

Extensible Personal Health Record and the Microcard

A Strategic View and Application Exploratory

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Solutions and Innovation from the Convergence of Service Opportunities, Consumer's Concerns, Medical Benefits, and RFID Technology

This document reviews advanced uses of the PHR beyond its present use of holding personal health information on a computer system.

The primary purpose of a personal health record is to hold essential health and medical information about a person. Such information is described as: allergies, identification, medical history, major illness, medications, infectious diseases, immunizations, health maintenance, devices, eye information, documents, and family medical history. Children records may contain birth date and growth and development information.

Many PHR's are kept on paper by consumers with 42% of consumers keeping a PHR. 84% of consumers think a PHR is a good idea. Only 15% of consumers think that insurance companies are a good place to host online PHR's. Electronic PHR's provide quick access and updating through electronic systems. Consumers, physicians, hospitals, insurance companies, and the government believe they should hold or host the online PHR. Online PHR services and software applications are increasing in popularity and promoting their benefits to use their solution. The market is at a young stage with all solutions in play.

EXTENSIBLE PHR

If we extend the main purpose and use of the PHR in its present form to include other services, such as real time medical information transference, location and tracking solutions, wellness application solutions, identity solutions, and financial solutions, we create an extensible PHR that is more of a Personal Life Device or PLD. The PLD is always with the owner so that these new solutions become a necessary tool; much like the wallet or pocketbook is today. It becomes an electronic recording device and communication device that is able to determine and communicate its location.

PHR LOCATION AND ACCESS

The exact location of where the PHR should be is controversial. Many want to own the information and the location where it is stored, such as the government, physicians, hospitals, insurance providers, and consumers. It seems reasonable that in the beginning, the PHR will be stored at several locations so use scenarios must have the capability to update the PHR at each location to avoid incomplete records, but forces a primary location as the ultimate control point.

Studies show that the consumer wants to own the PHR since it holds their sensitive private medical information. A consumer based location will have the highest adoption rate at the start because of privacy and early logistical issues. However, secondary storage can play a key role if deployed in a way that the primary location remains in the hands for the user with the secondary location adding value for offsite value-added services that focus on wellness. With the PHR location at the physician's office or hospital, it places additional work on the back offices to maintain the PHR and deliver it quickly if needed by another physician. Such requests for immediate information in a 24x7 environment do not currently fit well in to the back offices work flow making access to a PHR a critical barrier in the event of an emergency. The physicians will require a copy of the PHR as well, but it will be as tertiary storage at least until there is a medical network able to provide immediate 24x7 access.

Online services with 24x7 access enables real time PHR reads and updating. Systems with limited operations, in terms of time, will require a batch processing method making the data several days old and not valuable during an emergency or short term treatment schedule.

MICROCARD – THE ENABLER

A Microcard is an active RFID device with the capability to store data as well as transmit and receive data in a miniature package. Since the Microcard has the capability to send/receive and store data, it can easily synchronize with applications or be read and updated at locations such as hospitals, doctor's offices, and insurance providers. Insurance providers with online consumer portals have an advantage in that they already communicate with the consumer and are a natural secondary location for consumers to store the information as opposed to PC based applications which cost consumer's money and are not standardized. All health and life planning information would be in one location on the online portal and the Microcard. As long as the portal service provider offers sticky value added services, integrating PHR's into the portal will provide consumers a single focal point for Microcard control, access, and storage.

Most RFID devices today are passive devices and used to track inventory in companies such as Walmart and track vehicles on highways for automatic toll charges such as the EZ-Pass service. Ultra Wide Band (UWB) RFID is an active form capable of communicating on its own and is currently being deployed in commercial, industrial, and medical sectors but with a large form factor. Utilizing Parco Merged Media's new SLE technology enables United to explore many new applications in a portable and personal environment.

MICROCARD COMPONENTS

To utilize the device and support applications in a real time mode, the device must be either wearable or carried on a person. The Microcard has three main components: a micro chip, a thin battery, and an antenna.

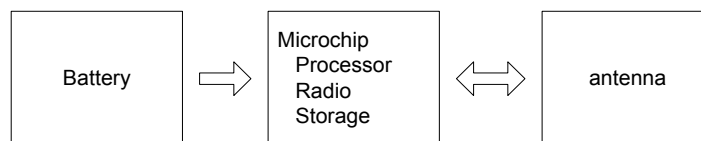


Figure 1 - Microcard components

PORTABILITY

Since the Microcard is the size of a grain of rice, it can follow the owner and not just be located on their PC or online, but on their person embedded in a piece of jewelry, watch, or clothing – something the person always has on their possession. Since the chip requires a power source (battery) and an antenna for transmit and receive functions, it cannot be inserted underneath the skin at this time. The packaging can have the form factor of a standard credit card or take the shape of a piece of jewelry that conforms to holding all three components.



Figure 2 - Credit Card Form Factor

A health care necklace is applicable for personal use. The battery and micro chip can be stored in a pendant with the antenna using the chain part of the necklace.

A passive RFID device may be inserted underneath the skin as a chip encapsulated in a bio-friendly container. This practice occurs now with pets and may not be acceptable for human use at present, but will probably be the norm in future years.

Having multiple Microcards from various service companies is probable as credit cards companies and other companies using cards begin to utilize this approach. Card decentralization will drive the new market and with a maturing market driving to consolidation as storage grows and card control and functionality becomes more standardized.

SECURITY

Security and privacy must be regarded as barriers to entry due to the perception that tracking capabilities are seen as invasive and storage of confidential information can be extracted easily. Incentives must show value in many areas to ease these fears. Tracking applications can cause concern for privacy, but the benefits of locating lost children and injured people during a catastrophic event as well as financial and health incentives will probably outweigh the concerns in the long run. If lost or stolen, a signal could be sent from a remote administration location to either locate the Microcard or disable/destroy it thus protecting the information contained within it from falling into the hands of others. The Microcard uses encryption to store data and be as strong as NSA standards.

POSSIBLE EXTENSIBLE PHR SOLUTIONS

The PHR is truly personal. It would hold the more current information regarding a person's health and well being. If an emergency arises, the PHR on a Microcard could be scanned on site or in an ambulance to provide essential information required to provide proper treatment and avoid medical mistakes.

FINANCIAL APPLICATION

It has the capability to be a Personal Financial Record. It also has the capability to hold financial data such as credit/bank codes, retirement data, and personal/family investment data. The Microcard will probably be the new credit card of the future. It can hold many credit cards in one Microcard. The added capability of storing and accessing additional financial information offers unique applications to a using fro general banking and investment portfolio management. With biometric data in the form of fingerprints and a personal photo included on the Microcard, identity theft is minimized. With appropriate online applications, the user can also manage their investment portfolio through an ATM or Kiosk device in a secure manner offering valuable services in locations away from home in real time.

IDENTITY APPLICATION

It has the capability to be a Personal Identity Record. Due to the nature of the secure Microcard technology, it could also be used in identity and security applications since biometric data (photograph, finger prints) can also be stored and used to validate identity. It could aid in smoother, quicker operations for boarding transportation services (airlines and rail) and used in federal service scans at sensitive public and private areas.

During disasters and critical events, identity recognition could aid rescuers in locating and identifying people and their specific needs.

Automatic identification of disabled people could help with deploying applications that provide assistance from automated and personal services such as sounding an identification signal for a service center for the visually impaired, sounding a warning signal for a nearby obstacle or set of stairs, or hailing a porter in an airport for local transportation assistance. Targeted services are provided immediately depending on the specific need.

LOCATION TRACKING APPLICATION

Identity and location services are complimentary. Location services offer tracking capabilities such as tracking people at disaster locations, tracking children during kidnapping events, and tracking friends and family at shopping malls, recreation areas, parks, entertainment events, and resorts. Such companies, such as Disney, would eagerly utilize this capability to extend their services to consumers visiting their parks offering targeted services and promotions. Such services could be controlled by the consumer to opt in or opt out of selected services to ensure privacy and security. While tracking children, alarms could be set that if a child goes beyond an established boundary, an adult is notified immediately to minimize a potential threat.

MEDICAL APPLICATION

With the PHR located on the Microcard, it can be tracked along with other Microcards that may be in the possession of physicians, nurses, hospital staff, equipment, surgical tools, diagnostic equipment, rooms, etc. This practice already occurs in many leading hospitals where digital systems have been deployed. The ability to track and associate Microcards to an event allows an automated tracking system to link and record usage such as a specific patient having an x-ray in a specific room by a specific technician at a specific date and time. This use leads to validation of services used. A system could determine if a patient has been in a diagnostic room and within 2 feet of the diagnostic tool indicated that the equipment was used so a log of the activity would be generated. Small RFID chips are presently used to track surgical instruments, people, and diagnostic equipment. They are also applied to patients in the area of proposed surgery to validate the identity of the person and the correct body area that is to be treated in a surgical procedure, thus reducing medical errors.

MICROCARD DATA MODEL

- Card OS

- Logging, alerts, and control
- Identity and security
- User demographics
- PHR data
- Insurance plan data
- Financial data
- Life and tracking data
- EMR data
- Medical multimedia data
- Expansion (future)

NEW SERVICE OPPORTUNITIES FOR OTHER SECTORS

The advanced capabilities of the Microcard will stimulate new services and faster adoption if available in other industry sectors. It can ultimately become the new electronic wallet or pocket book since it can hold information about:

- Identity: Drivers license, vehicle registration, biometric data
- Currency: Bank cards
- Services: Health card, frequent flyer, hotel/resort card, shopping cards
- Security: Passkeys, access codes
- Personal data: Contacts, lists, business cards
- Location: Wayfinding, entertainment
- Special needs: Medical alerts, donor

Adding display capabilities to the Microcard provides new service opportunities to view stored data on demand such as shopping lists and to do lists. Microcards would be able to extract stored media upon demand for playback to a headset. Libraries could transfer electronic books and magazines to Microcards with a built in time limit for access.

e-cash

Microcards could have a storage area for electronic petty cash purposes in which the consumer “fills the card” with \$100 and uses that e-cash to pay for items (working like a local debit card). Imposing limits to the balance can provide spending parameters for children or activities and can provide a means to deposit financial incentives and rewards to an e-cash account.

INDUSTRY DISRUPTER – TECHNOLOGY ENABLER

The EMV (Europay, MasterCard, Visa) is adopting the smart card or RFID technology quickly and will replace magnetic stripe cards in the near future. EMV is the largest distributor of credit cards globally. If the financial community moves in this direction, all others will follow their lead. The cost of Microcards will be driven to a commodity price level within one year enabling many new and existing services to adopt a portable, micro sized communicating storage agent.

The magnetic stripe card is easily read and not secure. It is limited in application and capability. Its large size limits its use to applications that require storage and as a result, many people do not carry all of their service oriented magnetic stripe cards with them all the time.

THE PHR APPLICATION SYSTEM

If UHG is to pursue the portable PHR concept, we need a reliable, easy to use PHR system in the backend. Carekey does not provide this presently. The idea of a non-branded web based application doesn't seem like it is an "insurance company" product and may work because many people associate the solution as a personal application. Since studies indicate that only 15% of people believe that an insurance company should hold the PHR, a solution is needed to earn the trust of the consumers. Choosing a vendor to create the web based PHR with an already trusted brand, may quicken adoption and allow UHG to be recognized as a supporter.

WEB SITE - THE CONSUMER FRONT END

The actual website could also be branded with a different domain name like myPHR so it does not seem like the website is an insurance site but more like a sponsored site by a health organization interested in personal health and well-being. This strategy avoids a possible collision with public opinion with people saying they do not want insurance companies to hold the PHR. The primary reason is a lack of trust. Perhaps as the purpose of the PHR is enhanced by taking on new functions for life management, a domain name of MyPLR or MyLifeRecord would work well. These domains are currently available A domain centered on the customer (myhealth.com) is better than one centered on the company (myuhc.com) especially when building trust. It should always be from the perspective of "the customer's eyes". Company branding can reside on the pages.

RECOMMENDATIONS

Offer a service with a Microcard that keeps the PHR's primary location and ownership with the Consumer to avoid early adoption issues. Promote the PHR's secondary location be the UHG consumer portal for processing, graphical tracking, alerts, wellness tracking incentives, data management, and access control. UHG focuses more on the well being aspects instead of the medical records aspect, but does both. The secondary location acts as backup, online storage, a control point, wellness manager, and a place for additional applications. Provide access from primary and secondary locations to tertiary locations being the physician's office, clinics, and hospitals. If the tertiary location cannot obtain access from the primary location, the secondary UHG location is available as a backup. Even without the Microcard, wellness tracking and life management services offer a strong portfolio for the consumer.

For wellness tracking, offer an automated service that tracks and manages employee exercise and activity that enhances employee health in the workplace with incentives. Incentives may include a reduction in insurance plan costs, a reduction in cost for use of workout centers, or accrual of "health excellence points" to be used for purchasing items in a catalog. Voluntary diet tracking may be added to follow trends that affect health and could be aligned to other health indicators such as weight and cholesterol so consumers see the connection for impact.

A very thin client is placed on the consumer's PC to minimize support, installation, and costs. The thin consumer client could be downloaded and updated directly from the consumer site with its main purpose being a conduit; acquiring and storing data on the Microcard and sending it to the online portal using Web services.

Enhance the PHR's capabilities to hold life records and not just medical records making it stickier in day to day use. Life records include wellness tracking, alerts, and location services.

MICROCARD USE IN CONSUMER APPLICATIONS

Enhanced consumer applications are enabled by Microcard use as demonstrated in the diagram below. In that security is a main issue for adoption and regulatory compliance, Microcards offer many benefits over magnetic stripe cards.

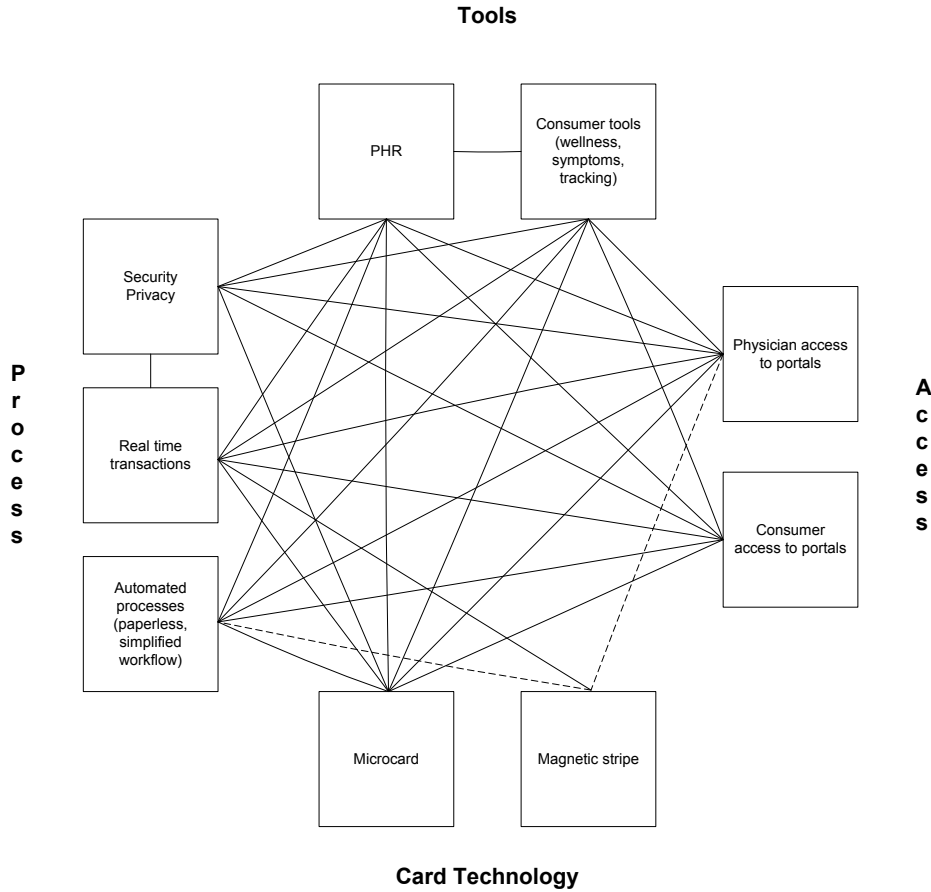


Figure 3 - Application Dependencies

In order to deliver to a forward looking vision with services that align to the consumer, adoption of the Microcard is imperative. Many potential consumer based service applications rely on the Microcard as opposed to a magnetic stripe card. Benefits include:

- Added security and privacy
- Automated processes
- Location and tracking services
- Portable PHR's
- Enhanced access