Critical Access Hospital Informatics

How Two Rural Iowa Hospitals Overcame Challenges to Achieve IT Excellence

By James A. Bahensky, MS; Brain Moreau; Rob Frieden; and Marcia M. Ward, PhD

ABSTRACT

Critical access hospitals often have limited financial and personnel resources to implement today’s healthcare IT solutions. Two CAHs in rural Iowa overcame these obstacles and found innovative ways to implement information technology. These hospitals earned recognition from Hospitals & Health Network’s Most Wired Magazine for excellence in business processes, customer service, safety and quality, work force management, and public health and safety. Though the hospitals come from different environments—one is part of a system and the other is independent—both exemplify best practices on how to use healthcare IT solutions; engage clinicians from a community setting in informatics decisions; integrate technology into an organization’s strategic directions; and support healthcare IT environments.

KEYWORDS

Electronic medical record, critical access hospital, rural healthcare, Most Wired, informatics.

Despite the benefits attributed to electronic medical record (EMR) implementation, healthcare IT adoption has been slow, especially in small and rural hospitals. A 2006 American Hospital Association survey indicates that while 68 percent of responding hospitals have partially or fully implemented EMR systems, only 3 percent of hospitals with fewer than 50 beds achieved these results. Hospital size is a critical factor in healthcare IT implementation. Limited financial and IT resources are cited as the primary constraints. Studies also show that a critical access hospital’s (CAH) affiliation with a healthcare system correlates to the degree of successful healthcare IT implementation.

Against these odds, two CAHs in rural Iowa have achieved EMR success, earned “Most Wired” status by Hospitals & Health Network’s Most Wired Magazine and exemplify best practices in the use of these systems. Interestingly, these CAHs found success in very different environments: one is part of a larger healthcare system and the other stands alone as an independent entity. This article identifies similarities and differences in their approach to healthcare IT strategy and process.

BACKGROUND

CAHs are defined as small, rural hospitals that are either located 35 miles from another hospital or are state-certified necessary providers of care. CAHs must have a maximum of 25 acute-care
beds and must maintain an annual average length of stay of 96 hours or less.\textsuperscript{5}

Iowa is typical of many rural-centric states. Eighty-nine percent of Iowa is farmland. Forty-five percent of the state's three million residents live in rural areas. Of the 116 hospitals in Iowa, 82 are designated CAHs; 20 are urban hospitals; eight are rural prospective payment system hospitals; and six are rural referral hospitals.\textsuperscript{6}

Iowa's CAHs, along with their associated primary care providers, are the main source of care for most rural residents and, in most cases, are the foundation of their community's economy.

The Flex Monitoring Team, a consortium of rural health research centers from the University of Minnesota, University of North Carolina and the University of Southern Maine, conducted a national survey of CAHs in 2005.\textsuperscript{5} This survey indicated that adoption of healthcare IT is a priority and because of Medicare cost-based reimbursement many CAHs have made investments in this technology. A 2005 University of Iowa survey of Iowa hospitals on the usage of healthcare IT confirms that, in general, small hospitals are committed to using healthcare IT to improve patient care, but face considerable shortages of financial and personnel resources.\textsuperscript{7}

Both surveys report that most CAHs have a high-use rate (97 percent) of administrative and financial system applications, including patient billing, claims submission and patient registration. The studies indicate that the vast majority of CAHs have high-speed Internet access. (For Iowa's population, most of the connectivity has occurred recently; 28 percent of communities had high speed access in 2000 vs. 93 percent in 2006.\textsuperscript{8}) With high-speed connectivity CAHs have utilized technology solutions for increased healthcare services and quality by employing teleradiology (67 percent in Iowa\textsuperscript{7} vs. 80 percent nationally),

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The 2005 University of Iowa survey\textsuperscript{7} had a response rate of 85 percent for the CAHs (N=70 out of 82). Of the 70 CAHs reporting, 34 percent indicated they had implemented portions of an EMR. The term “portions” is used in regard to EMRs because a number of these hospitals did not have clinical documentation, electronic medication administration records or clinical decision-support tools implemented.

Using the HIMSS Analytics\textsuperscript{TM} model\textsuperscript{9} as a guide, most of these CAHs would be classified in the early adoption stages of the model. Another 10 percent of the CAHs indicated they have plans and approved budgets for implementation of an EMR system. Twenty-six percent have EMR plans, but have not received final budget approval.

Finding investment capital ($500,000 to $1.5 million) for healthcare IT is a daunting task. With limited capital CAHs are required to make tough decisions to fix aging facilities, purchase new or replacement medical equipment or invest in information technology. With healthcare IT standards still materializing, a lack of knowledge of the healthcare IT industry, and with ongoing changes occurring in technology, it is often easier to shy away from the technology decisions in fear of obsolescence and/or a decision that could disastrously affect the organization.

Another major hurdle is finding IT resources and/or clinical personnel with backgrounds in informatics to lead technology transformational efforts. The 2005 University of Iowa survey discovered that 34 percent of CAHs do not have any permanently assigned IT personnel; another 35 percent have only one or two IT employees.\textsuperscript{7} It could be argued that because of their size CAHs are not as complex as larger hospitals. However, a number of different technology and business skill sets are still needed to implement and maintain IT solutions. Further, to achieve maximum benefits from implementation and continue to gain efficiencies and quality outcomes, it takes ongoing resource investment to enhance processes and technology. A number of CAHs find that after having installed some EMR functionality they experience difficulty implementing other features or reworking processes due to the time it takes to keep up with new software releases.

**MOST WIRED**

As rural hospitals strive to compete and deliver high-quality patient care, they can’t afford to ignore technology. To obtain capital, resources and IT knowledge, some hospitals have joined systems. Others forge ahead alone and work to make the best of investment decisions.

Two Iowa CAHs, Genesis Medical Center-DeWitt (GMC-DeWitt) and Henry County Health Center (HCHC), were awarded Most Wired status last year for their success in EMR implementation and maintenance.\textsuperscript{10} Each took a different path toward the implementation and use of healthcare IT solutions.

Most Wired status emphasizes the use of information systems to improve patient safety and quality. Sixty percent of the scoring is based on service goals: safety and quality, public health and safety and customer services. Forty percent of scoring is based on operational goals: business processes and work force.

**ENVIRONMENT**

The IT executives for these Most Wired hospitals address how they approach these goals and use clinical informatics in their solutions. To start, we look briefly at each hospital's setting and services.

HCHC, established in 1921 in Mount Pleasant, is a 25-bed CAH with an attached 49-bed long-term care unit. With more than 300 employees, HCHC serves as one of the community’s largest employers and offers healthcare services to the county’s 21,000 residents. Mount Pleasant (pop. 9,000) is located in southeast Iowa and is within 50 miles of three major acute healthcare facilities.

HCHC has approximately 460 inpatient discharges and 50,000 outpatient visits annually. It also manages two outreach clin-
ics staffed by nurse practitioners within the county (Wayland and Winfield).

The Mount Pleasant campus is home for a number of independent physician clinics, including a large, family practice clinic, two orthopedic clinics, two general surgery clinics, a podiatrist, a gynecologist and an ophthalmologist. Collaboration with two nearby acute-care hospitals supplements healthcare services through specialty clinics by visiting physicians.

Over the years, HCHC has been nationally recognized for excellent service. Modern Healthcare magazine honored HCHC as one of the top 100 hospitals in the United States and as a top-20 rural hospital with fewer than 250 beds. HCHC received the EMT-Paramedic Emergency Medical Service of the Year award by the National Association of Emergency Medical Technicians in 1998. In 2007, HCHC was named a Top 100 Most Wired Hospital by Hospitals & Health Network’s Most Wired Magazine.

GMC-DeWitt, established in 1952 in DeWitt, is a 13-bed CAH with an attached 77-bed long-term care unit. GMC-DeWitt serves as the community’s second largest employer, with 195 employees. It offers healthcare services to DeWitt’s 5,050 residents, as well as to surrounding areas in Clinton County (50,000 residents). GMC-DeWitt is located within 25 miles multiple acute-care facilities in Clinton and Davenport.

GMC-DeWitt has approximately 400 inpatient discharges, more than 31,000 outpatient visits and 5,000 emergency department visits annually. GMC-DeWitt is a two-time winner in the Most Wired Small and Rural Category. Last year it received the Summit Award from Press Ganey for consistently achieving 98 percent or higher customer satisfaction scores for three consecutive years.

In 1997, GMC-DeWitt affiliated with Genesis Health System. It is one of three hospitals in that system. The other two are GMC-Davenport and GMC-Illini. Genesis Health System has more than 4,900 employees and is the region’s market leader. There is only one board of directors and no affiliate boards. The management structure for GMC-DeWitt includes a Genesis Health System Vice President-DeWitt Operations and an assistant administrator to oversee the campus. Information technology services are a health system department. Associated costs are part of the corporate overhead that is allocated to GMC-DeWitt along with other health system expenses.

**CULTURE**

Hospitals & Health Network’s Most Wired Magazine indicates that Most Wired Hospitals have better outcomes than other hospitals in four key measures: mortality rate, the AHRQ’s patient safety measures, the Joint Commission’s core measures and average length of stay. They also make the connection between quality results and dedication to information technology.

What can’t be seen from these data sources are the organizations’ culture and management styles. It is believed that these hospitals embrace change; seek higher efficiencies and quality through changes in business and clinical processes; and use technology to help transform processes and sustain change. These organizations appear to employ the people, process and technology change models (see Table 1) within their culture to drive strategy, vision and mission for better outcomes.

**HCHC:** HCHC culture centers on people as its greatest asset. Most HCHC employees and physicians have years of experience in the healthcare industry. They have a strong commitment to a shared vision: to be the healthcare provider and employer of choice. HCHC’s Board of Trustees and CEO listen closely to patients, physicians and employees and then develop concrete strategic plans that allow HCHC to compete with larger acute-care facilities in the area.

HCHC strives to have a “blameless” culture. The hospital uses LEAN, a Toyota Production System process management philosophy for reducing waste. When deficiencies are discovered, the focus is on how to improve the process.

HCHC’s culture believes technology is crucial. It evaluates and implements new technology to improve efficiencies, quality, safety and competitive advantage. Having several large acute-care facilities within driving distance drove the Board and CEO to conclude that the innovative use of technology would be an effective way for HCHC to gain a foothold in a competitive marketplace. In 2003, the Board and CEO incorporated the goal of becoming a Most Wired hospital into their organization’s strategic plan.

**GMC-DeWitt:** At GMC-DeWitt staff is the highest priority. Helping them embrace change and future challenges is best

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**Table 1: Key attributes of the successful change model.**

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<thead>
<tr>
<th>Model Components</th>
<th>Key Attributes</th>
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<tr>
<td>Environment/Culture</td>
<td>• Visionary&lt;br&gt;• Open/collaborative/forgiving and willing to take calculated risks&lt;br&gt;• Quest to improve quality, patient safety and operations</td>
</tr>
<tr>
<td>People</td>
<td>• The foundation for all endeavors&lt;br&gt;• Engaged and aligned with vision&lt;br&gt;• Informed/educated&lt;br&gt;• Willing to challenge the status quo</td>
</tr>
<tr>
<td>Process</td>
<td>• Multidisciplinary in use of formal process improvement approaches&lt;br&gt;• Measured results</td>
</tr>
<tr>
<td>Technology</td>
<td>• Tools that enable the people and processes to deliver results to meet or exceed expectations</td>
</tr>
<tr>
<td>Sustainability</td>
<td>• Synergy achieved by effectively aligning, integrating and balancing people, processes and technology for maintaining and achieving constant incremental improvement outcomes&lt;br&gt;• Continued assessment and documentation of the value of process and technology changes&lt;br&gt;• Valued vendor relationships</td>
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articulated by Jeff Cooper, Genesis Health System Vice President–DeWitt Operations: “Having highly qualified staff and giving them the tools to do their job has been a priority and has led to our success. Seven years ago, the organization made a commitment to focus strategies and resources on information technology. Healthcare is a constantly changing environment and GMC-DeWitt believes in the ability of IT to help streamline changes into better healthcare. Technology is constantly changing with new releases and new modalities. By concentrating on both people and technology, it allowed GMC-DeWitt to deliver the highest quality of care by giving the best people the latest technology and the best IT systems to do their jobs. With these in place we can operate with the most efficient processes and handle the inevitable challenges that come along.”

The planning process starts with the Genesis Health System Board of Directors and leads to the creation of a health system strategic plan, which then drives the creation of an information technology strategic plan. There are clear links between these plans to ensure the Board’s goals are met.

IT planning and capital commitments are carried out at the health system level. Representatives from GMC-DeWitt sit on the Information Council, a group of individuals who represent each entity within the health system. There the technology plan is developed and allocation of capital dollars is determined.

**PEOPLE**

People form the cultural foundation of each organization. Through this culture they accept and create change within the organization. To achieve value, alignment must occur with organizational strategies. Both organizations describe how this alignment occurs and how they get clinicians to embrace new IT tools.

**HCHC**: A primary reason for HCHC’s technology success has been the involvement of associates, managers and physicians in the selection process of new technologies. All employees take ownership in successful implementation because they selected the systems. Being a small hospital with limited IT staff, it is critical to get buy-in from all employees. Their expertise will be counted on during the implementation phase. At HCHC, employees embrace change because they have a say in that change.

Physicians in the HCHC community embrace collaboration and buy into technology as a tool to improve patient outcomes. HCHC’s size has proved to be an advantage for achieving buy-in to the overall vision. HCHC administration believes that physicians know what is best for themselves and their patients, and thus do not implement technology for the sake of technology.

A medical director of IT serves as a liaison between the physician community and hospital administration and sits on the IT Steering Committee. The director indicates when technology is ready for use at HCHC. Once the physicians approve to move forward with a project, they have ownership in the success of that project.

All technology is managed by a four-person IT staff. The team consists of an IT manager, a systems administrator, a network administrator and a help desk/desktop support technician. The services of outside security consultants are occasionally used to supplement the IT staff.

Much of HCHC’s success is attributed to the expertise of hospital staff. Nurses, lab technicians, radiology technicians and others work continuously with IT staff to fill gaps of expertise. Success in becoming technologically advanced is a credit to the entire organization’s involvement.

**GMC-DeWitt**: At GMC-DeWitt, the work force is aligned with the Genesis Health System mission, vision, values and goals. This takes place through the health system strategic planning process, including IT planning, which allows input from all components of the health system. Education on emerging technology takes place at the steering committee level and during the health system strategic planning process.

Physicians are engaged at multiple levels in the planning process.

First, during the annual board planning sessions physicians are invited to participate. A part of these planning discussions involve information technology.

Second, at the IT level, physicians are part of the Information Council, which sets the priorities for planning and capital spending.

Third, as implementations that have direct impact on physicians occur, ad hoc committees are formed to allow the physicians the opportunity to assist in design decisions, determine the appropriate metrics and to review the system build. These ad hoc committees are normally chaired by the Genesis Health System IT medical director, who has a degree in medical informatics.

Nursing/clinical informatics establishes standardized nursing documentation processes that support complete and comprehensive clinical documentation and nursing standards of care. While the implementation of electronic patient plans of care has not yet been completed, the foundation has been established through the nursing department’s utilization of standardized nursing diagnosis codes: the North American Nursing Diagnosis Association, the Nursing Interventions Classification and the Nursing Outcomes Classification.

Additionally, within the Cerner SurgiNet implementation, the Perioperative Nursing Data Set was used to capture the required charting elements. GMC-DeWitt also participates in health system nursing documentation activities by providing staff to various working committees.

Since the IT department is a health system department there is no IT staff on the GMC-DeWitt payroll. When issues arise, staff contacts the IT department through the centralized health system help desk. This model allows the IT staff to address multiple issues simultaneously. In addition, since GMC-DeWitt is part of a large health system, the 85 member, centralized IT staff is segmented into implementation and support units, which permits IT staff to specialize in their activities.

**PROCESS**

Scoring for the Most Wired includes the use of information systems to improve service and operational goals related to process changes. IT initiatives are used as an enabler for change with a focus on people and processes. We examine some of the process changes each of the hospitals has made through the use of technology and identify other tools used in the change transformation.

**HCHC**: One significant benefit of implementing the latest technology is process efficiency. HCHC uses the LEAN process for obtaining value and reducing waste in all processes. For example,
in trying to increase safety in medication administration, processes were examined and technology was employed using a point-of-care bar-coding system. This has resulted in a 56 percent reduction in medication errors.

One of the best examples of gaining efficiencies is found through the use of portals. A physician portal allows authorized personnel to securely access relevant programs anywhere he or she has Web access. Physicians can review charts, order tests, view PACS images, consult schedules and do many of the things they do in the hospital. An employee portal offers tools for staff, including a scheduling calendar, hospital news, policies and procedures, electronic forms and benefits information.

Another example of the improved work flow via a portal is the Radiology T-1 Network. HCHC is part of a group of three southeast Iowa hospitals that contract the services of Davis Radiology Group. All three hospitals utilize GE Centricity PACS. To make the process more efficient, the hospitals collaborated on a project to integrate their PACS environments. Dedicated T-1 lines were installed among the hospitals and to the homes of all six radiologists so they could retrieve diagnostic-quality images from each hospital or their homes at any time.

Improved work flow for patients and visitors is accomplished through the Web site’s patient portal. Patients and visitors can get information on relevant medical procedures or pre-register online. They can view photos of babies born in the nursery, send messages to patients, get information on job openings or review community education classes. Through a partnership with VeriSign, patients can even go online to pay bills.

The HCHC Web site also offers consumer content. Originally, HCHC linked to other Web sites offering patient education, but HCHC leaders came to realize that their site was an excellent marketing tool. So HCHC partnered with a patient education company to develop customized and HCHC-branded content. English- and Spanish-language materials include interactive animations on procedures and health conditions, health calculators and the HCHC e-newsletter. Over the next 18 months HCHC plans to implement a true patient portal, which will allow significant interaction with patients in personal health and disease tracking.

**GMC-DeWitt:** GMC-DeWitt has experienced process improvements in almost every department due to IT implementation, including improved patient and information flow in the emergency department. GMC-DeWitt has been scoring in the 99th percentile in the country for patient satisfaction; that wouldn’t be possible without the proper IT systems in place to support multiple processes.

GMC-DeWitt has seen significant process improvements in several areas due to IT solutions. For example, by redesigning the pharmacy department process to leverage the technology, more than half of the steps for checking medications prior to dispensing have been eliminated. Also, as part of the Bar-Code Medication Administration project, a Failure Mode Effect Analysis Task Force was established to identify potential points of failure and provide recommendations for implementation. In addition, with GMC-DeWitt being part of the Genesis Health System all captured clinical information is stored in one clinical repository. For example, lab results captured in the emergency department at GMC-DeWitt are electronically available when a patient is transferred to GMC-Davenport.

To facilitate process improvements GMC-DeWitt utilizes the Plan/Do/Check Act model, as well as LEAN and Six Sigma concepts, for process improvement. In addition, the IT department is using Capability Maturity Model Integration principles for all implementations.

**TECHNOLOGY**

Technology solutions were used to enable or sustain process improvements and obtain Most Wired status. Following are some technology approaches and vendor relationships:

**HCHC:** After a search, HCHC found the right IT vendors to help meet their goals. A partnership was created with Computer Programs and Systems Inc. (CPSI), a Mobile, Ala.-based company to develop customized and HCHC-branded content. Engaging the Web site’s patient portal. Patients and visitors are accomplished through the Web site’s patient portal. Patients and visitors can get information on relevant medical procedures or pre-register online. They can view photos of babies born in the nursery, send messages to patients, get information on job openings or review community education classes. Through a partnership with VeriSign, patients can even go online to pay bills.

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cy department, order latency was reduced, leading to a reduction in the time patients spend in the emergency department.

SUSTAINABILITY

Once a system has been implemented the journey toward obtaining value has just begun. Numerous CAHs find it difficult to maintain the systems and support the infrastructure, let alone continue using the systems for additional process improvements.

HCHC: HCHC has developed a close working relationship with key vendors to gain functionality and receive reduced pricing considerations. In return, HCHC is a showcase hospital for many of its affiliated vendors. HCHC understands that being a positive influence for their vendors will help strengthen their relationship. In addition, HCHC receives continued assessments and training to ensure systems are used to their fullest potential and instructions on the latest functionality are delivered.

Lastly, the entire organization has experienced first-hand the results technology has on physician, employee and patient satisfaction. HCHC is a small community. Everyone has ownership in what they do and everyone is proud of their accomplishments.

GMC-DeWitt: Implementation of clinical systems and technology at GMC-DeWitt is influenced by whatever approach utilized by Genesis Health System. In this instance, the approach is a coordinated effort between the clinical service areas and information technology. Through established multidisciplinary committees, GMC-DeWitt leadership and staff participate at all levels of engagement in various projects. When possible, they create duality of ownership by having co-chairperson leaders and assigning other sub-group leadership positions to the clinical knowledge experts.

Additionally, the participation of specialty area super-users or work-group members is used to help document current work flow and to establish desired/optimized future state work flow. These super-users or work group members then become key liaisons and resources to assist with testing, end-user training and go-live support.

CONCLUSIONS

Both CAH hospitals profiled here have reached acclaim as Most Wired through their implementation and use of technology to affect change within their organizations. One CAH has done it as part of a system, the other as an independent. Previous research indicates that health system-based small hospitals benefit from capital and IT resources.4 This is the case for GMC-DeWitt.

As summarized in Table 2, both CAHs appear to share cultures that embrace change and technology. Both go through an alignment process, albeit somewhat differently, to meet organizational goals. GMC-DeWitt's process is more formalized, reflecting its membership in a system and shared goals with its parent organization. HCHC probably has more autonomy in its overall direction, but has to develop its processes without outside support. Both have engaged the Toyota Production tool LEAN to evaluate and make process changes. They also engage clinicians/physicians in change processes and have an appointed medical director of IT to help make informatics decisions.

The EMR strategies of both hospitals appear to implement an integrated vendor solution. GMC-DeWitt benefits from the technology available through its parent organization's direction, allowing it to implement a vendor solution unaffordable for most similar sized hospitals. GMC-DeWitt also benefits from the health system's IT personnel resources, which have staff segmented for support of ongoing maintenance and implementation.

HCHC, because of limited IT resources, must continually engage help throughout the organization in its implementation and use of technology solutions. They report needing to be more inventive in their technology solutions and often have to push hard on the vendors to cut back on costs. Once a vendor is selected, HCHC benefits from vendor partnerships to stay educated and take advantage of new technical functionality.

Both hospitals use technology to implement a number of initiatives to increase efficiencies, quality and safety. Both take initiatives to link to other hospitals or practices to share patient information. Both also appear to use technology solutions to achieve employee and patient satisfaction.

What can be learned from the approaches of these two hospitals is the importance of culture and its aspects; IT staff, clinicians, administration and boards take an active role in aligning the use of technology.

### Table 2: Similarities and differences between hospitals.

<table>
<thead>
<tr>
<th>Similarities</th>
<th>Differences</th>
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<tbody>
<tr>
<td>• Culture of embracing people as their highest asset</td>
<td>• System based vs. independent decision-making</td>
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<tr>
<td>• Alignment of strategic planning processes</td>
<td>• Funding stream for healthcare IT support</td>
</tr>
<tr>
<td>• Employ formal process improvement approaches</td>
<td>• IT resources and specializations</td>
</tr>
<tr>
<td>• Embrace technology in strategy and to create process changes</td>
<td>• Technology richness/capabilities</td>
</tr>
<tr>
<td>• Engage clinicians/physicians in technology decisions</td>
<td>• Risk level in implementing healthcare IT</td>
</tr>
<tr>
<td>• Utilize a medical director of information technology</td>
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</table>
What can be learned from the approaches of these two hospitals is the importance of culture and its aspects; IT staff, clinicians, administration and boards take an active role in aligning the use of technology. These hospitals differ in their IT resources and specialization, funding stream for healthcare IT support, technology capabilities and risk levels for IT adoption. Organization-wide alignment of culture appears to be the common ingredient in their success. An ability to balance people, processes and technology to govern outcomes is the key factor that places these CAHs in the elite Most Wired category. JHIM

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