

Innovation Scouting

Understanding Trends in Consumer Health Device Design: Innovation Hotspots

Introduction + Methodology

Changeist recently conducted research into the landscape of emerging trends surrounding development and design of consumer health devices. Our objectives were twofold: to better understand what factors are influencing how this market evolves, and to help our clients focus and sharpen their foresight, strategic planning and innovation approaches as they look to this increasingly important market. We also performed this work to identify which trends to continue exploring with deeper research dives as we follow the evolution of consumer health in the near future.

Our approach included two streams of research. The first involved secondary research to uncover emerging trends, design approaches and technologies influencing the near future of consumer health devices and accompanying services. The second involved interviews with an Expert Network we assembled from executives, designers and product managers with both the consumer medical and electronics sectors, with some of our experts crossing into both sectors in their work.

Experts were consulted with experience within organizations such as Sony, Nokia, Google, Philips, Intel, Microsoft, Sprint, GE Medical, Lenovo, Continuum, IBM, Mayo Clinic, Medtronic, HP, and Carnegie Mellon. Their insights were synthesized to identify eight important innovation hotspots in consumer health device design, and four disruptive technologies now emerging that could shake up the landscape in this market.

“I think that the aging of the baby boomers and a much different set of expectations of quality of life later in life and they are putting a lot of pressure on the designers of consumer health care products.”

—Design executive from a global product design agency

Major Drivers

At the beginning of our research, we outlined several dozen macro drivers of change affecting the consumer medical device market's evolution now and over the next five years. Of these, several stood out as fundamentally shaping this evolution:

- **Aging** –The average age of populations is increasing (seniors make up 15% of the total developed world population today, 30% in 25 years), meaning more people need care and treatment for age-related conditions, and with smaller populations of the working young to support their care directly and through indirect funding of government and private health services.
- **Fragmenting health care systems** – With demand for medical care expanding rapidly, standalone retail clinics are booming in order to meet the demand. RAND data suggests that the number of retail clinics in the US alone will rise by from 1,000 in 2008 to 6,000 by 2013, increasing the need for medical professionals and technology ready for the retail environment. Likewise, the erosion of boundaries between traditional health care practiced in hospitals and in doctors offices and consumer health care served by retail products and services has opened the doors to a larger converged market, where consumers have access to professional quality services, information technology in many more locations, including at home, in many more specialized areas such as nutrition, psychology, sports medicine, chiropractic care, homeopathy, and other emerging areas.
- **Networked health ecosystems forming** – Previously disconnected or loose islands of information and technology, today's health care services are becoming more connected through fixed and wireless networking, integration of IT systems, and networks of interconnecting businesses. Both short- and long-range wireless networks are being optimized for use with medical devices to transmit data and enable remote monitoring. This includes dedicated wireless networks, use of Wi-Fi, Bluetooth and other short-range networking protocols. Data from ABI Research suggests there will be 400 million medical devices in use worldwide with wireless sensors by 2014.
- **Shortfalls in human resources** –Training of medical professionals has not kept pace with demand, placing even greater reliance on technology, particularly remote technology, to

“There’s a trend toward home healthcare and that’s driven by a number of things – hospital costs, and treatments. Then people are interested in learning it themselves. Maybe you could have a home ultrasound some day, but that would detect basic things. It would need a system that was sort of red light green light level.”

—Engineering executive at a large diagnostic imaging manufacturer

allow oversight of a greater number of consumers of medical services with fewer people. According to the World Health Organization, the global shortfall in 2006 was approximately 4.6 million medical professionals, a gap that has continued to grow in the years since.

- **Changing technology tolerances and customs** – Generation X and Millennials having grown up comfortably with networked technology, digital communication, electronic monitoring and the proliferation of data to drive decisions, are more naturally turning to technology, as both care providers and end users, to help them better understand their own health and wellness. The number of innovations around casual technology for health and wellness has increased in recent years as both major players such as Philips and Intel catch on to the larger trends, and many small startups bring new designs to market. This feeding of the emerging behavior changes among these generations is helping to reinforce the attractiveness of the market (see our Q4 2008 Emergence Report, *Play for Health*, for more on this topic).

Innovation Hotspots

Taking into account these macro drivers, over 100 trends and the insights of more than a dozen key executives in this market, we identified eight areas we call “innovation hotspots,” or areas we believe represent the most pivotal for innovation and competitive differentiation in the next three to five years.

- **Consumer-friendly form factors** – With the four walls of the traditional medical environment dissolving due to shifts in health care models, more medical technology is finding its way into environments where it comes into contact with consumers—in retail clinics, other health services, and even in the home. Demand for portability, thinness, durability, ease of use, simpler interfaces and aesthetic design that fits more with these consumer environments—appearing less industrial or clinical—is driving a shift toward design that more closely resembles popular consumer electronics, such as notebook PCs, smartphones, and other portable or handheld devices. A broader range of colors, materials, interfaces and user experience is being carried over from the CE market into consumer medical devices, in everything from glucose testing devices to patient monitors to ultrasound. This trend is being fueled further by the growth of specialty medical design practices within major design firms, as well as expansion into this area by traditional consumer electronics ODMs and EMS companies.

“[One of the important factors] in our marketplace, and with us in particular is [the area of] wireless, and the ability to network all the devices together. Long cables are a hassle, and it’s a hassle to transport the patients. Wireless bio signs didn’t exist as of a year ago. Now the patient just wears a little box inside the MRI tube. Now the patient can be transported easily from before and after, with continuous monitoring.”

—*Marketing Product Manager, MRI division of major medical device OEM*

- **Wireless networking** – Both short- and long-range wireless networks are being optimized for use with medical devices to transmit data and enable remote monitoring. This includes dedicated wireless networks, use of Wi-fi, Bluetooth and other short-range networking protocols. New data from ABI Research suggests there will be 400 million medical devices in use worldwide with wireless sensors by 2014. It is also being driven by the falling cost and wide availability of wireless networking components, which are penetrating the medical device ecosystems as designs are upgraded. This is creating a virtuous cycle in which medical service providers are increasingly creating broader wireless IT environments, spreading the need for additional devices, users, and facilities to be brought within these environments to realize the value delivered by wireless. We expect to see the expansion of wireless medical devices increase most quickly from the bottom up, pushing from more consumer-friendly devices upward into clinical environments.

“The diabetes aisle of products is a great example. It’s gone from clunky and painful to easy to use, small and painless and understanding that you don’t want to advertise to the whole world that you’re a diabetic. The idea that there’s actually money to be made and markets to be created is spilling over into lots of other conditions. The smart companies in those spaces who’ve worked on consumer design are now spilling over into medical.”

—*Design executive from a global product design agency*

- **Remote monitoring** – As more consumers require some form of care, with the need for both long- and short-term care increasing, remote monitoring technologies will be heavily relied on by medical care providers to support these large populations. In this case, consumer behavior is being established at the lower end of the market, with simpler devices such as heart rate monitors and, more recently, activity monitors. The need to monitor numerous patients from a central point, even as they move around within a medical environment, will drive greater focus on cutting the cord via a range of short-range wireless networking.
- **Power management** – For medical applications, long-life power sources are critical, as monitoring cannot be interrupted in many situations. Also, in increasingly mobile care scenarios, recharging isn’t always convenient. Additionally, manufacturers are increasingly looking to provide more efficient power management for electronics as a green initiative. The result is greater focus on longer-life batteries, power management in software, and other forms of charging devices and delivering power.
- **Flexibility** – As industrial design becomes more human-centric, flexibility increases in importance. Devices, sensors, cables and connectors are among the elements that maintain sustained contact with the body, and to be worn long-term under a range of conditions, these designs need to be highly flexible. Configurations that can be attached to or wrapped around the arm, hand, leg, torso or other area of the body for prolonged use in monitoring or, for instance, drug delivery must use flexible materials and contain electronics that can also bend, maintain a thin profile and so on.

Printed electronics, printed batteries and similar innovations will become increasingly important as device and electronics profiles become thinner.

- **Personalization** – Consumers have come to expect high level of personalization in their communications and media devices—new faceplates, case colors, alert tones, screen backgrounds, etc. This expectation is already crossing into medical devices as well: glucose monitors from several manufacturers look more like MP3 players than the medical monitoring equipment they are, for example.
- **Play** – A younger generation of users sees play as a central component of many endeavors—they have grown up being incented and rewarded for engaging with new challenges and situations. Maintaining their health and wellness will not escape this trend. Innovative devices makers, health professionals and developers are together creating new approaches to nudging consumers toward healthier behavior or better treatment regime adherence by adapting to a game-centered generation, creating incentives for consistent use, and attracting broader populations to care, particularly the very young. Friendlier, more playful designs, interaction schemes, and social “connectivity” between devices will be important as care providers seek to engage a wider population to manage their own health.

Potential Disruptors

Looking forward, we also indentified a short list of potentially disruptive technologies that will impact the consumer medical arena in the coming three to five years. Below is a brief summary of each, including top-level implications for design.

- **Processors** – Some device makers are turning toward system-on-a-chip (SoC) designs as a means of physically integrating many more functions on a single processor. The implications for design will be significant, as much of the bulk of separate electronic components will be eliminated, allowing for much greater miniaturization.
- **Printed Electronics** – Like SoCs, printed electronics will create the ability to shrink devices, create them in a wider range of form factors, and use them for longer-term application such as monitoring patients over months or years.
- **Lab-on-a-Chip** – Lab-on-a-Chip technologies will allow device designers and manufacturers to compact multiple devices and processes that may have even required separate environments into one package—both sampling and testing blood chemistry and reporting and storing results within one small unit.

- **Open Data** – Following the evolution in other forms of data, such as geographic information, health data formats will standardize and become more easily captured, transmitted, analyzed and communicated among medical devices. This will enable creation of device/technology ecosystems that communicate continuously. As such, medical devices become less about standalone islands and more part of a modular family of technologies.



For more information on this research, Changeist Innovation Scouting or our other capabilities please contact Scott Smith at ssmith@changeist.com or visit us at www.changeist.com.

With the insights found in this Innovation Scouting brief as a foundation, Changeist can help your organization:

- Understand where your markets may be headed, through a **Horizon Briefing**.
- Gain a wider field a vision into forces converging around your market or consumers through a **Convergence Briefing**.
- Identify new consumer needs and uncover potential whitespace or product ideas using an **Opportunity Workshop**.
- Track the critical trends and driving forces identified, and detect new ones as they take shape, using a **Tracking Program**.
- Explore important current consumer behaviors and indicators of future behaviors through **Ethnographic Futures**.
- Develop roadmaps for the future of trends and technologies identified here via our unique approach to **Roadmapping**.