

Rural e-Disease Management System (ReDM)

---via a Telehealth-Community-ASP in each rural community---

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INTRODUCTION:

The most important purpose of this article is to invite the open source community to participate in this project.

Simply stated the health care system in the rural communities is under pressure:

both the rural clinics and rural hospitals are more frequently facing:...

...their patients are increasingly from the retired and aging population as the retirees are moving into rural communities. This type of patients require more frequent interaction with their health professionals including reminders to take their medication, more frequent monitoring their vital life functions, preventative measures, etc.

...the increasing need for IT (information technology) professional services for compliance, interaction with insurance companies, interaction with health services providers, etc. These IT professional services are not currently available in the rural communities in a cost effective manner.

...there are no nurses available in the rural communities

...the increasing acceptance and requirement for e-visits via simple devices including basic telephony

HealthHighway Inc, acting as a master-SI (systems integrator) and master-ASP, proposes that a low cost reliable collaborative network should be installed in each rural community which would connect the rural clinics, nurses, case managers hospitals, social workers, information providers to the patients in the community for...

...e-disease management

...teleconsultation

...distance learning

...telediagnosics

...telemonitoring

...e-visits

thus this Telehealth-Community-ASP through a the collaborative net will allow the professionals of the community: medical professionals, social workers etc to support the fast and ever growing retired, ailing, disabled etc members of the community with greater productivity and precision.

HealthHighway will organize, in partnership with an established ISP, in each community a Telehealth-Community-ASP and associated community collaborative extranet and enable such to act as the community ASP and network.

This proposed collaborative net can be built using existing simple technologies and HealthHighway will act as the master ASP linking the rural facilities to the supportive expert medical centers linking the rural facilities to the supportive expert medical centers as well as linking all the participants in the community to each other.

One of the most important aspect of the Telehealth-Community-ASP community net is that it is based on an ASP server platform which can be connected to either by simple switched telephony (POTS) either wired or wireless, as well as by IP (internet protocol) capable thin-client. This dual purpose architecture thus allows the simple user interface even for people who are afraid of the the complexity and unreliability as well as cost of the PC style desktops.

In order to finance the collaborative net in each rural community Telehealth-Community-ASP will be helped by HealthHighway to apply for a USDA loan-grants which would provide funds to acquire the needed hardware and software to install and run this telemed extranet in an ASP style in the rural communities:

“ 7 CFR Part 1703, Distance learning and Telemedicine Loan and Grant Program “

<http://www.usda.gov/rus/telecom/dlt/dlt.html>

These USDA provided funds can be used by the rural community to buy equipment, software and pay for the ASP services of Telehealth-Community-ASP. Of course the fact that the rural medical facility will be able to keep the patients and the associated revenues will provided a sustained flow of fees to pay for the ASP services as well as the expertise of the supportive distant medical organizations.

Each Telehealth-Community-ASP was also organized to additionally improve the quality and productivity of rural clinics and hospitals by means of integrating biosensors into the collaborative telehealth extranet thus providing home based telemedicine functions connected to the rural clinics and rural hospitals.

THE ReDM APPLICATION:

One of the most important service capabilities of Telehealth-Community-ASP is to provide a Web-Services style Linux OS or Windows OS based server portal enhanced with...

... an in memory high speed SQL database

....XML document markup capability

... front ended with an IVR enhanced soft switch allowing PSTN connectivity

(public switched telephone network)

in each community offered in an ASP mode, which will let the patients of the medical professionals of the community talk to all the various services of the health care

facilities as well as expert systems such as the NIH medical database using HIPAA compliant sessions.

One of the most important aspect of the Telehealth-Community-ASP community net is that it is based on an ASP server platform which can be connected to by any of or any combination of...

.... simple switched telephony (POTS) using touch-tone or server based voice recognition

.... cellular telephones including voice recognition and SMS (short messaging)

.... IP (internet protocol) capable thin-client.

This dual purpose architecture thus allows the simple user interface even for people who are afraid of the the complexity and unreliability as well as cost of the PC style desktops, even simple POTS and videophone or simple smart displays will be usable:all functions are in the community server which is a Lintel (Linux on Intel) blade server highly reliable, cost effective and continuously expandable and duplicable. The server base voice recognition will include speaker independent voice recognition for simple commands and later speaker dependent full voice recognition and handwriting recognition.

Telehealth-Community-ASP proposes that a low cost reliable collaborative extranet should be installed in each rural community which would connect the rural clinics and hospitals for...

...e-disease management

...teleconsultation with information databases

...distance learning for nurses, doctors, social workers and even patients

...telediagnosics of patients via simple interaction as well as biosensors

...telemonitoring of usage of medications

...e-visits of all types increasing productivity and increasing the frequency of professional to patient interaction

This proposed collaborative extranet can be built using existing simple technologies and Telehealth-Community-ASP in each community would act as the ASP linking the rural facilities to the supportive expert medical centers as well as connect all the participants in the community to each other including patients, medical professionals, social workers etc. One of the most important aspect of the Telehealth-

Community-ASP is that it is based on the thin-client to server architecture thus allowing the simple user interface even for people who are afraid of the the complexity and unreliability as well as cost of the PC style desktops, even simple POTS and videophone or simple smart displays will be usable:all functions are in the community server which, for example, can be a Lintel (Linux on Intel) blade server highly reliable, cost effective and continuously expandable and duplicable.

What is needed by the population of these communities who will be the end user of the telehealth system including end user members such as....

-professionals in support of the community
-moderators, mentors, experts in specific applications
-health care workers
-social workers
-aged
-ailing
-disabled
-retired or about to retire

is a unified, simple, reliable, affordable (and easily connected via the telecom network or power cable as the data link), telecom style telehealth system, equipped with server based centralized voice-recognition and voice-activation, that lets the end users interact in the fashion of a support group but replacing the need for a face to face gathering with a network supported virtual gathering.

These segments of the population and the professionals supporting them are in deep need for telemedicine and distance learning applications which could be delivered on Linux based low cost, rugged and simple to use ASP (application services provider)s.

A very important example is the telehealth capability which can be used in preventative fashion to detect some of the early and silent conditions of diabetes, hypertension, cardiovascular conditions. Diabetes total annual cost in the USA is 132 billion dollars based on 11 million diagnosed diabetics and 6 million undiagnosed diabetics. Hyperentention can be detected in 29% of the population of the USA. Of course, cardiovascular conditions are the number one killers.

The professionals in support of the community will also benefit from the simplicity of the user interface of the Linux-based client machine: desktop or laptop or later even a tablet. Simpler interface makes it quicker to use the system will make it more convenient resulting in higher precision records and faster execution of transactions.

Using such simple systems the professionals can monitor, mentor and moderate and even medicate the members of the collaborative community. Also they can track and analyze the information collected from all telemedicine sessions.

THE MARKET FOR ReDM:

In the United States, there are 8,200 hospitals, of which 6,500 are in rural areas. There are 450,000 doctors and 1.2 million nurses. There is a great shortage in rural areas and productivity improvements via e-disease management and associated distance learning for health care providers and patients are greatly needed.

12 % of all Medicare enrollees account for 75.5% of all Medicare fee-for-services (FFS) expenditures. These patients are mostly chronically ill people with one or more morbidities such as...

- ...CHF
- ...Diabetes
- ...COPD
- ...Hypertention
- ...etc

E-disease management has an important place in reducing costs and improving provider effectiveness in disease management. 60% of people do not take their medication or do not take it at the right time. Simple telemedicine solutions can make a tremendous difference in this one area alone. Additionally, there are various diagnostic and second opinion services that have an important place in telemedicine.

This centralized user specific handwriting and later voice recognition equipped telehealth community systems architecture incorporating Linux based:

- ...Smart Display for doctors, nurses, social workers, thin client machine for the professionals
- ...HIPAA compliant servers
- ...medical equipment embedded systems connected to expert systems
- ...VoIP and internet telephony for teleconsultation
- ...internet connectivity for distance learning
- ...tablet and PDA devices for the patients
- ...collaborative software
- ...server based voice and handwriting recognition

It can also be used in clinical trials to improve the quality and precision of data collected from patients participating in the trials. connected via their power cable as the data link is what needs to be developed and this is the project for which a grant is being sought by me and my supportive team with educational and information technology experts as members of the team.

With the attractive price of a Linux-based central collaborative community system to which the end users can connect with plain telephones will offer all the applications needed for...

- ...predicting health conditions
- ...preventing health problems
- ...resolving health problems

In fact it should be stated that the Linux based telehealth support system will have the following attributes;

- ...telephone style simplicity
- ...telephone grade reliability
- ...telephone type cost effectiveness

In addition to the simplicity and low cost of using the power cable and or the phone lines as the data connection an additional important features of the collaborative community system will be the server based voice recognition capability. Everything that is now done by typing and text, will be more quickly and easily performed with voice recognition. That is, a voice will identify a caller, read short messages aloud, provide e-mail services in both text-to-voice reading of the incoming e-mail and voice-to-text for outgoing E-mail, voice access of address books, and voice-activated placing and closing out phone calls, search the web, collaborate with the mentor, etc.

Of course the professionals in support of the community will also benefit from the simplicity of the user interface of the Linux-based end-to-end community support systems for all their information technology needs: precision, quicker use, fewer if any errors, easy tracking. Even the able-bodied eyes-busy, hands-busy professionals can use it to improve their productivity. This low cost virtual community ASP (application services provider)s and associated Web connectivity could be very useful in many government and commercial employment arenas as well reaching out to the individuals who are in need of upgrading in skills.

THE PLATFORM FOR ReDM

One of the important aspects of the Telehealth-Community-ASP end-to-end systems is that it can connect both class of end user terminals (client machines) either plain switched telephones

(wired or wireless cellular) or IP capable thin-clients all of which run on secured Linux (SELinux) offering a high speed in memory SQL interfaced via XML enhanced documents which can talk to any client device via the XSL client-server interface. These Linux based devices include...

- ...servers to offer the ASP services
- ...client systems such as desktops, tablets, laptops, PDAs, to connect the the end user such as the professionals and patient to the ASP server
- ...communication nodes
- ...embedded systems for biosensors

The ASP servers is capable of interconnecting with and in support of any mix of client machines...

- ...POTS
 - ...Cellular telephones
 - ...SIPs
 - ...Intelligent telephones
 - ...Thin clients in general
 - ...Desk tops, tablets, PDAs, laptops running under Windows, Linux, MacOS, Unix
 - ...KVM
 - ...Any IP connectable device
- thus assuring unprecedented reliability, simplicity and lower cost.

One of the important aspect of the Telehealth-Community-ASP end-to-end system that it will incorporate broadband, thus images and videoconferencing, based on any mix of

- ...co-axial cables like cable TV lines
- ...DSL
- ...Wi-MAX (802.16a)
- ...Wi-Fi hot-zones (meshed network extended Wi-Fi)
- ...Wi-Fi
- ...VSAT
- ...Ultra Wide Band on the in building cables

All these communication capabilities can be used in the communities and in the health care facilities as well.

HealthHighway will be the leading architect, integrator and supplier of a combination telecommunication in the form of a community extranet connecting the community to the community ASP (application services provider) offering:

- _ Ultra Wide Band for mobile tablet access to medical imaging and other medical applications within the health care facility
- _ Integrating Bluetooth adapter technologies
- _ Best value bandwidth sourcing to the health care facility
- _ Standardized communications infrastructure that can be deployed across multiple health care facilities using the latest proven data transmission mechanisms
- _ Local caching of DICOM images as appropriate to network engineering and cost factors when using Application Service Providers
- _ Medical application integration for mobile tablet use
- _ Telemedicine application integration for embedded medical devices, telehomecare, telemonitoring, regional and teaching hospital solutions

The proposed project will also develop applications for the community to allow easy, secure and reliable collaboration between the health service professionals or social worker professionals and the many people in need. Web connected AT oriented software components running on Linux client machines connected to Linux servers will be created such as...

-simple and application specific user interface,
-voice based interaction via IP thin-client or POTS telephone,
-always on and always available systems,
-a collaborative virtual community systems,

...life function sensors: blood pressure, respiration, retina, etc.
...security of data and individual privacy

THE RURAL COMMUNITY CONSORTIUM SERVING AS AN ASP:

Telehealth-Community-ASP will have a large number of community based subsidiary style Consortium structures, which will include...

- ...Local health care providers
- ...Regional and teaching hospitals
- ...Application Service Providers currently servicing the local health care providers
- ...Local power companies; and,
- ...Internet Service Providers (ISPs)

to provide seamless end-to-end telemedicine solutions.

The goal of Telehealth-Community-ASP is to become the leader in the design, integration and implementation of advanced telemedicine solutions enabled by power line and wireless broadband technologies, and through leveraging existing wire line Facilities.

In addition there will be a large number of subsystems providers under an OEM contract each: medical devices, embedded, adapters etc. After the completion of Phases I and II grants Telehealth-Community-ASP will also commercialize in the following markets:

Although market estimates vary widely, one estimate of the global demand for telehealth services is \$1.125 trillion. Roughly in ratio with the gross national products of the Group of Countries: USA, EU, China, India, Japan with the USA representing a 300 billion dollar opportunity.

With the combined telemedicine ASP (application services provider), Telehealth-Community-ASP has large-scale opportunities within multiple markets. Successful distribution will be through direct selling by Telehealth-Community-ASP to hospitals, health care clinics, physician's offices and international organizations that are managing remote telemedicine implementation projects.

Telehealth-Community-ASP will be offered via the local ISP in the form of consortia with HealthHighway and other services providers and will make use of the USDA Distance Learning and Telemedicine grant/loan program, plus other private grant funding sources, for implementation in each community.