communications (NFC) is a contactless communications standard which allows for two-way communication between endpoints – an incremental step from the one-way standard of RFID. Requiring very close proximity (<10cm) and with a relatively low maximum data rate (~400kbps), NFC does have the advantage that the endpoint can operate in passive mode – the endpoint is powered through magnetic induction by the host device – or active mode where both endpoints have their own transmit power sources. While NFC is likely not the technology of choice for sustained or longer distance device to device data communication, NFC does offer several potentially compelling applications for Wearable devices, including (1) simplification of pairing process for BT/WiFi, (2) primary or secondary authentication for contactless payment, banking, or other secured transactions, (3) conditional access, or (4) other type of one-time data transmissions. Additionally, in a passive implementation, NFC would require no external power to operate – making NFC the lowest power wireless communication option available.

With NFC, users can make payments using a mobile device without needing a physical credit card. Whether a Wearable has its own NFC chip or makes the transaction through a phone or other device, it can still be used for the transaction, adding another level of capability. According to IDC, total mobile payments are expected to grow from $150bn in 2012 to >$1tn by 2017, accounting for 2.5% of total payments. Further, IDC expects NFC to account for 25% of mobile transaction value long term, driven by rising levels of NFC adoption within Smartphones and other connected devices.

Other Considerations: CPU, GPS, Interface, Display, and Sensors

Processing elements on a Wearable device will likely vary widely with the application of the device – a smart watch might use a reduced feature-set apps processor, while a health monitor may use an ultralow power 8-bit MCU. In both cases, form factor and SoC integration will be critical for designers as they look to reduce the device footprint, as well integrate for improved efficiency. We also see the potential for more significant processing tasks to be offloaded to other personal compute devices (smartphone, tablet, etc.) or passed through to the cloud for additional processing – the Wearable device would be remain primarily a data collection and data transmission device.

Location based services and position-based devices will depend on GPS technology to determine geographical location, direction of travel, etc. This technology has been optimized for mobile devices for the better part of a decade and is standard in nearly all Smartphones and in many feature phones. There is equal potential for a Wearable to include this capability, or for it to lever GPS capabilities off-device (i.e. on a smartphone) via wireless connectivity.

User interface will also be an important aspect of Wearable products. While some devices may simply be data collection or sensor driven data input (fitness bands, health monitors, etc.), or interpret motion as data input via an accelerometer, other devices like smartwatches or glasses-type devices will likely incorporate touch, voice or both as user interfaces. Siri and Google Now allow the user to control devices through speech commands. A user could give an audio command through a Wearable product and have it transmitted to another device which then performs the required function. Additionally, a Wearable device could both receive voice-activated commands, and potentially act as a microphone to store or transmit voice communication via WiFi or BlueTooth.

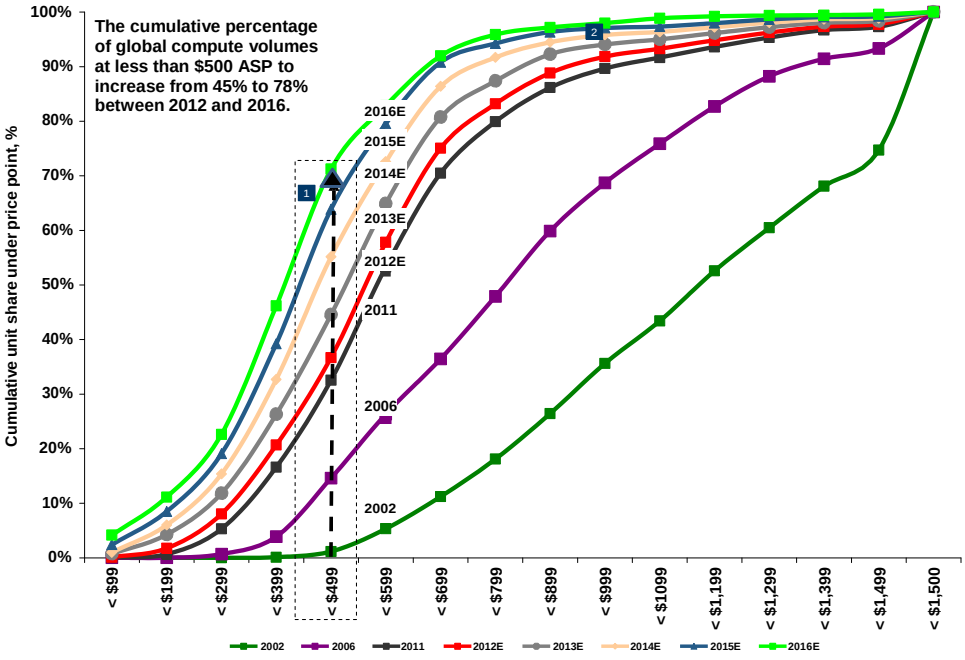
Wearable products would have a smaller screen compared to a phone with touch screen technology. However, in order to maximize screen size around a user's wrist, it is possible the devices would use bendable glass, a technology that Samsung and Apple have both been developing as evidenced in recent patents (Exhibit 35). Regarding touch, expectations are for some type of capacity touch screens similar to current Smartphones – speculated advances in touch include being able to read touch inputs without activating the screen itself. In this way a user could give input without draining the battery to power the display/backlighting for simple and pre-determined touch/swipe commands. Alternatively, as in the case for Google Glass, touch input could be measured on non-display interfaces of the device.

Sensing and physical measurements of external inputs will likely be a key capability for Wearable products. The recently released Samsung Galaxy S4 includes 9 sensors: accelerometer, gyroscope, temperature/humidity, barometer, proximity, geomagnetic (compass), gesture, light and cover sensor. Wearables, again depending on application, will likely include these types and more – health monitors to include vitals sensors (heart rate, body temperature, blood statistics, etc.), fitness may include respiration, heart rate, pedometers, etc.

A High Elasticity of Demand of Lower Price Compute Products

Whereas a decade ago many of the computing products sold (i.e. notebooks, desktops) offered less mobile, but highly robust compute performance, there is increasing movement toward less powerful, but highly mobile computing products – products which are moving further down the price curve. As shown in Exhibit 19, the sub-$500 PC's and tablets market has grown from 3% of the volume in 2002 to 45% today – we believe this grows to 78% over time. The growth that we have already seen in the sub-$500 market shows there is a strong appetite for compute performance at these price points, something that Wearable compute products will drive and deliver.

Exhibit 19: Compute: Tablet Market to Move Down Lower Price point, Similar to PCs

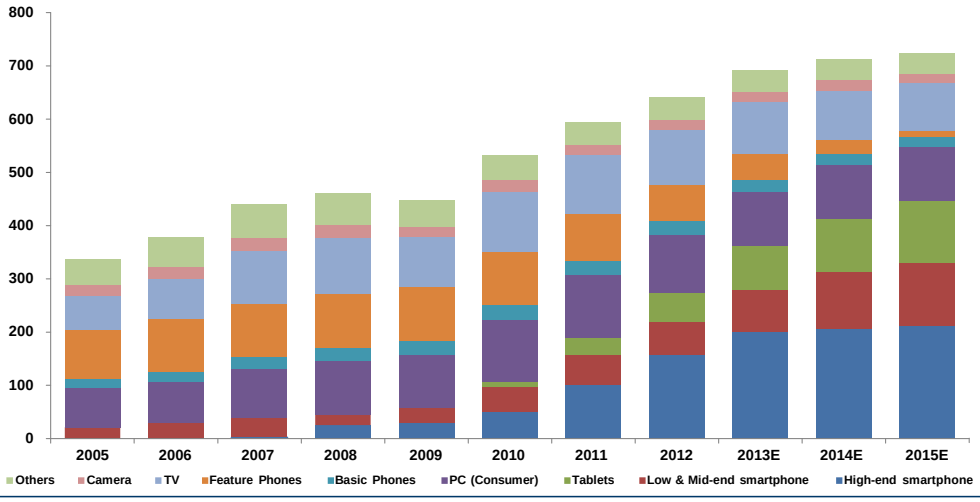


Source: Company data, Credit Suisse estimates

Sizing the Market

First, before sizing the potential for the Wearable computing market, it is important to arrive at a crisp definition. We consider a Wearable computing device, as one that ultimately either provides data via a highly portable device that a consumer can wear (such as Google Glass and or the smart watch), or one that takes some form of measurement and data from a consumer like a fitness band or watch. Sizing such a market is challenging, although several observations are worth nothing:

Exhibit 20: The Consumer Electronics Market is Estimated to be $720bn in 2015

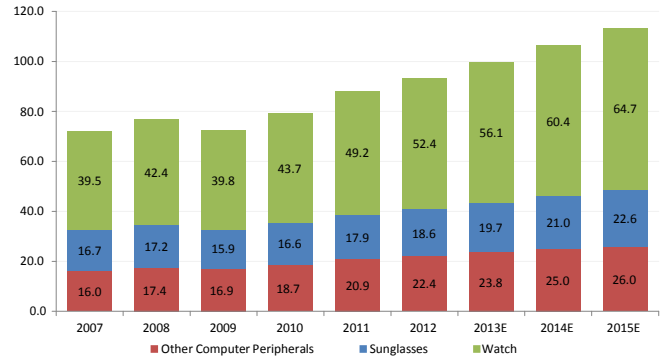


Source: Company data, Credit Suisse estimates

The experience of Smartphones suggests that powerful enough computing products can cannibalize a significant part of the CE industry. We note that the high end of Smartphone market (>$400 ASP) has risen to become 25% of all CE spend in CY12, and is now one of the largest markets globally. Because of the rich feature sets that Smartphones represent, Smartphones have been able to systematically cannibalize other areas of CE spend including consumer PC's, MP3 players and PNDs. We believe the feature set for Wearables likely impacts the watch, sunglasses, and other peripheral market broadly – implying $110bn of peripheral CE products likely impacted by the advent of Wearables.

Exhibit 21: $110bn of Peripherals at Risk to Wearables

US$ in billions, unless otherwise stated



Source: Company data, Credit Suisse estimates

Exhibit 22: Wearables Could Be 400m Units in CY15

Units in thousands, unless otherwise stated

Smartphone CAGR CY12-CY15	CY15 Smartphone Subscriber Base Attach Rate				
	10.0%	12.5%	15.0%	17.5%	20.0%
26.2%	235,953	294,941	353,930	412,918	471,906
28.2%	247,353	309,192	371,030	432,868	494,707
30.2%	259,115	323,894	388,672	453,451	518,230
32.2%	271,243	339,054	406,865	474,676	542,487
34.2%	283,745	354,681	425,617	496,553	567,489
36.2%	296,624	370,780	444,936	519,092	593,248
38.2%	309,888	387,360	464,832	542,304	619,776
40.2%	323,541	404,426	485,311	566,197	647,082
42.2%	337,589	421,987	506,384	590,781	675,179
44.2%	352,039	440,048	528,058	616,068	704,077

Source: Company data, Credit Suisse estimates

In terms of quantifying the potential size of the Wearables market, we baseline our assumptions on the potential attach rate to the global Smartphone user base. Current estimates are for the Smartphone base to grow from 1.2bn subs to 2.8bn subs by CY12, a CY12-CY15 CAGR of 34.2%. Assuming a 15% attach rate to the CY15 Smartphone sub base yields a 425.6m unit market in CY15.

In terms of revenue, assuming a Wearable attach rate of 15% to the CY15 Smartphone subscriber base of 2.7bn, at an average ASP of $100 at the midpt, implies a CY15 Wearables TAM of $42.6bn. Relative to Semi TAM, assuming a Wearable GM of 30-40% and semi content as % of BOM of 18-22% implies a Semi TAM in CY15 of $4.6bn-$6.6bn.

Exhibit 23: Wearables Market Could be $42.6bn in CY15…
US$ in millions, unless otherwise stated

Wearable ASP ($)	CY15 Smartphone Subscriber Base Attach Rate				
	10.0%	12.5%	15.0%	17.5%	20.0%
$50	$14,187	$17,734	$21,281	$24,828	$28,374
$60	$17,025	$21,281	$25,537	$29,793	$34,049
$70	$19,862	$24,828	$29,793	$34,759	$39,724
$80	$22,700	$28,374	$34,049	$39,724	$45,399
$90	$25,537	$31,921	$38,306	$44,690	$51,074
$100	$28,374	$35,468	$42,562	$49,655	$56,749
$110	$31,212	$39,015	$46,818	$54,621	$62,424
$120	$34,049	$42,562	$51,074	$59,586	$68,099
$130	$36,887	$46,109	$55,330	$64,552	$73,774
$140	$39,724	$49,655	$59,586	$69,517	$79,449
$150	$42,562	$53,202	$63,843	$74,483	$85,123

Source: Company data, Credit Suisse estimates

Exhibit 24: …With a Semi TAM of $5.5bn
US$ in millions, unless otherwise stated

Semi as % of BOM	Wearable GM %				
	25.0%	30.0%	35.0%	40.0%	45.0%
15%	$4,788	$4,469	$4,150	$3,831	$3,511
16%	$5,107	$4,767	$4,426	$4,086	$3,745
17%	$5,427	$5,065	$4,703	$4,341	$3,980
18%	$5,746	$5,363	$4,980	$4,597	$4,214
19%	$6,065	$5,661	$5,256	$4,852	$4,448
20%	$6,384	$5,959	$5,533	$5,107	$4,682
21%	$6,703	$6,257	$5,810	$5,363	$4,916
22%	$7,023	$6,555	$6,086	$5,618	$5,150
23%	$7,342	$6,852	$6,363	$5,874	$5,384
24%	$7,661	$7,150	$6,640	$6,129	$5,618
25%	$7,980	$7,448	$6,916	$6,384	$5,852

Source: Company data, Credit Suisse estimates

Quantifying the Semi TAM

Assuming a 30-40% Wearable GM, and a Semi content of 18-22% of COGS, we conclude that Semi content makes up 7% of the ASP of a given Wearable product – dollar content ranges from $3.30-$14.40 for ASP of $50-$200. Further, we made various assumptions on the potential content for a Wearable product at a given price point. We made our content assumptions based on ASP of the Wearable – lower ASP products likely dictates less capability for connectivity, less processing, less overall power vs. higher ASP Wearables. As an example, a $50 Wearable may have a BT connectivity chip ($1.00), a low power MCU ($0.50), 1-2 sensors ($0.50) and power conversion ($0.50). The device may include "other" content like LED drivers, touch, and likely no GPS. By comparison, a $200 Wearable likely includes high end connectivity (WiFi/BT/FM/NFC), and either a high end MPU or even low end apps processor. The power budget is likely higher, and the higher power draw likely requires more efficient (and costly) power converters.

Exhibit 25: Content Assumptions by ASP, by Function

	ASP			
	$50	$100	$200	Avg.
GM	30%	35%	40%	35%
COGS	$15.00	$35.00	$80.00	$43.33
Semi % of COGS	*22.0%*	*20.0%*	*18.0%*	*20.0%*
Semi Content	$3.30	$7.00	$14.40	$8.67
Semi Content as % of ASP	*6.6%*	*7.0%*	*7.2%*	*6.9%*
Connectivity	$1.10	$2.80	$3.84	$2.72
Connectivity % of Semi	*33.3%*	*40.0%*	*26.7%*	*31.4%*
CPU	$0.55	$1.12	$4.80	$2.28
CPU % of Semi	*16.7%*	*16.0%*	*33.3%*	*26.3%*
Power	$0.55	$0.75	$1.44	$0.95
Power % of Semi	*16.7%*	*10.7%*	*10.0%*	*11.0%*
Sensor	$0.55	$0.93	$2.40	$1.36
Sensor % of Semi	*16.7%*	*13.3%*	*16.7%*	*15.7%*
GPS	$0.00	$0.47	$0.96	$0.51
GPS % of Semi	*0.0%*	*6.7%*	*6.7%*	*5.9%*
Misc	$0.55	$0.93	$0.96	$0.85
Misc % of Semi	*16.7%*	*13.3%*	*6.7%*	*9.8%*
Total	$3.30	$7.00	$14.40	$8.67
	100%	100%	100%	100%

Source: Company data, Credit Suisse estimates

Exhibit 26: Content Share, Aggregate Content by ASP

Connectivity	BRCM	NXPI	CSR	Other
Share of Total Connectivity	*80.0%*	*7.5%*	*7.5%*	*5.0%*
CPU	NXPI	FSL	MCHP	Other
Share of Total CPU	*20.0%*	*20.0%*	*25.0%*	*35.0%*
Power	MXIM	TXN	ONNN	Other
Share of Total Power	*25.0%*	*25.0%*	*15.0%*	*35.0%*
Sensor	STM	INVN	ADI	Other
Share of Total Sensor	*40.0%*	*20.0%*	*20.0%*	*20.0%*
GPS	BRCM	CSR	NXPI	Other
Share of Total GPS	*80.0%*	*8.0%*	*7.0%*	*5.0%*
Misc	ADNC	SYNA	ADI	Other
Share of Total Misc	*40.0%*	*25.0%*	*20.0%*	*15.0%*
Content by Semi COGS	**$3.30**	**$7.00**	**$14.40**	**Avg.**
Other	$1.18	$2.18	$5.09	$2.96
BRCM	$0.88	$2.61	$3.84	$2.62
NXPI	$0.19	$0.47	$1.32	$0.62
ADI	$0.22	$0.37	$0.67	$0.48
MCHP	$0.14	$0.28	$1.20	$0.48
ADNC	$0.22	$0.37	$0.38	$0.42
FSL	$0.11	$0.22	$0.96	$0.38
TXN	$0.14	$0.19	$0.36	$0.27
MXIM	$0.14	$0.19	$0.36	$0.27
ONNN	$0.08	$0.11	$0.22	$0.16

Source: Company data, Credit Suisse estimates

Relative to share assumptions, in connectivity we expect BRCM to maintain a healthy share of the market given their integration capabilities, presence in the market (>70% Smartphone connectivity share) and economies of scale by having similar products for Smartphones (4x the CY15 Wearable unit estimate). We also expect NXPI (NFC) and CSR (BT) to participate in more discrete applications in their respective areas. For processing, we see equal opportunity for NXPI and FSL with low power MCU/CPU products, with low power MCU from MCHP modestly higher. "Other" processor vendors comprehend the potential for large Wearable players (AAPL/Samsung) to use captive silicon. In power, we view MXIM (integration), TXN (volume/price) and ONNN (size) as the likely frontrunners, with "Other" again a large percentage based on the diversity of the analog market – we would include FCS, ADI, and ISIL, among others in this group. We would expect STM to leverage existing gyro/accelerometer into Wearable sensor opportunities; other participants likely include INVN, ADI and MXIM. We see a similar dynamic in GPS as with connectivity – i.e. BRCM the leader by a wide margin – and miscellaneous components which include functions like noise cancellation (ADNC) and touch (SYNA) to name a few.

Semi TAM Skewed Towards Connectivity and Processing

In terms of sizing the Semi opportunity, we used a baseline TAM assuming a CY15 Wearable attach rate of 15% of the total Smartphone user base by CY15, with 10% in CY14 and 5% in CY13. Our estimates resulted in an average unit total of 84.5m in CY13, 226.4m in CY14 and 425.6m in CY15. Assuming a $100 ASP, our analysis shows a potential CY15 opportunity of $1.2bn for connectivity, $477m for CPU, $397m each for sensors and miscellaneous, $318m for power and roughly $199m in GPS – total Semi TAM for CY15 of $5.5bn.

Exhibit 27: Semi Content Breakdown by Function
US$ in millions, unless otherwise stated

	2013			2014			2015		
ASP ($)	**$50**	**$100**	**$200**	**$50**	**$100**	**$200**	**$50**	**$100**	**$200**
TAM ($m)	$4,226	$8,453	$16,906	$11,318	$22,637	$45,273	$21,281	$42,562	$85,123
COGS (35% GM)	$2,747	$5,494	$10,989	$7,357	$14,714	$29,428	$13,833	$27,665	$55,330
Semi Content (20% of COGS)	**$549**	**$1,099**	**$2,198**	**$1,471**	**$2,943**	**$5,886**	**$2,767**	**$5,533**	**$11,066**
Connectivity	$99	$237	$316	$264	$634	$845	$497	$1,192	$1,589
CPU	$49	$95	$394	$132	$254	$1,056	$248	$477	$1,986
Power	$49	$63	$118	$132	$169	$317	$248	$318	$596
Sensor	$49	$79	$197	$132	$211	$528	$248	$397	$993
GPS	$0	$39	$79	$0	$106	$211	$0	$199	$397
Misc	$49	$79	$79	$132	$211	$211	$248	$397	$397

Source: Company data, Credit Suisse estimates

BRCM Leads the Merchant Silicon Pack

Relative to our expectation of Semi content in a Wearable (20% of COGS) and expectations for share of content by type (ex. 14) and Semi vendor share by content type (ex. 15), we arrive at potential revenue by vendor. Assuming a 15% CY15 Wearable attach rate to the Smartphone user base, and a $100 ASP, BRCM screens as the largest beneficiary with a potential $2.1bn of incremental CY15 revenue – or roughly $0.70 of incremental EPS. Of note, while the estimated opportunity for ADNC in CY13/CY14 is small in dollar terms ($59m/$157m), they equate to 31.8% and 73.1% upside from current CY13 and CY14 Street rev estimates, respectively – ADNC screens as having the highest upside relative to current estimates. We would also note the category of "other" represents $1.7bn of CY15 revenue, with the largest contributor to this bucket being CPU share – we would expect a fair number of ASIC CPU solutions in the Wearables market, most likely from AAPL and Samsung.

Exhibit 28: Estimated Semi Market Opportunity by Vendor
US$ in millions, unless otherwise stated

	2013			2014			2015		
ASP ($)	**$50**	**$100**	**$200**	**$50**	**$100**	**$200**	**$50**	**$100**	**$200**
TAM ($m)	$4,226	$8,453	$16,906	$11,318	$22,637	$45,273	$21,281	$42,562	$85,123
COGS (35% GM)	$2,747	$5,494	$10,989	$7,357	$14,714	$29,428	$13,833	$27,665	$55,330
Semi Content (20% of COGS)	**$549**	**$1,099**	**$2,198**	**$1,471**	**$2,943**	**$5,886**	**$2,767**	**$5,533**	**$11,066**
Other	$197	$343	$777	$527	$918	$2,082	$991	$1,726	$3,914
BRCM	$147	$410	$586	$392	$1,099	$1,569	$738	$2,066	$2,951
NXPI	$32	$73	$201	$86	$196	$538	$161	$369	$1,011
ADI	$37	$59	$103	$98	$157	$275	$184	$295	$516
MCHP	$23	$44	$183	$61	$118	$490	$115	$221	$922
ADNC	$37	$59	$59	$98	$157	$157	$184	$295	$295
FSL	$18	$35	$147	$49	$94	$392	$92	$177	$738
TXN	$23	$29	$55	$61	$78	$147	$115	$148	$277
MXIM	$23	$29	$55	$61	$78	$147	$115	$148	$277
ONNN	$14	$18	$33	$37	$47	$88	$69	$89	$166

Source: Company data, Credit Suisse estimates

Apple & Android Have the Market Power

The Wearables computing market is clearly nascent as several expected participants have not formally announced products – there is great speculation that Google, Apple and Samsung have intentions in this market place. At this early stage, identifying a clear winner is not practical, though we would highlight several core requirements for success:

Installed base. Ultimately many of the potential Wearable computing products (smartwatch, wristband, glasses, etc.) are an accessory to the mobile compute products a consumer may already have. The installed customer base can be a very powerful selling proposition, and Android stands out as has having an advantage above peers given the 1.1bn Smartphone user base running Android (Exhibit 29).

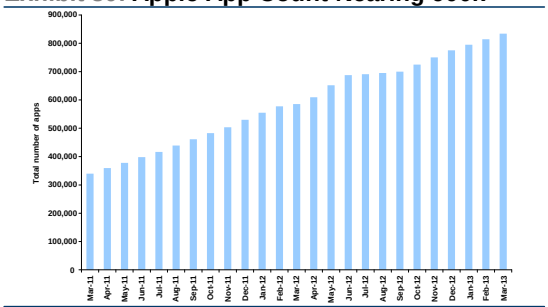
Exhibit 29: Install Base of Smartphones by Platform
in millions, unless otherwise stated

	2010	2011	2012	2013E	2014E	2015E
Android	71	257	626	1,083	1,486	1,837
iOS	63	121	199	280	360	433
BlackBerry OS	58	75	79	70	64	59
Windows (Mobile/ Phone)	20	13	24	85	185	296
Symbian	207	207	147	91	54	32
WebOS	2	1	0	0	0	0
Linux	14	10	9	11	13	12
Other OS	5	9	34	40	48	71
Total	**440**	**693**	**1,119**	**1,661**	**2,210**	**2,740**

Source: Company data, Credit Suisse estimates

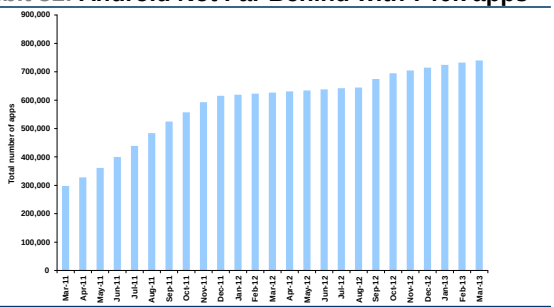
Ecosystems are Well Developed. The Android ecosystem supports ~740k applications with iOS ~840k and Windows ~130k. The ecosystem of developers supports all types of screen sizes across the key software platforms who we believe will be willing participants in the Wearables movement given the monetization opportunities that Wearable devices may offer.

Exhibit 30: Apple App Count Nearing 900k



Source: Company data, Credit Suisse estimates

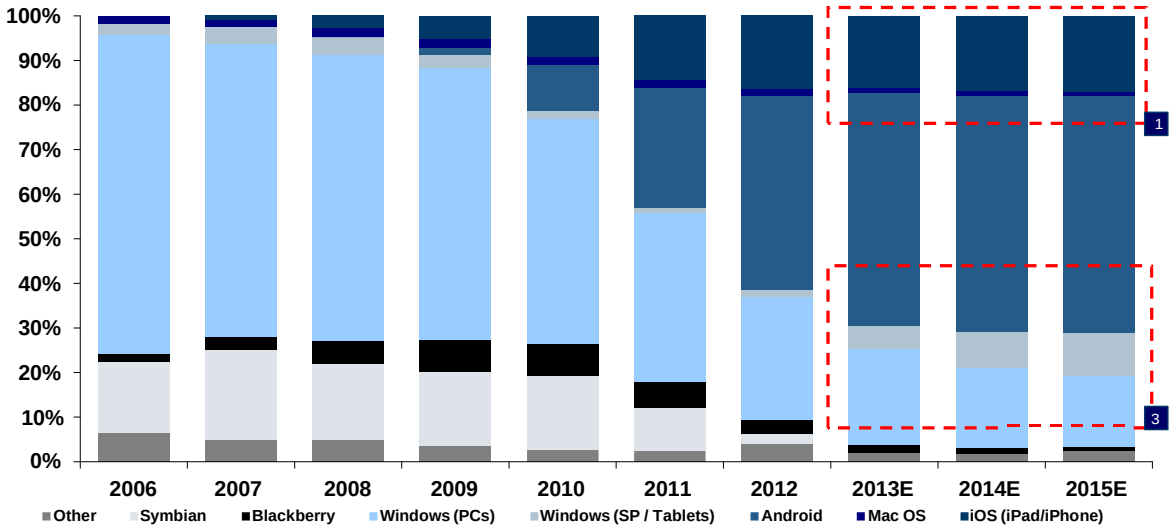
Exhibit 31: Android Not Far Behind with 740k apps



Source: Company data, Credit Suisse estimates

Multi-compute integration. The platform that ultimately succeeds in the market of Wearable computing will likely need to deliver seamless integration across multiple products. We believe that part of Apple's core competitive advantage is its ability to seamlessly integrate core features from messaging, data synchronization and video calling across the entire product portfolio (iPhone, iPad and Mac).

Exhibit 32: Computing Devices by Operating System (Smartphones, Tablets, PCs)



Source: Company data, Credit Suisse estimates

1 Apple mastering all, but for what share? For now we believe that Apple is materially advantaged, principally because the company's vertically integrated structure allows it to simultaneously address all three markets i.e. PCs, tablets and smartphones effectively. Moreover much of the innovation comes in software. Add to this the broad range of "i-Services" that are built well beyond iTunes; to include an apps store, iAd service, iBooks and now iCloud; the company allows consumers to seamlessly access content across multiple devices. The issue is that when considered in the context of the entire compute market in volume terms Apple have a ~18% share, this will rise given their exposure to the relatively faster growth smartphone and tablet end markets to 18% longer term.

2 Google/Android, monetizing growth, need to expand beyond smartphone. Google is aiming to address the compute market as well as protect and grow its search revenues through multiple strategies. To date Android has collectively captured significant volume share within smartphones – close to 70% share, however, its share within tablets remains weak at 25%. Furthermore it has seen limited traction with its Chrome OS. Longer term it will without doubt have a robust level of share in the market based upon its smartphone exposure of the compute market. share could rise to over 50% longer term from 43% currently. However we believe its execution outside of smartphones remains to be seen. In particular, the ongoing continuous complaints against the headaches of Android fragmentation, risk alienating either consumers or developers, which are two main stakeholders in this new compute world.

3 Microsoft traditional strength, can it all change with Windows 8? Historically this platform has dominated the market, however with the higher exposure of Windows to the PC market, limited success in smartphones and tablets this has been eroded. The good news is that we believe the company is strategically targeting the move towards a common UI, with Windows 8, which will support the new Metro UI. In addition given the alliance with Nokia and level of support on the smartphone side, not to mention Microsoft's traditional strong hold in the corporate market; we believe that long term share will decline to 25% compared to 30% currently.

Source: Company data, Credit Suisse estimates

Multi-compute integration represents a challenge for the overall Android device installed base – while similar synchronization is available through Google Play today, the challenge is the sheer fragmentation of Android as 75% of its base is running on an older version of Android (Exhibit 34). Additionally, the many Android-based devices are made by different hardware vendors, each using varying degrees of modified Android to optimize for their particular HW.

Cloud. Ultimately consumers may forgo synchronizing data across multiple platforms and will simply opt for data to reside in the cloud. In this case, a robust cloud strategy will be needed as a central repository for user data – data produced on a fitness device can be seamlessly stored in the cloud. While both the Android and Apple platforms can offer this service, many of the point product hardware vendors lack the infrastructure to do this.

Exhibit 33: Smartphone Subscriber Mix by OS

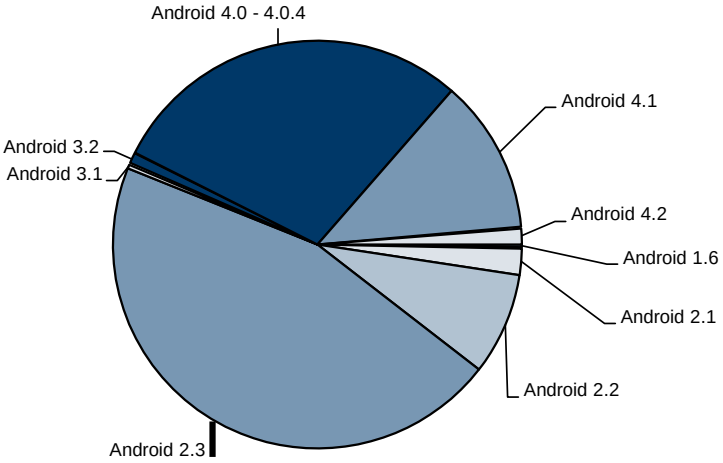
US$ in millions, unless otherwise stated

	2007	2008	2009	2010	2011	2012	2013E	2014E	2015E
Android	0%	0%	3%	16%	37%	56%	65%	67%	67%
iOS	3%	6%	12%	14%	17%	18%	17%	16%	16%
BlackBerry OS	12%	11%	13%	13%	11%	7%	4%	3%	2%
Windows (Mobile/ Phone)	12%	11%	9%	4%	2%	2%	5%	8%	11%
Symbian	62%	60%	56%	47%	30%	13%	5%	2%	1%
WebOS	0%	0%	0%	0%	0%	0%	0%	0%	0%
Linux	9%	8%	6%	3%	1%	1%	1%	1%	0%
Other OS	2%	3%	1%	1%	1%	3%	2%	2%	3%
Total	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**

Source: Company data, Credit Suisse estimates

App monetization. According to a recent survey of application developers by Appcelerator, while 90% of developers remain very interested in developing for iOS, Android has seen a gradual fall from nearly 90% in 2011 to just under 80% in 2012. It is worth noting here that with over 800k apps and more than 35bn downloads in four years, Apple has to date paid over $8bn in royalties to developers through the App store. While both Android and iOS are agreed upon as the two platforms to develop for, Android comes with its own set of challenges when compared to iOS. First, with regard to device and OS fragmentation, each redesign (for an Android OS upgrade, hardware SKU) requires about a 35-40% code rewrite. Many of the developers stressed that while Google understands the fragmentation, it will be hard to change given the hardware refresh cycles and OEMs' unwillingness to push software upgrades.

Exhibit 34: Fragmentation of Android Software Versions Across Installed Base



Source: Android Developers

In addition to these, other core success factors include design, brand, distribution, and IPR. While we believe no one vendor will have them all, our preliminary conclusion would be that Apple and Android may end up being at the forefront on this.

Will Apple enter?

There has clearly been significant speculation that Apple may enter the Wearable computing market with a smartwatch or iWatch. There are few reliable stories on this and the company has remained silent, but most observers believe that such a product would have the following functionalities:

Passcodes. The iWatch could authenticate the consumer, eliminating the need to type passcode or passwords. If another device senses the watch, it knows that the proper person is using the phone.

Payments. The iWatch could leverage an NFC chip for making payments. A user could use an NFC chip in the watch, which could then be connected to another device (iPhone), to make a payment.

Alerts. When your iPhone rings, your watch says who's calling, and you can handle your response by touching the watch.

Control panel for media. Your music may be on your iPhone or iPod, the sound may come from your Bluetooth headset, but your controller is on your wrist with the iWatch. Similarly the watch could be used to pause, mute, or change the channel on your TV.

Clearly the application of such a device is endless, and as speculation continues, we would make some observations around the likelihood of an eventual product:

Recent IP filings have been active in the Wearable areas. In Exhibit 35 we list a series of patents that have been filed, but not yet necessarily granted. We believe that these give some indication that at least Apple is active in considering Wearable products, with patents for flexible displays, head mounted glasses and gesture control. While these patents are not conclusive proof, it does suggest that Apple is active in the area of Wearable computing.

Exhibit 35: Apple Wearable Patents Summary

Date	Patent	Patent Number	Summary
Aug-11	Flexible Display (iWatch)	Serial No. 212045	A Wearable/bracelet accessory that could double as a watch. Using multitouch, the user can adjust the order of a playlist, review recent calls, or respond to a text using a virtual keyboard. For power, Apple contemplates using a solar panel beneath the display or kinetic energy. Functionality can be added to the end of the bracelet and so when the accessory is active it can report the location of the connected device and deactivate the screen of the connected device. In this way the accessory device can be wrapped tightly around the wrist of any size user with no display discontinuity problems. A user can even switch between arm and leg mounting without having to go through a time consuming recalibration process each time.
Feb-11	Shoe Wear-Out Sensor & Sensing System (Shoes)	Granted Patent No. 7911339	As a shoe is worn, it has inherently less protection from injury, and eventually, the shoe may not provide adequate support and may in fact, cause damage to feet. Apple's patented sensor provides a solution to monitor the condition of a particular type of sporting footwear. A sensor worn on the outside of the shoe includes at least one detector for sensing how worn out the sole becomes and an alarm for informing a user of the shoe when the sole is worn out. A body bar sensing system includes at least one detector for sensing a physical metric that indicates a repetition movement of the housing when attached to the body bar. The embodiments of the system could include and an iPod, iPhone or even a future watch.
Sep-08	Virtual Gesture Control Ring	Granted Patent No. 8413075	This is an exemplary virtual gesture movie control ring that appears around contact points when a finger touchdown is detected. The perimeter of the ring can have an "open" end and a "close" end. By rotating the user's fingers until either the open end or the close end of ring touches the ring, a gesture can be made to make the ring appear or disappear. Thus a user can touch fingers on a certain area of a touch sensor panel and call up gestures on the screen associated with the particular finger touches the wearer uses.
Aug-08	Head Mounted Display System (Glass)	Patent Application No. 20100079356	The Head Mounted Display system may contain its own video camera or be connected to one that is already integrated into another device. The system will have some physical controls but other controls may be set off by voice commands and/or head movements that sensors could recognize as distinct commands. The system will likely offer a Picture-in-Picture (PIP) feature. While the user is viewing a something in the display, a PIP can show something approaching in the near vicinity. The system will also offer advanced haptics in the earplugs enhance sound effects. It could also include an optical subassembly configured to help optically adjust and correctly project the image based content being displayed by another device for viewing through the head mounted display.
Jun-07	High Tactility Glove System (Gloves)	Granted Patent No. 7874021	Worn as a glove, this device includes inner and outer liners to transmit user inputs to another electronic device. The liner may be constructed such that the user receives tactile feedback when the user manipulates the input mechanism of an electronic device while wearing the liner. The liner may be inserted just inside the outer shell part of the glove. The outer shell may include an insulation layer to keep the user's hands warm.
Mar-07	Smart garment	Granted Patent No. 7512515	This is similar to the Nike + iPod product. Although the smart running shoe is the main focus of this particular patent, the patent does state that "authorized garments" include only shirts and slacks. The specialized sensors described in this patent that are to be built into the running shoe itself, go beyond the traditional Nike + iPod sensor . The new sensors are designed to send the "tracked garment usage and detected wear patterns to the external database." It's also designed to alert a user when the garment reaches its expected useful lifetime. Furthermore, smart garments will be able to tie into possible training programs using a "virtual trainer".

Source: Company data, Credit Suisse estimates

The growth in the installed base is a key asset for Apple. We note Apple currently has some 500m iTunes users, and this base continues to grow at some pace, with approximately 70% of new unit sales yielding new iTunes accounts. This represents a significant and attractive installed base into which Apple can continue selling product. With many users and multiple end products, this could provide a further method of consumer retention.

What could it mean for numbers. Any analysis on a product that is not fully defined is hard to estimate. For the sake of simplicity, if we assume Apple were to introduce a smartwatch while also assuming the installed base of loyal iPhone users is around 394m in 2015; perhaps 25% would purchase the device, at a $250 ASP, this could drive $10bn of sales, $4.9bn of gross profit and an incremental $3.29 to EPS as shown in Exhibit 36.

Exhibit 36: An iWatch Could Add $10bn Incremental Revenues and $3.30 to EPS by 2015
US$ in millions, unless otherwise stated

	2015E
iTunes users (mn)	**1,195**
iPhone installed base	**394**
Increase in number of iPhone users	46
Replacement iPhone Units	174
% of previous years base	50%
iPhone Units (mn)	**220**
Assumed watch attach rate	*25%*
iWatch replacement rate (2.5 years)	2.50
iWatch annual units (mn)	**39.36**
iWatch ASP	$250
Incremental revenue - iWatch ($mn)	**9,840**
Gross Margins (increase with scale)	50%
Gross Profit ($mn)	**4,920**
Opex to Sales %	*7.6%*
Operating expenses	751
Operating Income	**4,169**
Effective tax rate	25.2%
Net Income	**3,118**
Diluted shares	947
EPS	**3.29**

Source: Company data, Credit Suisse estimates

Wearable Apparel Technology

We see two primary areas of engagement for Wearable technologies within the apparel landscape: (1) as a tool to increase consumer engagement with athletic and fitness-oriented brands; and (2) as a source of potential cannibalization of watch sales (particularly sub-$500 fashion watches).

Fitness Technologies: Tools Of Brand Engagement

"It's a product, it's a platform for services, it's an ongoing dialogue with our consumers, and it's a rapidly growing community that crosses categories, gender, age, and geography."

-Mark Parker (CEO of Nike) on Nike+

Wearable technologies in the apparel space have seen the broadest early adoption from fitness vendors, with products designed to monitor, track and record physical activity. While early initiatives were led by technology-oriented firms (Garmin, Suunto, Polar), more recent product introductions have come from global athletic brands like Nike, Adidas, and Under Armour, who are utilizing these technologies as tools to increase consumer engagement with their brands, and not necessarily generate incremental profit. To that end, price points are competitive, product is heavily branded and marketed, and the online analysis tools are often highly integrated into brand narratives and eCommerce sites.

Nike Plus

Nike has been one of the earliest adopters of Wearable technologies, beginning with the 2006 introduction of the Nike+iPod Sports Kit, which consisted of a pedometer and small transmitter device that communicated with various iPod products to store elapsed time, distance, pace and calories burned during a workout. The product line has since expanded to include iOS and Android apps, a multi-functional GPS watch, and the Nike FuelBand, an accelerometer-based activity monitoring tool. In total, Nike now has over 10 million members on its run logging site, Nike+, making it the largest running community in the world.

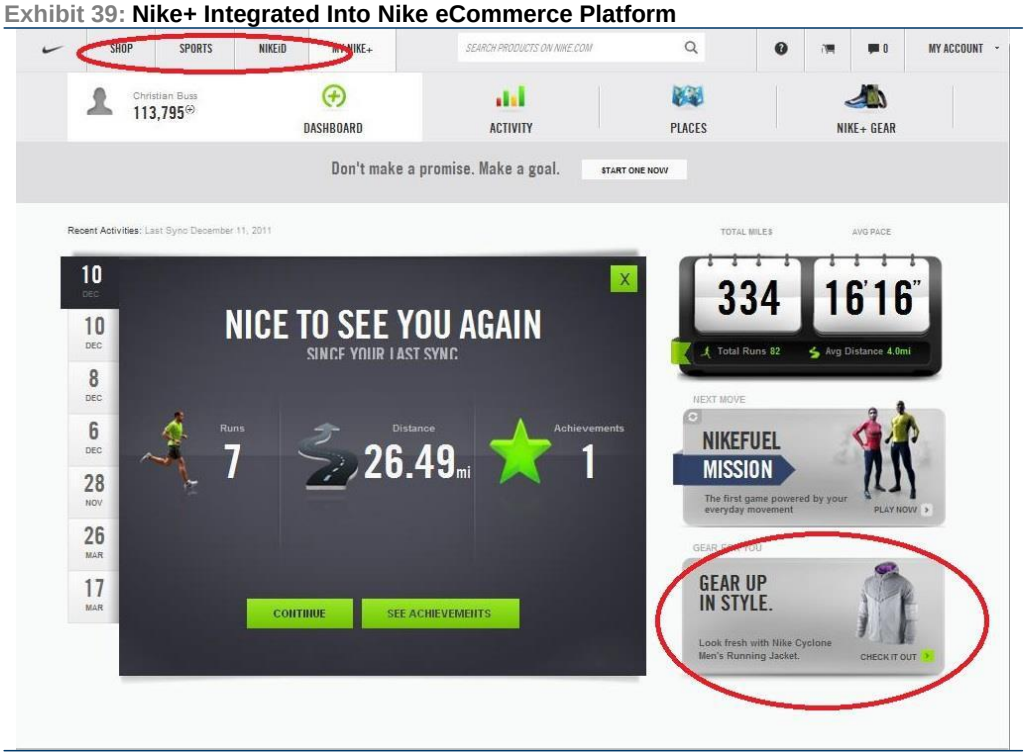
Exhibit 37: **Original Nike + System**

Source: Company website

Exhibit 38: **Nike+ Fuelband**

Source: Company website

Exhibit 39: Nike+ Integrated Into Nike eCommerce Platform

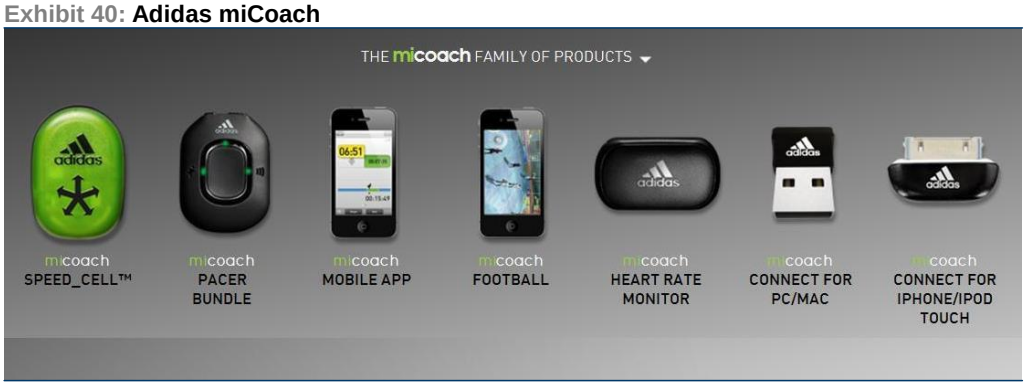


Source: Company Website

Adidas miCoach

Adidas has been a late mover, with its fitness tracker introduced in 2010 as a three part system that includes an accelerometer-based sensor (speed, distance, pace), a heart rate monitor, and a receiver that communicates with the user to highlight time remaining, and provided pacing instructions (speed up/slow down etc.). The system has also been integrated with Smartphone apps and an exercise game (Xbox and PlayStation).

Exhibit 40: Adidas miCoach



Source: Company Website

Under Armour Armour39

In February of 2013, Under Armour announced its Armour39 tracking system, which consists of a Wearable chest strap that records heart rate, calories burned and communicates with smart phones via Bluetooth. The system costs $149.99 and can also be upgraded with a $199.99 watch that provides real-time feedback.

Exhibit 41: Under Armour Armour39

Source: Company Website

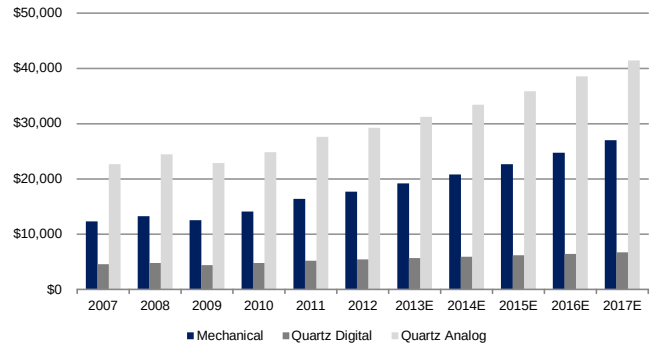
Watch Industry

We see some risk in that increasing adoption of Wearable technologies will shift spending dollars away from global watch sales as these technologies have the potential to: (1) replace watch functionality, (2) take up scarce wrist real estate, and (3) become watch-alternative status objects for consumers. We see particular exposure for sub-$500 fashion watches, which has been one of the fastest growing categories in the global watch market in recent years. This would add particular risk for companies like Fossil (FOSL) who have specialized in this market niche.

The global watch market is expected to top $56bn in CY13E, with 66% of the market quartz and 34% mechanical – 15% of quartz watches are digital (digital represents 10% of global watch sales). The overall watch market has grown at a 6.0% CAGR since CY07 with mechanical outgrowing quartz (+7.7% vs. +5.2% CAGR), and quartz analog outgrowing quartz digital (+5.5% vs. +3.7% CAGR). The US is expected to represent 13.3% of the global watch market by sales: 15.9% of the mechanical market and 12.0% of the quartz market – quartz analog leads quartz digital 12.8% vs. 7.4%.

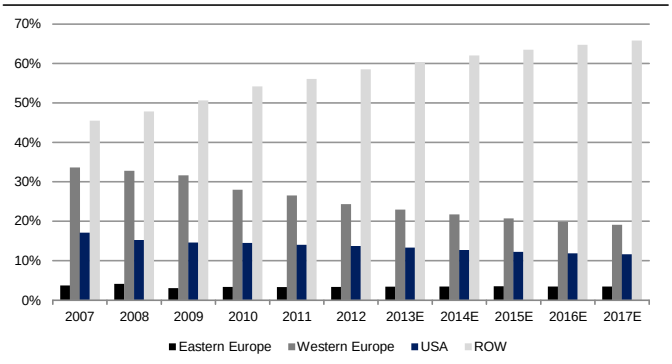
Exhibit 42: Global Watch Market by Type

US$ in millions, unless otherwise stated



Source: Euromonitor

Exhibit 43: Global Watch Revenue Share by Region



Source: Euromonitor

The Wearable Impact on Consumer Internet

We see the advent of Wearable technologies as an accelerant on the already-established theme of the proliferation of connected devices driving higher engagement for services.

Exhibit 44: Google Glass

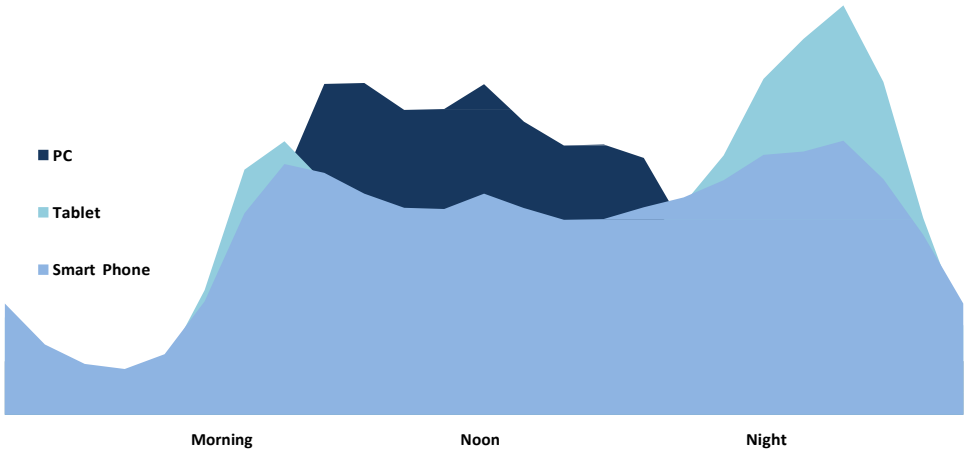
Source: Google

In short, the wristwatch or even for the poster child of this theme – Google Glass – is an additional screen for content and service delivery. We believe Google CEO Larry Page best articulated these concepts on the 3Q12 earnings conference call:

"…we want a seamless experience that goes across both mobile and desktop and TV or whatever screens you have. And that's what we're building. I think we are going to see tremendous growth in these things…"

The importance of the advent of Smartphones and tablets cannot be understated as these additional compute devices have made it easier for consumers to stay online and engaged throughout the course of the day:

Exhibit 45: Online Activity by Device, February 2013

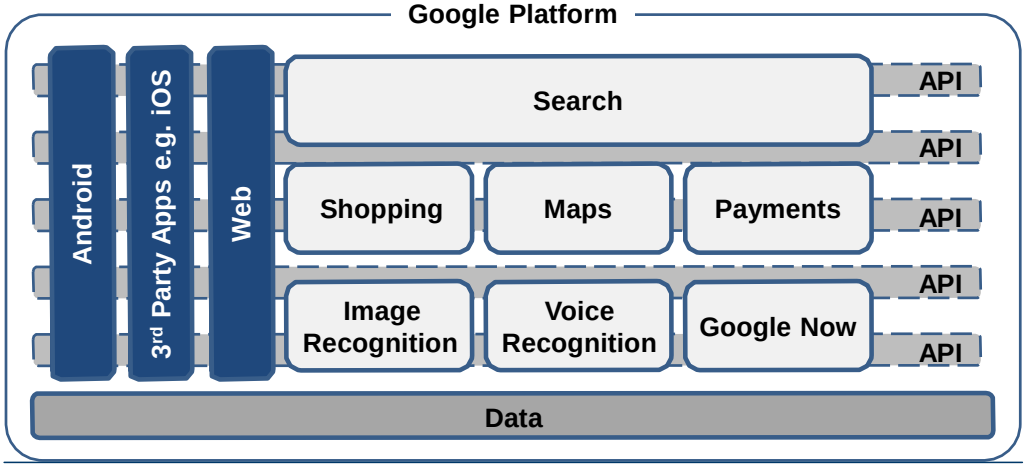


Source: ComScore

We submit that additional Wearable devices, whether they are in the form of glasses, watches, or otherwise, will likely lift the entire curve above upward or at the very least help to fill in some of the gaps in engagement. Simplistically, increased engagement translates into increased opportunity for the operators on the Internet to show advertising or offer goods and services.

While it is difficult for us to argue that Google Glass at roughly $1500 will serve as an immediate catalyst, we expect that over the course of time the cost will come down. In the meantime, we believe Google is uniquely positioned to take advantage of this theme given its current platform and the interoperability of its various products with search. From the perspective of Wearables hardware vendors, we believe Google will be perceived as an attractive software layer given the open connectivity of the platform through APIs, relative maturity and large existing install base for its products, cloud architecture, and generally free/open source licensing model.

Exhibit 46: Google's Positioning in a Multi-Screen Future



Source: Credit Suisse

Google Maps: The use case is already well established on smart phones with turn-by-turn navigation. Maps can be integrated with other products such as Shopping and Google Now to augment the relevance of recommendations and direct local commerce.

Voice Search: Voice recognition on smart phones has ushered in new hands-free ways to engage with devices. This functionality takes on increased importance on Wearable devices which may otherwise not offer users a way to type in requests/queries.

Image Recognition: The use cases for this product are still emerging, but today it can be used in travel (for translation) as well as facilitation of commerce – snap a picture of a product or its barcode and buy online. And within this context, the increased adoption of Wearable devices may accelerate show-rooming. Conversely, physical retailers could use these technologies to improve the in-store shopping experience.

Google Shopping: Collectively with Google Images and Google Maps, Google Shopping can be used to locate products online or nearby - take a picture of a product, have Google recognize and identify the desired product, conduct a search for nearby inventory, and map the directions to the store.

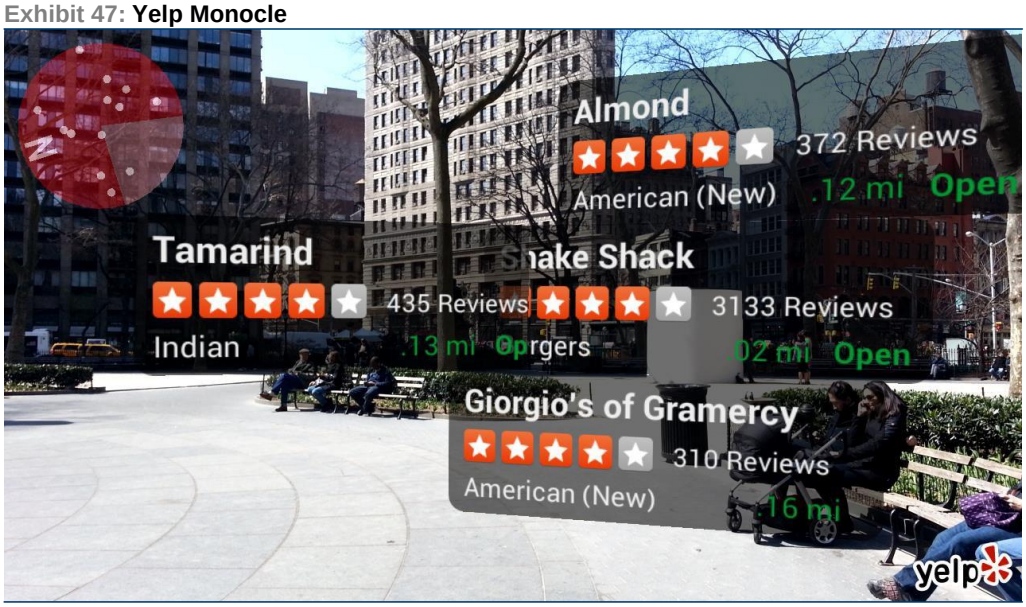
Google Payments: While the landscape of mobile payments is still being determined, the Google payments platform can also integrate with Wearable devices to offer consumers even less of a need to look for their wallets (versus the smart phone).

Google Now: First released in mid-2012 and first available only on limited number of Android devices before recently moving to iOS as well, Google Now is an intelligent virtual assistant embedded within the search widget on Android phones that bridges across Google's products. In addition to natural language voice search, the app uses real-time signals such as user location, time of day, email contents and user search history to push contextually relevant and timely information. While still relatively early in its lifecycle the product has received excellent reviews from the tech community.

Other Use Cases

Below are examples of products from other Internet operators that may flourish with the advent of Wearable devices:

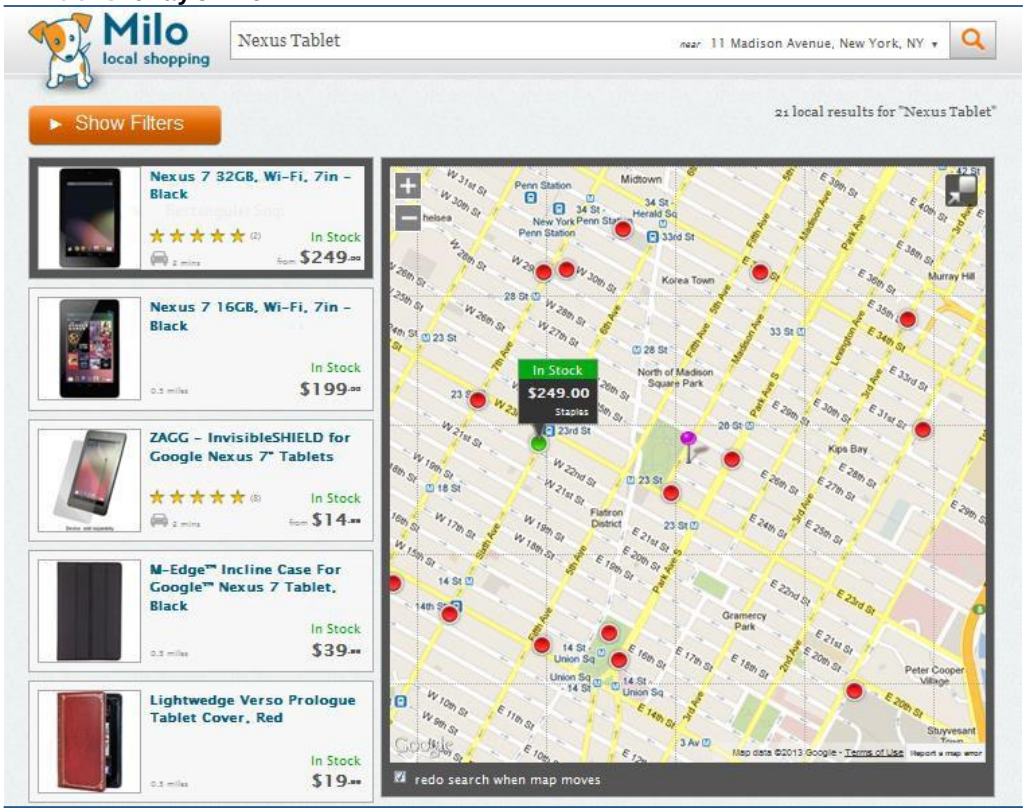
Exhibit 47: **Yelp Monocle**



Source: Company website

Yelp's Monocle: The potential link for this product with Google Glass is fairly straightforward – the above screenshot is from a smart phone. Monocle employs the user's location data to locate relevant restaurants or businesses within the vicinity.

Exhibit 48: eBay's Milo



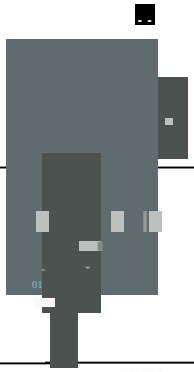
Source: Company website

eBay's Milo: "Milo, fetch me a Nexus Tablet from stores near Eleven Madison Avenue" – the potential for this product is also straightforward with Wearable devices as it lists real-time in-store product inventory for stores tied into its system.

Appendix

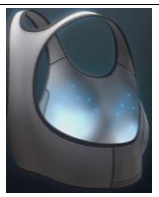
I. Fitness

Company	Product	Description	Image
4iii	Viiiiva	Viiiiva is a Heart Rate Mooil:.or that connects your fi.JI§.Jl:e of ANT+® sensasto your iPhone®, with no aHkw..-dapters and aB:1 WCfks with yotr A">>T+ watch cr cof11:1lter (Garmin, Tmex. addas). The Liiii1k Coonectivty Modue nside *your* Vlii'lla turnsyoor iPhone into a cyc:g t011ptier cr ruming montor; delivetilg al yoor ANT+ d<ta seamle<S and il real tmethe free 4ii App or aofthe pul<¥ fitness Jws. Liink als:J makes t eafo/ to changr your Sportiiiis settirqs from *yoa* iPh:Jne. (Spcrtiiiis heads+up display system is another 4iiii Inn01'al:.b1 availat:E separate). Liiiink is an exclusNe 4iiii Inn(ll(af:.bfs feature <1d only available with Viiiiva.	
Adidas	adidas miCoach	Adidas has been a late mover, 'lo'lth ts Itness tracker 1ltrodJced in 2010 as a tine part systerr th;t ilcllides an acceler01 leter-based sensa (speed, d&<V1Ce, pace), a heart rate monito ard a receWer that communiC<tes wth the user to higf"light bne remailing. ard provi ipig instructions (speed up/slow down etc.). The system has al91 been integ-ated with sm<¥tphoneps and an exercise game (Xbox and PlaySt<i:ion)	
Amiigo	Fitness Bar.:J	flness tmcelet for iPhooe rd l>rl<toid measures and tr s specific exercisteps, heart rate and calories burned.	
Basis	81	r<te monlcr., activly metricee p metripersptation mootir., skir1 temp, and detectrn, a autCl'Tlatically classSfied irlto a persrnal data feed that comrn.Jticates via BiJletooth.	
BodyMedia	FIT	Core and displaJ armband mooftors. Weig'lt management., flness trackhg, sleep moodri1g. Requires 9.bscription to ooine manager product	
Bodymonitor	Smartband	Based oo ye..-s of research at CSA tile Lebriz Ingdute fCf Social Sciences, one of the leading i1g:ilt:Jes for mettxlds of emprical social reffiarch, we *have* created n8\Wl techrxllogieS for dete of emctiOns in realtme: tx>dy temperatL..te, <rnbemperature,pt.ise, motion. USng tt1ese p..-arneters elernertary emctbos c<t1 be recogrized. One wtt1 up to 12 buttons assigubie keyboard also enables tile specific<:iioo of sltljectilie par<rnetersthat the individual user sees of specialtnpcrtance (eg he<ty traffic). The smart band g:Xds for extraordir CO'Tlfa1: and ease of use., wlhoot cl i ilter or &icky ef!ctr(Xjes. Hus, the detection of emotion data is posible everywhere - wthout bildi1g to lab Xatories and test studios.	
FitBit	Flex	Tracks l'teps, calores tx.Jmed, sleep hall'S and qua., actille mimted&X ce traveed - frack goaooline and on mobile devices	
Garmin	Garmin Forermner 910XT GPS Heart Rate Watch	Forerll1ner 91OXT is the oflo/ a -11-ooe, GPS-enabled device tt1at JXOVides detailed 9lVl'11 and tracks distance,pace, ee...atKJn and heart rote fCl' rumi1g and eyeing. .Abe to s-Vill dil'tance, efficiency, l'trd\e type, Collit, and po!! lemj:hsvvhle e ipped wth five rate traini1g zooes. Mairtains battery ife up to 20 hours	

GOW	GOW Pack	SM/>RT T-shirts 'Mth rlegrated sengxs IncLJdes a heart rate montor wth an exclle aw for iPhJne 4515 <l"id Gallaxy Samsurr,J s3. t%o provides a web ste for trairi1g managemet1t.	
Jawbone		The tracelet helf tracks mO\lernert and⟺ep, ⟲ld gwes feedback il these areas — rernildng the uset to get up and move if they've been nactwe too long and wakng them up ;tan KJeal pOilt il ther Seep cycle. The UP system also tracks m:Jod and eatil g habt:::; but ttlese haie to be logged directnto thep t:y the user. The foo::i trking. whie stil mo marKentry, is more sqJhstic<ied than t was last year. aii ONing for barcode-scanning and calorie trackng	
Misfit	Shine	Flness Tr-ker, waterproof, replacable battery lasts 4 morths	
Motorola	Motoactv	Flness Tror:ker, he<lt rote mooitor, peciJmeter, GPS, MP3, FM tuner, comecti.ty to !m <ltp>ne for email, calendar ⟲ld alert mtih:ations	
Nike	FwlBard	Tr<lcks 4eps, calories tx.Jrned through credit tr<llkilg - track go<is anine ard on mobile deviCes, and can be u93d il cofiurctiOn with other Nike+ prOOucts (!IJcrts watch, GPS tracker)	
OnTheGo Platforms	Ghost Runner	Meet Ghost Rll1ner, the frst st"owcase appk:atb1by OnTheGo Pl<tfcrfi'}S, hl iltate tranng tool for rl.l1ners <1d erdl.l"<tlce athleteGhost Runner ch lenges <thletes wth real-time analyh s ard perfcrmarce ghosts. The Ghost Rumer pli catiOn is fXM"Elred by OnTheGo Platforms and is hou93dwtrw-, a pair of ligrt:IIIIE!Kjlt, faffib1-for*'t'ard !IJcrlsglasses.	
Polar	RCX5	For triathletes <1d et1dur<i"lce athletes looking for better perfcrmarce. MoNs you to create yol.I" ONn !IJcrt profMes and quickly SIM/tch bet et1 them. ImprCll'es performancewlh e11durancetrairi1g JXogrxndCJNnlo able for free from pol;¥per9:1nattrailer.com wlh the Polar D<talirlk.PrOr'ideS heart rate BYen rn w<ter """th a comfort<ille fybrd transt'l'ltl:er Certainsto 8-iii morths of bal±ety Ue	
Re-Timer	Re-Timer	The Retrner is de9[1ed to real9'1 your bOOy cbck to dirnise 9eep, assist shift wcrkerhe frequet1t H;ers cr hyouf It the Wrter bkJes.. We've l:ctlX1ed eYerythl1gyou need to get trnal use from yol.I" Retmer.	

Suunto	Suunto Ambit2 S Red	The Suunto Ambit2 S is equipped with the latest GPS in a light and sleek design with advanced features for running, biking, swimming and more. Thousands of Suunto Apps also available to install on the watch.	
TmG	TmG-BMC	TmG-BMC lets users monitor muscle fatigue while exercising using a muscle contraction (MC) sensor. The company's newest product is its MC sensor, which measures muscle mechanics directly and selectively under different loads and during exercise. It provides feedback on individual muscles for contraction and relaxation speeds, as well as produced force.	
Xybermind	Achillex	Your way of moving is as individual as your fingerprint. Clearly a sports shoe has to match your personal motion profile. A less than perfect match will only become noticeable when pain occurs, usually too late. Achillex matches customers with the shoe that optimally fits their motion profile. Ease of use - Achillex places the capability of a complete biomechanical lab in your store. Measuring, guidance and analyses are all integrated in the fully automated Achillex system – as easy as it gets.	

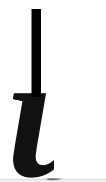
II. Medical

Company	Product	Description	Image
BodyTel	BodyTel Products	BodyTel products offer the convenience of home diagnostics to people who have chronic illnesses or simply hope to avoid health problems by making lifestyle changes advised by a doctor. The devices include a blood glucose meter, a blood pressure meter, and scales. Each has a built-in Bluetooth module that automatically sends readings to the user's home base station or cell phone. The station then forwards the data to a secure online database using a protected Internet connection. In addition to viewing the data, doctors have the option of having an alert sent to them under defined conditions; when data exceeds or falls below a pre- defined threshold, the doctor is informed. This lets medical personnel help quickly in the event of hyperglycemia or hypoglycemia in a patient with diabetes, for instance.	
First Warning	The First Warning System	The goal the First Warning Breast System™ is to enhance clinical breast examination aiding in the reduction of superfluous mammograms, needless biopsies, and other screening/diagnostic procedures, as well as to develop a physiological profile of the changing breast over time, to identify breast tissue abnormalities at their earliest stages. The unique value of the First Warning System™ is related to detecting tissue growth pattern changes at any stage of development, regardless of the type of breast lesion.	
Imec	EEG Headset	Imec's wearable electroencephalography (EEG) headset and EKG patch keep tabs on your brain and heart activity, respectively. Your heart rate and 3D-accelerometer data are stored in the system or streamed to a smartphone. Imec also has developed a wireless EEG headset prototype. The system uses impedance monitoring and active electrodes to increase the quality of EEG signal recording, compared to former versions of the system. The data is then transmitted in real time to a receiver located up to 10 miles away from the system. The Imec development services are available in the U.S. as prototypes only. Pictured above is a user demonstrating the Imec EEG headset.	
Vancive	Metria Wearable Sensor Technology	A small sensor is worn on the body and is attached using a skin-friendly adhesive. The low-profile design makes it suitable for daily activities like showering and exercise. The sensor is built to gather a variety of patient information, from heart rate and respiration to sleep duration and activity levels. Patients will view their own data on their smart phones. This information will be useful in conducting a health and wellness assessment, pursuing fitness goals or monitoring the elderly. In a clinical setting, patient data will flow directly to caregivers for interpretation and action. Professionals will be able to monitor vital signs in real-time or store data for later analysis.	
Nuubo	nECG Platform	Nuubo provides a new approach to cardiac remote monitoring, with its e-textile technology BlendFix® sensor electrode technology that is cost-effective, wearable, remote, continuous and non-invasive. nECG Platfom can be used simultaneously for both individuals and large number of patients.	

Philiips	Bilirubin Blanket	The Bilirubin Blanket is still in the development stage, but it already shows a lot of promise. Because it is the blanket itself that emits the blue light, the light reaches the maximum amount of the baby's skin – this close range should significantly improve the efficiency of the treatment. Plus, the Bilirubin Blanket is just as soft as a normal blanket. So baby can be safely treated while also being comfortably wrapped up, and Mom and Dad can cradle and comfort their baby without interrupting his or her treatment. This decreases the stress for everyone, and enables the parents to bond naturally with their new baby.	
Preventice	BodyGuardian Remote Monitoring System	Developed in collaboration with Mayo Clinic, this FDA-cleared system uses sophisticated algorithms to support remote monitoring for individuals with non-lethal cardiac arrhythmias. BodyGuardian RMS allows physicians to monitor key biometrics outside of the clinical setting, while patients go about their daily lives. Important physiologic data is securely collected by a small, wearable body sensor and transmitted to physicians. It maintains a constant connection between patients and their care teams.	
Roche	Accu-Chek Mobile	The Accu-Chek Mobile system allows you to test virtually whenever, wherever you want; it's the only blood glucose meter with the breakthrough Test & Go Technology. A strip-free system with 50 tests on a continuous tape, combined with the Accu-Chek FastClix Mobile lancing device offers a whole new way of testing; simplicity and convenience. Just test. Let the Accu-Chek Mobile system do the rest.	
T.Ware	T.Jacket	The T.Jacket was developed to provide comfort, calm and control to both people with sensory processing challenges and to their caregivers (parents, teachers, therapists, etc.). Individuals, including children, who are diagnosed with autism spectrum disorder (ASD) or attention-deficit/hyperactivity disorder (ADHD) are often found to have sensory processing difficulties. Sensory processing difficulties result in behaviors such as inattention, distractibility, and agitation as the individual is unable to cope with everyday sensory inputs. Deep pressure has been found to produce a calming effect and can help children to better organize the sensory inputs. It can also help increase attention to task and lower hyperactivity.	
WatchMinder	WatchMinder3	The WatchMinder is a simple wristwatch that can easily be programmed to set up discreet vibrating reminders throughout one's day. Invented by a child psychologist, the WatchMinder was designed to aid children with Attention Deficit Disorder (AD/HD) and others with special needs in staying focused, managing their time, and modifying their thoughts and behaviors.	
Withings	Blood Pressure Monitor	All you need to do is to wrap the Blood Pressure Monitor around your arm and plug it into your iOS device. Choose between one single measurement or a mean average (based on your doctor's advice) and get instant visibility of your systolic, diastolic blood pressure and heart rate. Your results are saved automatically on your iOS device. No need to worry about manually updating your data. Keeping an eye on your blood pressure trend is crucial. The free Withings app displays your results in clear graphs, always to hand. Make the most of your Blood Pressure Monitor - email your measurements history to your doctor in a tap. An easy way to stay healthy and get peace of mind. Share your results from the relaxed environment of your home - straight to your doctor. Just push a button on the Withings app to send an update and seek advice.	

III. Lifestyle

Company	Product	Description	Image
AIQ Smart Clothing	TouchMan Gloves	Conductive gloves made with stainless steel fiber – The TouchMan glove is constructed with stretchable material that provides maximum comfort and high performance. Conductive yarn is knitted or woven into the gloves fingertips. Our unique and simple design allows you to use touch panel devices with accuracy and precision without the inconvenience of removing your gloves. They are washable and will never oxidize, making them perfectly safe for your skin and electronic devices.	
AIQ Smart Clothing	BioMan	Wearable electrodes combined with modern information technology that provides vital sign monitoring for different applications in a daily living environment without sacrificing comfort. Paired with Bluetooth connectivity to your smart device, BioMan is perfect for weight control, sports training and health monitoring.	

Amsterdam	Mnemo	Mnerno is an itteracti'i'elrienbracelet th;t enables yoo to record, retve, and sh;¥e a memcry reel of al yol.I" friends' picture9Jngs, <t1d bcat.OOs from a singe evert. Mnerno t:facelets are collectible and customzeable. VVhen two or more ;¥e !irked together, common rn:JmetltS are combiled to create colective mem£l'ieS of shared experiences	
Breezing	Breezing	Breezing allows you to meas..Jre your metaboHsm uSng the WCf ld' s oriy mobile metabo»sm tracker. For the trst time,accurate metabok: inlorm<tion is ;t yoor fl""qerts Breemg tracks yoi.X metaboNsm O!'er trne Xd creates a ciet and exercise pl<i1 specific to you	
Chinavasion	Solar Vest	This Solar Vest is a fu!Kin of fashion and techrology that lets yoo keep your gadgets fulo/ charged when you're 11l0lkhg or playing oLtSde. Ths vest is like a sdar JXYIIY'Et station to keep yotx eel prune, portable mecia pl<fjer, nol:etxmk compLier, digtal C<rnera, ard other rtable electrooies h.fy powered vvhile yru are wakilg oL.tc):)ors. This "fashiOn-tech" earN as ve!'t iS tt1e perfect fiekl accesoory for photo!;f hers, a-ct1eolog&s, nve!'tig<tors, geologi!'ts, and <t1yone else constart!y workirq outdoors. The C\.f"R- S09 Solar Vest iS designed for yotx comfort ard c«werWmce. It comes witt1 big storage pockets for hog tools or camera equipment and 11cUdes a b<ttery pack + cabes <t1d connectors for a l of tOOay's pu!a-rtable ef!ctrooies.	
Everon	Lyra	Everoo iS tt1e ultimate, irteligent,wfelesstelecare alarm. Coothuou9; mortared, the gnart PRESS & PLAY wreless sen::ms and alarm bli:tons combl1ed with a GPRS I"ub alow wire free nstalatrn il mrsilg homes and other care fadies. Everoo's alarm managemert !¥4em albNs alarms to be drected to a carer's mdJ e,secLreS the ala-ms h<Ne been <t'1SNered and thet1 sends detailed ala-m 11fo to ther motile. If tt1e c a-er d:Jes net anSoNet the arm call from the server, tt1en tiS redirected seamlesether to anrther carer or <t1 ala-m receivl1gcerter	
Everon	PERSmobile	PERSmobile offers mdlilty and secLrity to <t1 ageing poptJation PERSrnobile provrles Is users with freecilm of morement. It allows <¥)eing perffins to e lorYJet 11 ther home envrooment or enables earn release from ho il:al For example PetS11obile mKjlt be used to give mdlility to Unse wth loo;; term coodil:rns s.x:h as COPD, l-lea-t DiSease <nd Diabetes or to gve peace of mind to an eldero/ perffin rec011ering after a hreacement	
Everon	Urgentys	Urgertys is the mo'"t feature riCh b1e '1¥:Jrket prrtectoo deviCe on the market todaJ. Urgertys comOOes accurate JIGPS po D"lhg. GPRS arms <t1d q. alil:y voice cats to prClllide lone wakerswth a diS::rete but effecte secLrty ffik.tDl. Ur gentys also allows 'I¥::lrkers to manage ther ril'k el, put themseWes on and off shift and to send and receive me::S<¥JeS ard i'n<¥JeS from the colour 9::reen	
Everon	Vega	The Vega is a purpose bl.ijt system to aid safer wal<ng for ttnse with P1zhemer or other cogntNe dscfders. Vega atows wearers to wak freely in a predetermned saf e zooe but r<fses <t1 ali:om<tic alarm shoold tt1e arer wak outOOe of this rone. Vega <M9J fe<tures an RF me base that tdieatesto the Vega tracelet that the arer iS at home. The Vega iS de9gned to ai0lll more freedom whilst yet redUCr-x:J riS<	
Heapsylon	Garment	Heap!¥00 is focused oo deli'eting a famjo/ of boOj-seng deviCes for the hl.man foot. Our arable fl'Oducts capture <nd comrn.Jricate data &Jch as act il:y type,boweight, eversion and 11-footwear pres:ure to the user. The d<ta iS presented and anao/zed il an easy -to-use,moblle dashboa-d wth a modern, clean look Heap91lon products make more fll1 <t1d safer to exercise They may also cootrbJte to prevent certain i"fJries, Xd 11 case of I'lliY or dJsease they track p<tient adherence and offbadng d<ta.	
""alletUSA		\M'lether is because you c):)n'ke havirq to char'9e w<Miets once tt1ey a-e worn o:biiYl'l,or if you dcrf t like the feel of leather on yoobin, twanet is a game-char'9er you'd wart to take a kxJk ;t. Wth a strOl)',j, ha-d casilg. biometriC occess, ard bleto!th technolo!lf to act as a deterrent <¥Jain!'t thieves, the M/anet is out to prore that it takes yoLr se0Jril:y very serK:>uso/.lf the iWalet Ot yOllt phone iS too far apart from one an!thet (more th<n 10-15 ft), your ooe will SOlJnd, warri1g you of a piCkpocket's foiled attempt or if you hal1e m laced ether of these i'nport<i1t pers:xl effects. Prices are 11 the $459 to.$599 rarqe <t1d the wallets a-e avahble il carboo fb"e ard alrnilUm shel	

Kinetik	Kinetik	What if your walk to work IX ENBI1ilg bike ride coukj po'¥1l3r yoor !m<¥t phme? Ktlett< celebr S<r1 FranciS:a as a hub of an actNe, young. ard tectl SiJNVy corrmuri:y ....th a commrn ! mllf1t to sustainat:E liv ng. ffl energy h<¥nes:ing de11ice, the Khetik stcres the energy kinetic created by the wearer's pt'¥sicaj movemet1t tiYough ther day. By cre<ting energy enot. ;Jh staying to fXWVet mdlile deviCes while on the move, the Knett creates a t:angtJie reward for fl.	
Kuchofuku	USB Air Conditioned Srirt	The US freshUSB Ar Condtioned Shrl is a f<w1tastic cool 1g itl(ention fcr hot days. USB+ fans t:(CII'II or rooar irto tt1e shrl, pcwered 9:Jiet¥ your powered USB drWe. Great fcr any hot office rocm, cr E!IIBI1 for portable actioo wth a ltop or rtl1er dE!llice.	
Nike	Nike Hyperdmk+	Athletes basketballWays w<t1t to im!=fr:Nethemselves, <t1d wth tpair of Nike HyperciJnk+, There are pl<fJerS C<V'I mooil:or thereed, jump hl: <V'ld ther CNegame performance. You can e ffinsors on the sh'Je that transmit flformal:rn to your smarl: on e via bUetool:h screen. Tel1en reccrd videos of the play, then watch the v deos wth the matchilg displ<fj on your progThesvideos and yoa S:<ts C<f'" be shared on social media, or C<f'" be used to monitor	
NuMetrex	NuMetrex Heart Sensing Sports Bra	The NuMeNJMetrex Heart Serrsi1g Sports Bra featAes electronic senSng technct>q; nte at.ed directly as you doInto the fabric. The textie electrodes that are knlted nto the br a stretch and move transmitter mairt ail"ilg contact Wth yoan and ffitlSng yoa heart's electrical pe. A tny instanta is sna ed nto a S'Tlall pocket n the front of the garmert, where t orottrtar""""" radbs your heart rate for digitreacblt on a heart rate mooitor wrist w<tch fitness r0Oe 'lo'tth H:egr<ted montorng device.	
NuMetrex	Nliv1etrex Cardio Srirt for Men	The Ca sensingCardO Shrt albNs men to wear a he;¥t r<te monlor lIYitl"olt kno'lll>i1g tis there. The a compafabric rroves comfortab)f wth the body,picking up the heart's pl.fse and sendl""q it to snapped heart rate ll'Xlritor w<tch or C;¥dO mac0Oe via a tny transmtter that is into a pocket on the shirt. The sleeveless S:yle can be wan ak:me or as a firS: layer.	
NuMetrex	NuMetrex Heart Sensng Racer Tart:	The sleeve integrateSeleveless tank top features a shef bra where the electronic sensing technoloq; is in the shelfdirectlyinto the fabric to ll'Xlritor heart rate. A tiny transrrtter snaps into a !X)Cket monitoring ctl'a to send data to a comp<tble heart rate mootor wrist watch or other second-skin . The Heart SenSng Racer Tart< is m<W:Je of quick riyl1g f¥lon Lycra wth a ft th;t offers mecJl.ITl st4Jport.	
Private	USB Cufflirt:s	Similar to formal lto the USB necklace, these cufflinks gWe a professional look to an ak'ea()j clean <i"'ld gunmetalook E cufflink carries 2 G8 W«'th of S:or<t;Je, <i"'ld is avalable n gctl and monogra. To per9:1naNze tlls even flrlher, there is an er.;Jravng service where you can plt a $8.00. of L{I to 8 char ters (pel< from a rar.;;e of forts) on yoa cuff tls for only Fina fla!:h drh'e you C<V'I pti yoa name on, at .$100.00 a pait.	
Rest Devices	Peeko Monitor	The Has Peeko Moritor montors respiration, boo:¥ poStion,til/ ty leveten1perature and audio. Fully a smart one app that lets you view your baby's breathng and sleep wherever you are m OOe wa!:hable.	

Rest Devices	SleepShirt	The Rest Devices SleepShirt is a new way to record and diagnose sleep for long periods in the comfort of your own home. At its core, the SleepShirt contains two of our thin-film respiration sensors. These non-contact sensors measure the movement of the shirt and body throughout the night and provide a complete signal of your respiration. Because there is no electrical contact, the SleepShirt is completely washable and requires no user preparation– there are no sensors or electrodes to attach. Once the shirt has gathered respiration data for a night, your data is uploaded to our servers, and from there we perform in-depth analytics on your sleep. Through respiration alone, we can determine not only if you have apnea, but also how long and how well you slept.	
Swarovski	Swarovski USB Necklace	Of the many out-of-the-ordinary flash drives, this one gives off a positive, almost classy vibe. Part of a line of crystal-studded USB drives, this 4GB USB necklace by Swarovski is proof that tech can also be sophisticated and elegant at the same time. At a price tag of $75.00, the necklace is also available in Violet and Light Rose. This two-part heart-shaped necklace is the perfect Valentine's day gift for the tech girl in your life.	
ThalmicLabs	MYO	MYO lets you use the electrical activity in your muscles to wirelessly control your computer, phone, and other favorite digital technologies. With a wave of your hand, MYO will transform how you interact with your digital world.	
ThinkGeek	Electronic Drum Kit Shirt	Geeky T-shirts aren't exactly new, but put in some electronics, a few AA batteries, turn down the lights and you can actually have an equalizer dancing on your chest, reacting to the sounds around you. Another kind of interactive shirt is one that makes sound – the electronic drum kit shirt has 7 spots that generate sounds when you push down on them. T-shirts like these are cheap to come by as they do not need high tech wizardry, just an electronic board that you have to remove before handwashing these T-shirts.	
ThinkGeek	Wi-Fi Detector Shirt	The glowing bars on the front of the shirt dynamically change as the surrounding wi-fi signal strength fluctuates. Finally you can get the attention you deserve as others bow to you as their reverential wi-fi god, while geeky chicks swoon at your presence.	

IV. Infotainment

Company	Product	Description	Image
Allerta	Pebble	Waterproof, ePaper screen, notifies of incoming calls, emails, texts, and other alerts. Comes with downloadable sports and music apps	
Apple	TBD	Features under consideration include letting users make calls, see the identity of incoming callers and check map coordinates, and a pedometer for counting steps and sensors for monitoring health-related data, such as heart rates. Apple has filed at least 79 patent applications that include the word "wrist," including one for a device with a flexible screen, powered by kinetic energy.	
BEARTek	Bluetooth Gloves	The problem with wearing gloves while riding a superbike or skiing is that it's impossible to reach for your smartphone with the thick outerwear. BEARTek was a Kickstarter campaign that had a great idea: a glove that communicates with your smartphone via Bluetooth. It has 6 touch points, that you can use to answer phone calls, and even basic music controls.	

Bt.ilel	Helmet Commurtcation System DOI	Buhel001 helmet corrmurt:atm system is a totalo/ new concept i1 Bluetooth® handstree hemet comrru rlcatKIns. Uoog a revdLtiooary vtntion ct er, paterted, Btllel DOi ncLces the hetnet shel ts df to create a rdlust, clear, 3O–e aucio il de the helmet. Buhel 001 ,..lJ\llIS yoo to phone, lIstet1 the rrusic and get informations with any ears coverhg helmet. Buhel001 c<r" be ftted drectly to the ol.tS(!e of the helmet wthout any lLrlher assemb er<tKm, as t has no 1Mres and m e<¥phooes. Btilel 001 C<Vl be rem()(ed at atime jwt !ling. ffi m riSks when you le<l'le yoLX helmet locked to the m!torcycle.	
Bt.ilel	Speakgoggle G31	G31 is a h q;alil:y 9d gooole wlh a modern and smart OOk. G31 cCf'npact Sze and ls !'tru:ture with movable lateral claNS m<l<e it very comfort<ille to be uffid wth a l types of hehlets. Its techtieal featu res make t &Jtable for many other actNlies that require eye ol.:ectiOn and txJssblity of C01lmll1ieati1g. G3i booe condLX:tiOn mierophooe is irtegr<ted H:o the frxne <t1d alCJoNS you to speak i1 freedom, absctlteheedless of ert'llirooroertal roise <iso whet1 Very strong. The autooomy of ts powerful battery grarts yoo to phone ardsten the musiC fCl' a whole day of art or wrrk.	
Bt.ilel	Speakglasses SG04	SG04 is a hig'l qualty sport 9..l1glasses wth pdarized lenses. It has been prcted for skiers <t1d cydst, tx.Jt t is perfect for m<t1y other !IJCl'tS too. SG04 techlieal engfleeri1g makes it &Jtable for the use n the open air,and partiareffieiert i l S:rong 'fWld condti:ms or lli'Wi'oornertalroiffiTo get ths perfClmance, SG04 is equipped ¥11th a bone corr1ucb:m mcrophone irtegrated into the frame, W'riehis able to c<tch your words drectfrom yoor rose and 9::1 albwing a clear co1111ers<tm e¥erywhere.	
Casio	G-Shock GB-6000	SuppCl'tS emaii/SMS me5Sage rotih:aton, ca ll notih:at:rn, a" find me" feature W.iehrilgs the sm<rlphooe if OS:, nd:fiCi<tiOn if w<tch tl'eaks BT connectm (ie you separ<te more than 50' from yol.l' phone).	
Cookoo	NA	NotifiCations for incoming calls, missed caJs, F ebook pand messages, calendar reminders ardmore. Customizable COMMANJ bli.ton enables ooe-button Facebod< check-n, location tagg11g. remcte trK)ger phone's camera etc. .AJetts 'When yoor dBYiee is out of range,or <t low battery leYel. Locate your phooe wth the press of abtiton from yo11 COOKOO "Watch Fttedwth an occur<te Japanese mcwement <t1d scr<tch-restart mineral cry!'tal "Watchfe. Up to 1year of battery Nfe for CONNECTED D;spay Xd 1-Þ to 3 years of battery ne fiX' analog watch mcwernet1t. Water re9start l4' to 5ATM.	
Google	TBD	Recertty nmored dB'I'el rnert effort ooqoo;l at GOOG.	Go g e
Google	Glass	Glass is capable of taking photorecordilg ¥Kieos, lod(ing up <t'ISNers on (;:)ogle, sho'tWlg reminders (such as for a fiQ1t) Xd sharhg W'\atever you're looking <t -ether 'llia me5Saging or tiYoa Google+ Hangoot	
I'm Spa	I'm Watch	Textemaisocial networki1g. calerdar <t1d phone sync for cal& The I'm Watch alows you to play mUS(;,get em, read social updates ard more, via ST. Because the I'm W<tch comes """th abLd-i'l microphooe <t1d speaker, you can B'l'en make cats drectfr001 yoor wiS:. Specs on thei'm W<tch flcl.Jde a 1.54-inch 240x 240 jCxel (220pp0 curved capacbe dlay, 450 MHz /<RM process::Jr, 64 or 128 MB of RAM, 4GB of H:ernal !'torage and a 450 mPh battery	

LG	TBD	In previous); released the GD910 smxtphooe vatch to l mled success.	
LG	Glasses	Rumored device to be blJit to compete with GOOG.	
Martian Watches	Passport, Victory and G2G	Traditional analog face with a slim 12-ch<racter LED bebw il: can par wi:h an Phone or Android han to JXClIde. Talk and listet1 u!ing MARTIAN'S clear speaker and noise-cancellation microphone. 2+ hotxs of t<k tme, 7 days of sl:<l1l.:ly time. The <f"alog watch uses a separate battery and willrun for aroxmal2 years. Martian Leash (1\l:JtiHes you when your phone is left be d). kcess phooe voiCe commands (.A.rdrod, 05/Sr0 - ace calls, send v Oice-to-text SMS me5S<l}8S, sten and resporxl to text messages, ffit cale ndar notifications, and use all ether voice command fll"cticns for cortroiling music, searchng the web, setting remnders and awointments, etc.Recei\le ncomng text <iierts and c<fend;y alerts via vibration, bkJ e LED and caler ID display. Receive ileomi lg notifical:much as Facebook Twtter, Weather, and Gmal	
Metawatch	Metawatch	Water Re9stan sports watch, trocks pace/diStance.	
Neptme	Neptune Pine	The Ne'1e Pl1e is the ofW smartwatch yoo'll?Y'er need. Simpo/ nsert yoor micro-SIM card Xd you'll erter a wt1ole new world of mobile cof11)li.h;J. With a ful dual-core front and proc rear-feilg cameras, ard access to more than 800,000 apps, the Pi1e puts the forefront of tcxhy's mobile technobJy rigl t oo yoa wrist	
Oakley's Men's Store	THUMP 2	These parb::!jar glasses are con dered to be the workfs first dil:al music eyewear. This is extremely hig'l erd wth an excefent build qualty ard it comes with ts own MP3 player ard adjustable e<¥buds. Yoo don't need <ny wi'es ha ng alover yo.r cbthes <nd you ciln't need to take yoor iPod rut every trne you need to change a song or !lltnethn:;. They can play mus9cfa- up to six l'ot..rs ard cct'r1e'lllth a 256Mb cr 512MB g:orage ee	
OMG Life	Autographer	Autographer is a new type of camera'WhiCh has beet1 cust()11 btJll: to en<ille !lJOt"taneous, hands-free im<oo capture. Its worki leacJng technobJy indJdes a custom 136° eye 11iew lens, an ultra sma GPS Il1it Xd 5 in-bt.Jsen9Jrs. These sensors are fused t¥ a 9Jphisticated algorithm to te the camera exactthe rig'It moments to take phct:os.	
O.R.B.	ORB.	With a simple twist, The O.R.B. transforms from a rhg to a heset \lri:Jn oo the ear that is capable of hands-free c ng. IncorpCl'ating HfN:av e™ tect'noiCXJy, the O.R.B. is a "Digitset™" that cfilrles - q;ality bone ccn1ucbm <. dio wi:hoot the dJscct'r1fort of placiY:l a device inside the ear. A delke edition also features an E lr* lisplaf for caller 1O,text messaging, and calet1dar remnders. To use the ri1g as a headset, si'nPo/ remCit'e t from the finger and twist open <¥ound the hinged joir1t. The ring (now a headset) is placed over the upper ear, so the ear ard the Sde of the he The tran!mil:tet et1d of the headset rests just abo the jailltlone and li.kzes dJal spe<l<er •voice <nni'Watioo" DSP tecl"rldogy The transmit excfter transducer rests just behind the outer ear.	

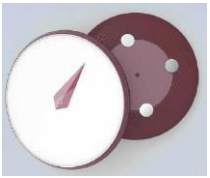
Recon Instruments	HUD Sports Goggles	Recon Instruments' first product to hit the market was Transcend in October 2010. Transcend are the world's first alpine goggles with GPS data viewable through a head mounted display providing real-time feedback to the user including speed, latitude/longitude, altitude, vertical distance travelled, total distance travelled, chrono/stopwatch mode, a run-counter, temperature and time. It is also the only pair of goggles that link to a post-processing software, Recon HQ and an online sharing community HQ Online. Here users can playback, re-live and analyze not only their stats on Recon HQ but others' on HQ Online where the user's runs and highlights are overlaid on satellite imagery.	
Rusty	The Wired Series	Say goodbye to tangled earphones that take up space in your pocket. Rusty has come up with a hoody with earphones that double as the elastic strings of the hood. To plug your music device in, in one of the side pockets, where you can house your music device, there is a jack to plug in your tunes. The earphones are machine washable (hence, waterproof – a very important feature for wearable gadgets) so you can skip the dreadful task of removing them and putting them back in. The Rusty clothing line has a lot of selections for men and women at various prices.	
Samsung	TBD	Product confirmed in development by Samsung, details unknown	SAMSUNG
Sony	SmartWatch	Email, text, social network, and calendar notifications.	
Swap	Rebel	Quad-band GSM wrist unit with a 1.46-inch color touchscreen and a built-in camera for both video and stills. USB port on wristband for data transfer to 2GB of expandable microSD storage. The watch also does FM radio, beams audio to your Bluetooth headset.	
Vuzix	M100 Smart Glasses	Just as smartphones forever changed the telephone, the Vuzix smart glasses M100 redefines our interface to the ever-expanding digital world. Vuzix smart glasses M100 is the world's first enhanced "Hands Free" smartphone display and communications system for on-the-go data access from your Smartphone and the Internet. Running applications under the Android operating system; text, video, email, mapping, audio and all we have come to expect from smartphones is available through this wireless personal information display system. Vuzix smart glasses offer a wearable visual connection to the Cloud, through your smartphone or other compatible smart device, wherever you go.	
WIMM	One	The WIMM One gets updates via Wi-Fi every hour, and does not require pairing with a smartphone. With a custom version of Android and its own micro app store, this watch extends beyond a handset companion, providing an entirely new platform capable of delivering news, weather, social updates and more, directly from the cloud. Note, details on the WIMM site no longer available as they entered an exclusive, confidential agreement for their technology in Summer 2012. Foxconn has previously been mentioned as an investor in WIMM.	

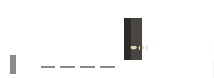
V. Gaming

Company	Product	Description	Image
Garmin	Approach S3	The S3 will run in GPS mode for up to 8 hours and 4 weeks in watch mode. 27,000 golf courses worldwide. Recharge, update courses, and download/print scorecard via USB. Touch screen is glove friendly, display shows shape of the green with moveable pin to give accurate distance to any portion of the green. Create and save custom points on the hole for bunkers, water or other hazards. Distance measure for driving distance, round timer, user selectable background color. Waterproof to IPX7 standards.	

GeoPalz	iBitz	The iBitz™ PowerKey and Unity activity trackers by GeoPalz® are physical activity based wireless devices and game designed to get the entire family up and moving. The device is available in both child and adult versions, that wirelessly syncs to your Bluetooth 4.0 (BLE) phone or tablet while encouraging users to meet their physical health and activity goals. iBitz PowerKey is the powered access to games and devices… they can exercise their right to play more! iBitz Unity is a family health monitor that wirelessly syncs to apps where parents can stay fit with their family and friends.	
Private	Game Golf	Game Golf, a system that pairs NFC with current golf tech like GPS and motion sensors to track your every duff. It uses NFC-equipped tags that pop into the end of each club and a hip-mounted "GYG" device to collect the data with a battery life of two rounds (about 8 hours) -- and no need to pack a smartphone or tablet onto the course. The golfer then "tags" his club against the hip-worn device prior to taking a lunge, and every shot from a 300-yard drive to a 5-inch putt is duly noted.	
Sqord	Sqord PowerBand	Sqord is making healthy, active play more fun for kids. With Sqord, you can score points, win competitions, earn medals, and get other online rewards with your friends simply by doing what you do. You can connect with friends and exchange Squawks and High-Fives, while competing with, and/or cheering for each other. Players wear a Sqord PowerBand while doing whatever it is they do: run, jump, walk, hike, ride, skate, chase, (be chased), take out the trash, walk the dog, etc. All the while, we track the amount of movement via a 3-axis accelerometer and some other state-of-the-art hardware inside the PowerBand.	
TN Games	3RD Space Vest	The 3RD Space Vest is the only gaming peripheral ever created that gives you the unique ability to sense and feel what your character experiences during gameplay. Unlike rumble or motorized force feedback devices, the Vest uses air to generate impact and pressure forces to your body emulating the quality, character, and directional attributes of what you see happening. Feel the impacts as bullets strike and grenades explode, not only as it happens, but more importantly, where it happens. The Vest creates a unique 3 dimensional physical experience, making you an integral part of the action while transforming how you play.	

VI. Other

Company	Product	Description	Image
9Solutions IPCS	the 9Solutions system	9Solutions IPCS is a wireless Bluetooth and SaaS-based real-time locating system (RTLS) and application platform that enables real-time tracking of people and equipment. The 9Solutions system, which works with cell phones, can be used to protect "lone employees" -- medical and other personnel who might need assistance while doing their jobs.	
Agile Dimension Inc.	Compass Go	In a world where city-dwellers often "pre-Google" destinations instead of discovering new places, CompassGo provides users with unpredictable experiences and unexpected adventures. When gripped in a user's hand, CompassGo suggests and guides them to an urban discovery by using smartphone-synced personal data, GPS technology, and physical signals. The device reveals a general category—such as culture, food, or relaxation—before providing navigation to a hip clothing store, hole-in-the-wall cafe, or super-secret winery that's under mile away.	
Austin	Tree Voice	Tree Voice collects data from a series of sensors—dectecting elements like motion, temperature, noise, and pollution—to display an augmented tree that "speaks" through light and iconic images. The interactive display provides anyone the opportunity to engage with the tree and receive updates on their local environment. Cloud connectivity feeds this data into a companion dashboard, aggregating data from neighborhoods and cities while also providing an overview of trees over time.	
BPS	Ninja	Designed for total mobile surveillance protecting the public, your business and vulnerable staff from threats such as terrorism, vandalism, abuse or direct attack. Compact, lightweight, comfortable to wear, providing high quality action recordings of sight and sound. Giving both support and reassurance to users. In the event of an incident, recorded data can be used to corroborate evidence and defend personnel. Whilst in a crisis, personnel can alert and inform colleagues of the live situation. Police Officers, security staff, public servants, hospital staff, check in staff, ticket inspectors, traffic wardens, care staff, driving instructors, lone workers, social workers, nightclub doorman etc.	

C.Scmeider	bukii	blukii is p!'t 2'2 mm 11 di<rnetet (the SZe of a 20 cent cOin) - and ;s lui of the very lalæ!'t technol · Bluetooti1® smart, NFC and a mctm and ter11Jer<ti.Xe sen9Jr. t:tJkM b6!fiimiJr0c es wth a sm;¥tph:me, tablet and computer. Ertire'; new and fanta!'tic aws are made pos!:tJie blb.	
Danfoss PolyP ower A/S	PolyP ower	A new range of \letsatile and compbrt stretch seos:JrS has been hunchedDanfoss PolyPower AIS. The PolyPOVIIE!r® wearable Sen!DrS <¥e C011pl<\/l't and make mea&Jri'lg and monitoring on the ht.man body ea!¥ . The stretch semms li:ilize the adv anced PcljPONer DEAP tec making the sen9Jrs vers;tMe <t1d corflllːrt, prClIrling a lirect ;r.d reiable capacitive sig'lal. Mea9..Jring and mortorhg of the h.Jm<f"" bo()j is easy to appro as tile stretch sensors can adhere directly to the skin or be embedded into a garment	
Du-ex	Fundawear	Fundaware is a cleller c001bination of a smart one app and tirP; vibrati1g rrotors seW1 into female lingerie <V'ld male underpants. It acc(l"npiJffies the task of transferri'lg touch across vast distances. Fundavvare uses tf¥ vibratilg actuators rrilar to those that gill e you r fin()!t that buzzing "hapb: feedback" on smartprunes. The rien!:ty of Fund<fNear's vbr<tions correspond to the movemerts of the perSJn's firqer toucliog the smartphone screen !rem afar	
Frog Desig n Competition	AirWmes Hello	Breathe il the ArWa es mask, one of ghtwnmg ar<ille technOO!lf concepts spaWled by an ilternal compettiOn at: Fr<X] Design. HaiMng from Sh<W'lg,ai, AiWavestakes the dea of a polk mask <W'd tans it hg:h tech The idea is for the mask to mooitor polutKJn M:!Yels ard share that d<ta wth other \lllearercre<ting a colectWe map shoWng Wlich areas of a city to avoid.	
Frog Design Competition	World DIY Icho	This \lllear<ille techndogy kl consiS:s of acces le kd.Jino projects th<t are designed to get girls playi1g Wth technology dt..rhg the otal tween ye s . 1'-b programmiNJ ils are needed and the ma:JL de gn gN es girls the freedom to combine pieces ard express ther Illq_Je !lyles	
Frog Design Competition	MTA Relay	Icho is ana ig<tion aid that coonectsvi9Jal)f impaired users to p.Jbk: es ir1 new ways, allowing them to both navigate and discover urban sp es mcre freeo/. Ushg technoklgy to augment the carent experience, !cho pro;idesa n81111 evel of access to comected pubk: spaces by ir1crea:trg perce iOn and oactweleading usersthroUJh their aban environment	
Frog Design Competition		Relay is a N9V11 Ycr-ker's &Jb<Nay companD!. A wi1dow ri the elatllxal:e MTA netvm'k that provides. 1nm:<enr:v and m;#(es yot..r ccrnml.te easier; Relay can fetch specific es of informatior fCf a rider's comrrute at: the very second they want I. It's a sin comected accessory prO'iding the tK.Jhl: ir1formati0n to et1harx::e a city dwelers dafe	
Geodog	Geodog Classic	As your dC.XJ most ike!1I4!1 conti1ue roamir1g while you lo ilg for hm, you cartw<te the searc mode. Then you <Ml get new postrn ilf[)'m<tion l!'l'ery time yoa dog has moved from his la.<t poStKJn by a certair1 distarx::e (e.g. 10Ctn). The message wi irlCWe the C<¥din<l direction. k; soon as this fenx::r.J' has beertill<ted, GEODOG® wil al.tcmatica)o/ supervise yot..r <bg <lt1d ir1fcrm you by SMS when yot..r <bg leaves the zone. These text messages will irlCWe the drectoo ard the distance to the HOME (e.g. 56Ctn 'lo'l€4).	

Hammacher Schlemmer	The Metal Detecting Sardals	These parb::!jar sand<is allow you to detect metal. Agan, this gadget is not for a er e consurr of course becase there are no applicai:.OOs But if you are waking across a field sure as he that there is 9Jmething bLXied undergoll1d thet1 you m9lt wTt to take these for a spin. Or for ex<mple, if yotx g:JOf of a friend tiYONs your keys rl:o a huge grass lawn, you can fmJ them ea. All you have to do is walk aromd t we<¥ing this gac);Jet m yoor leg.	
Icedot	Snap	ICEdot is an emergency IO and not:iftal:.ioo seN)::e ilrovati'lg safety technOO!!f for <thletes and outdoor enthusiasts. ICEdot syncs a secure ooline profi e wth products su::h as a band, snap, helme! stickers cr I'S KteS: pr!Xluct, the CraSenSJr. In Case Of Emergency, ICEdot has the abilty sha-e predesignated he<ith and geoloc<i:ion i1formatb1 over smS!text	
iKey	Wrist Keyboard	Well, this particular gadget is not for Bl'eryone of coorse. This ooe has been made up to the military S:andards whch is <ille to wthS:and extreme ectromag1ebc env ronments. It has an LED to d;splaf the keys for the n;;t1t tme. You can kiss your virtual keybo;¥d gootl.:lye and start wearing this a 9)me keyboard rig'lt on yol.!' wrist. It gWes a really cool look too Wlen you are using it.	
IN1COID	IN10DID	Get full keyboard input wlhout a typical Keybo;¥d• t¥ mov OJ at keystroh s orto your fingers. Holtl one firqer <"d !=fess another ard you c<11 create 100 Smpie keystrokes, all without moving your hand& A s-x:Jie tap f()' ten letters, !:hifl: ooe th..Jmb for eight letters more, shift the other thll1b for the la't ■ M:ttl:ers, the entre alphabet rig,t on the of your fingers! This rl'lJie interface can be <PPied universally <11ywhere to mak:e touch-typing more intelligent 9:1 you can type accurately on small devices wthol.t looking. Wth IN10DID, you can type safely whle val<:ing, rdng. or ing in bed. You wl never need to look at a keyboard again.	
LUMO BodyTech, Inc.	LUMOback	LUMOback is hg,Set19tWe at measi.XOJ lo bl< spinal posture. In most cases, poor lower back posture s.Jch as sbJching. M:!ads to poor neck and upper bk posture. By correc kroNer back po!il.l'e, LUMOback wil help cmect mac ases of po()' neck and upper back po!'ture. Ho'lo'l€Ver, there are ca93Sinwhich poor neck ard u er back posture occur in isol<tion wlhoti atl'lormal lower back po!'ttxe. Future pnx1ucts from LUMO BodyTe wf adcless these less common cases. Wth a single 93r'lSCf 9JkJtlon, the lawer back location aciires93s the majCfity b.Jt net at cases of poor spinal posture	
Memoto	Memoto Lifelogging Camera	The Memd:o C<rnera is a trw C<rnera and GPS that you dp on and WE!;¥. It's an ertirely new kind of ligtal cxnera wth no controls Instead ■ atiornatic atj takes phd:os as you go The Memcto app then seamlesard effortless¥ organizes them for you. The camera has no buttons (That's rig lt, no buttons.) k long as yoo wear the C<rnera, ■ is coostanttakng pictures. It takes two geot<¥Jged photos a mirLte wlh rec<J'ded orientatioo sJ th<t the app can show them U!=fig'lt no matter how you are weari1g the cxnera. And *s IIIE!<i:her protected, so you don't have to worry about it in inclement ather.	
MIT Design	Proverbial Wallets	Financial Sixth Sen93 – The t."ain trust at MIT has hbn a smpe way to sdve the credit crisis... a walet that resil'ts yoo \1/hen you C<i"t re# dillirq into l.They ha;e engineered a bossy billf th<t IIIII make ■ hard for you to make the purchase. The ..Proverbial W<JJr:K comes in three styles of gnart walets that link your bank account's bottom lne to your billfctl via your celphooe's Blietocth feature. The res.Jit is a cash c;¥rier that's smart enoug, to know when you can't afford a ptxchase <wld brassy enoUJh to let you know, tonMd:her Bear" syncs up wth a monthly tudget – the less money in your accoort,the tX]lter the wallet clamps do'M".Peck" connects to your assets, andinfl<tes and def l<tes based on your worth ..Bll11blebee• buzzes wlh each trar Stion	
Moticon	OpenGo Science	OpenGo 9:ience is a !¥stem for the meas.Jremert of plantar pressure d;9:rbJtion th<t is universally, a lic<ille <W'd open f()' applicabm deve ers. It is deal for the use n clinical research as IIIE! as forts 9:ierce, <W'd partict.Jarly in the fiek1s of rehabilitatioo and traning analysis ■ is the perfect s.Jk.t:OL The proci.Jct pack<¥je nckJdes the Wreless sen9:1t i'ls.JieS f()' data squisition, the ana sis 9:Jftware Beaker as well as an ,"\1\JT+ ena ed USB flash drWe for the data tr<i"sler. In We mode, the ser'lSCf in9Jies can transrnt the meas.Jred d<ta direct to the PC. Equippng the test per 9Jnwlh a large nll11ber of wres is no longer necessary, which sa;es the researcl'ilg physKiians ard orts &::iel'tisl:s val.ae tinle	

Now Computing	Stormfly	We built StormFly™ for speed. Running an Operating System from a USB is not easy, there's a lot of information spinning back and forth to make things happen at lightning speed. Because of that we designed USB 3.0, the latest USB standard, and we tweaked it a bit to give it some properties of SSD (Solid State Drives). The result gives you a device that not only allows you to run your Operating System, it also gives you a standard USB storage device that is super-fast.	
PFO Technologies	The PFO Safety Bracelet	The PFO bracelet conceals military navigation technology, developed exclusively for personal security. It is a GSM/GPS bracelet, a positioning device with a patented alarm function. It can operate in a set of different pre-defined modes easily changed with commands sent over- the-air. The bracelet is part of a hosted system including servers, accompanying smartphone apps and other mobile devices. It communicates using SMS and Data via GPRS , A-GPS for precise positions outdoors and GSM triangulation algorithms for indoor positioning.	

Source: Company website

CREDIT SUISSE

Companies Mentioned *(Price as of 16-May-2013)*

Adidas AG (ADSGn.F, €86.451)
Analog Devices Inc. (ADI.OQ, $46.5)
Apple Inc (AAPL.OQ, $434.53)
Audience, Inc. (ADNC.OQ, $16.34)
Broadcom Corp. (BRCM.OQ, $36.57)
CSR (CSR.AX, A$1.99)
Freescale Semiconductor Inc. (FSL.N, $16.63)
Garmin (GRMN.OQ, $36.39)
Google, Inc. (GOOG.OQ, $903.87)
Maxim Integrated Products (MXIM.OQ, $31.29)
Microchip Technology Inc. (MCHP.OQ, $37.58)
Motorola Solutions (MSI.N, $57.53)
NXP Semiconductors N.V. (NXPI.OQ, $30.17)
Nike Inc. (NKE.N, $64.44)
ON Semiconductor Corp. (ONNN.OQ, $8.06)
Philips (PHG.AS, €22.515)
Research In Motion Limited (BBRY.OQ, $14.69)
Roche (ROG.VX, SFr246.0)
Samsung Electronics (005930.KS, W1,508,000)
Sony (6758.T, ¥2,082)
Texas Instruments Inc. (TXN.OQ, $36.6)
Yelp (YELP.N, $30.43)
eBay Inc. (EBAY.OQ, $55.8)

Disclosure Appendix

Important Global Disclosures

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