Mobile Sensing (tm)

Health & Wellness 2013

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Executive Summary

Mobile sensing technologies promise to revolutionize healthcare by providing low-cost patient-centered solutions with real-time patient to doctor monitoring. Advances with low power wireless communications, MEMS and multi-sensor arrays have resulted in viable body area network applications for clinical patient monitoring, assisted care, at-home chronic disease management and general wellness. At the same time, there has been enormous growth of mobile sensing apps for smartphones and tablets. By 2017, there will be 1.4 billion mobile sensing health and fitness app downloads worldwide and health apps will increase the fastest over the next five years.

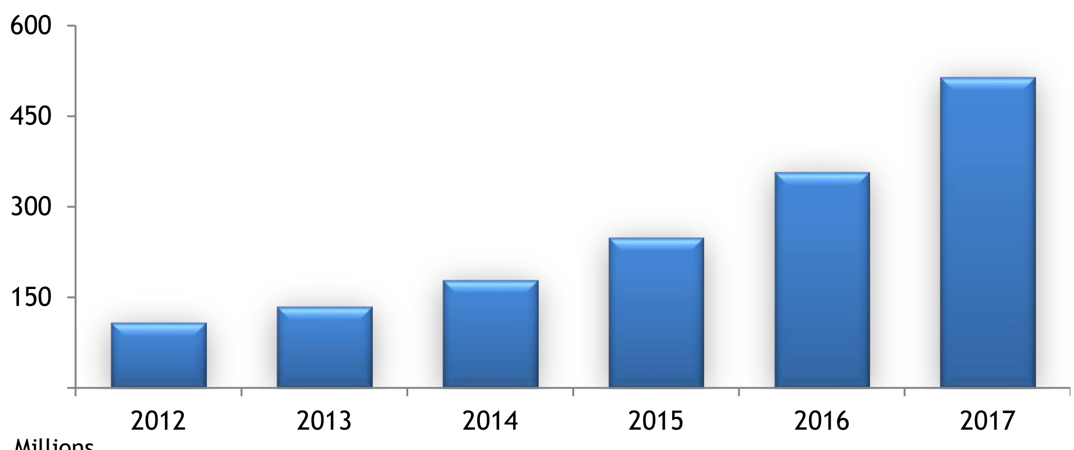
Mobile sensing solutions include wearable and implantable sensors as well as carry-able devices that can be used while the user is mobile. We have analyzed 200 mobile sensing products and 43% are focused on solutions for healthcare such as cardiac/ECG, blood glucose, multi-sensor vital sign monitors and a growing number of consumer health and wellness products.

Based on input from over 2,000 individuals between Q4 2012 and Q2 2013, this report covers the major mobile sensing health and wellness market segments and technologies including an in-depth evaluation of 70+ companies and their products. In particular, we focus on the following developments:

- Wearable Wireless Sensors
- Smartphone Integrated Carry-able Sensors
- Smart Mobile Devices & Mobile Apps
- Smart Watches

Global annual sensor shipments for mobile sensing health and fitness devices-- including dedicated devices and health/fitness enabled smart devices such as smart watches, smartphones and tablets—will reach 515 million in 2017 up from 107 million in 2012.

Figure 1: Global Mobile Sensing Health & Fitness Sensor Shipments (2012-2017)

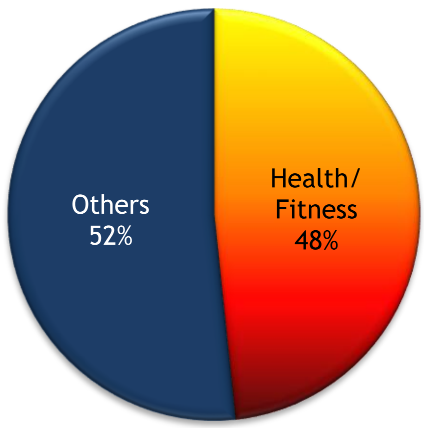


Source: ON World

Consumer Views

ON World's recently completed survey (Q2 2013) with over 1,000 U.S. consumers found that 48% are likely to use their smart watch for health and/or fitness. Respondents are especially interested in using their smart watch for blood pressure and heart rate monitoring as well as activity tracking.

Figure 2: Smart Watch Survey – Most Likely Smart Watch External Devices

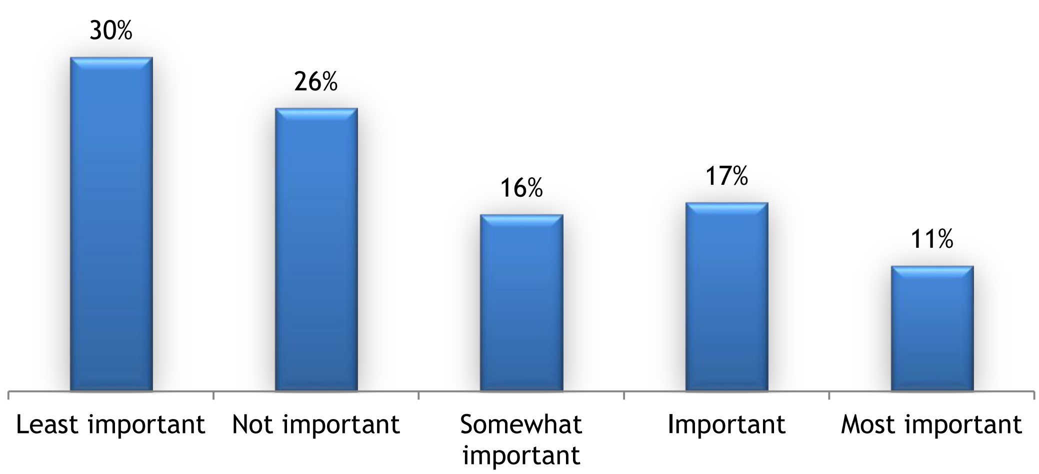


Nearly 1 in 2 U.S. consumers interested in using a smart watch are likely to use it for health or fitness.

Source: ON World

In another ON World survey (Q1 2013) with 300 early technology adopters, 28% believe it is "important" or "most important" to use a smartphone for chronic disease management.

Figure 3: Early Technology Adopters – Likely to use Smartphone for Chronic Disease Mgmt



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Source: ON World

The Value System

Traditional health products are quickly being replaced with mobile sensing solutions. The pace of innovation in this area is illustrated by the fact that 60% of the mobile sensing products we discovered from re-sellers, the web and from healthcare vendors were launched in 2012 or later. Despite reimbursement challenges, cardiac/ECG monitoring is a popular developer area that makes up 22% of the health products we evaluated. Some of the newer entrants include AliveCor, Corventis, Curvus (WPR Medical), Everist Genomics and Spectocor. There is also a growing number of innovations targeting diabetes management. There is also a number of innovations targeting diabetes management such as Cellnovo's cellular connected continuous blood glucose monitoring system, smartphone/cellular connected blood glucose meters by BodyTel, Entra Health, Sanofi/AgaMatrix and Telcare as well as implantable blood glucose sensors.

Although it is widespread for fitness, wearable multi-sensor vital sign monitors is still an emerging market for healthcare. Some of the wearable health device innovators include BodyMedia (recently acquired by Jawbone), Corventis, Sotera, Toumaz and Zephyr. Pilot results have confirmed that wearable vital sign monitors are effective and preferred by both patients and health workers. Between 2012 and 2017, wearable health and fitness device shipments will increase by 552% and make up over 80% of the mobile sensing health and fitness device market.

Technology Trends & Developments

Mobile sensing health and wellness solutions are being driven by the following technology trends:

- Multi-sensor wearable devices
- Convergence with health monitoring systems
- Exponential growth of mobile app downloads
- Ultra low power wireless components

Today, many mobile sensing devices are limited primarily by their battery lifetime which makes this a major innovation area. Six out of 10 of our early technology adopters are "concerned" or "most concerned" about the impact of battery life on mobile sensing systems.

Mobile sensing with smart devices such as smart watches or smartphones use internal sensors, but a large part of the future of mobile sensing will be pairing smart devices with external dedicated sensors. Within the next five years, smart devices will increasingly use their own internal sensors for mobile health and wellness applications. Software defined radios with multi core ARM processors and low power 1 volt chipsets will make more networks accessible through smart mobile devices. Companies such as EM Microelectronic and Toumaz have achieved solutions that operate on less than a 1 volt and Energy Micro continues to produce microcontrollers and RFICs that use a fraction of the energy of competing alternatives. Software defined radio test boards such as bladeRF support the creation of WiFi, Bluetooth, ZigBee, GPS, or GSM and 4G LTE radios in software.

Market Segmentation

The health and wellness mobile sensing ecosystem is composed of six major target markets and we analyzed 16 market segments within each of these and 70+ companies across the value chain that currently offer or are developing mobile sensing solutions.

Mobile Sensing Health & Wellness Market Segments

Telehealth Platforms & Cloud Services	Cardiac Rhythm Management Cardiac/ECG Monitoring	Diabetes Management
Bosch Healthcare Cardiocom Qualcomm Life GE Healthcare Healthrageous Honeywell Hommed Ideal Life Independa LifeWatch nLiven Numera Philips Tunstall…	AliveCor Biotronik BioWatch Boston Scientific Cardiocomm Solutions CardioNet Corventis Curvus (WPR Medical) eCardio LifeWatch Medtronic Philips Spectocor St. Jude Medical…	Abbott AgaMatrix BodyTel Cellnovo DexCom Entra Health Johnson & Johnson Medtronic Polytel Roche Sanofi Taidoc Telcare…
Assisted Care	**Vital Signs Monitoring & Other Medical Systems**	**General Wellness**
Acute Technology Be Close Care Innovations Grand Care Healthsense Lifecomm MobileHelp RF Technologies Tunstall Tynetec WellAware Systems…	A&D, Abbott, Asthmapolis, BodyMedia, BodyTel, Cambridge Temperature Concepts, Choicemmed, Corventis, GENTAG, iHealth Lab, iMPak Health, Intelesens, Masimo, Nexus6, Nonin, Omron, Proteus, Sotera Wireless, Toumaz, Withings, Zephyr…	Beam, HapiLabs, Lark, LUMO BodyTech, Scanadu, Zensorium…

Mobile Apps

ALTAVI sarl, Arawella, Asthmapolis, Azumio, Berserk Apps, Cardiio, Cube Software Solutions, EmergenSee, GreatCall, FSU Mobile Solutions, LUMO, Lukasz Szmit, Maciek Drejak Labs, MacroPinch, Medlert, ockendon.net, Runtastic, Urbandroid

Chipsets, RF Modules & Network Stacks

AKM, Analog Devices, Bluegiga, Broadcom, connectBlue, CSR, Dynastream, EM Microelectronic, Energy Micro, Freescale, GainSpan, InvenSense, Knowles, Marvell, Murata, Nordic Semiconductor, Qualcomm Atheros, Renesas, Silicon Labs, ST Microelectronics, Telit, Texas Instruments, Toumaz, Wicentric…

Report Scope & Methodology

Based on input from nearly 2,000 industry experts and consumers, this report provides in-depth analysis, forecasts and primary research on the market opportunities for mobile sensing health and wellness.

In addition to covering dedicated wearable, implantable and carry-able mobile sensing health and fitness devices, sensors and associated services, we provide forecasts and analysis on general purpose smart devices such as smartphones, tablets, smart watches, mobile apps and subscriptions. The report also presents the key findings from three separate surveys with online consumers, early technology adopters and developers conducted between Q4 2012 and Q2 2013.

Our research methodology consists of the following:

- **Primary Research:** Interviews/surveys with >1,800 individuals and 100+ organizations including consumers, healthcare organizations, service providers, software developers, device manufacturers, component suppliers and government agencies.
- **Investigation:** Analysis of 200 products/services, 1,000s of product reviews, technology and company financial reports as well as public and private databases.
- **Target Markets**: *Mobile* sensing solutions for the following:
  - Chronic disease management: Cardiac monitoring, Diabetes management, Remote patient/vital signs monitoring and self-monitoring, Pain Management, Medicine Compliance
  - Assisted care solutions for the elderly and disabled: Mobile PERS, Ambient Assisted Living and Quality of Care monitoring
  - Hospital and clinical vital signs/ECG monitoring
  - General Wellness: Consumer vital signs monitoring, Sleep monitoring, Posture, Dental Hygiene, Self-tests and others
- **Technology Evaluation:** Analysis of relevant standards, user requirements and competing alternatives including Bluetooth, WiFi, ZigBee, ANT, NFC and others.
- **Competitive Landscape:** Analysis of >70 leading health/wellness companies including their products, services, business models, strategic alliances and contribution to the market size.
- **Market Size Projections:** Our market size forecasts are based on all of the above and is then applied to our proprietary data modeling methodology (see page 62 in the full report for more details).

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ON World provides global business intelligence on smart technology markets. Founded in 1996 in the San Francisco Bay Area, ON World is headquartered in San Diego, California.

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