HealthNet Applications

A 21st Century Approach to Health Care

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Illinois Institute of Technology

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Instructor:
Charles Owen,
Distinguished Professor Emeritus

Team Members:
Akilah Williams
Arisa Xumsai
Ryan Pikkel
SuDong Cho
Structured Planning

Introduction:

Structured Planning is a process for finding, structuring, using and communicating the information necessary for design and planning activities. It is a front-end process for developing concepts.

A number of projects have been undertaken with it and used to continue its development. Among well nearly 100 of these, an early published project for Chicago's transit authority (CTA) was Getting Around: Making the City Accessible to Its Residents (1972). In 1983, the House of the Future project won the Grand Prize in the Japan Design Foundation's First International Design Competition. In 1985, a project on Space Station was undertaken for NASA. In 1987, the Aquatecture project won the Grand Prize again in the Japan Design Foundation's Third International Design Competition. In 1991, Project Phoenix on global warming was honored as Environmental Category Grand Winner in Popular Science magazine's "100 Greatest Achievements in Science and Technology" for the year. In 1993, two projects, NanoPlastics and Aerotecture, won awards and were widely publicized in Europe and Japan. In 1995, the National Parks project developed plans for the future of the National Park Service, and in 2001, Access to Justice, a project sponsored by the National Center for State Courts, was implemented for use in state courts across the country. As the process has evolved, it has become an increasingly useful planning tool for products, systems, services, processes and organizations. It is now being used commercially.

A diagram of the process, shown below in two figures, outlines the activities that make up Structured Planning and the working documents and final products that are produced along the way. The following general description follows the diagram. Where products of the process are discussed here in the abstract, it is possible to see specific examples produced for this project in the other appendices that accompany this report.
I Project Definition
The Structured Planning process begins with Project Initiation and the production of a Charter. This is a "brief" that serves as an initial communication vehicle between client and planners. It contains background, context, basic goals, a project statement that cuts to the heart of the planning task, resources to be used, and an initial set of issues to be investigated.

Defining Statements are mini “white papers” produced in the Framework Development phase of Project Definition. They focus the project within the direction of the Charter, concentrating on the issues and arguing specific directions that the project should follow with regard to them. Together with the Charter, they define the project.

II Action Analysis
Any system can be viewed as a complex entity working with its users in different ways appropriate to its modes of operation. To plan effectively, a planning team must recognize these Modes, identify Activities that occur within them, and isolate the Functions that the users and system are intended to perform within each Activity. The result of the Activity Analyses conducted is a Function Structure.

Half of the purpose of Action Analysis is the enumeration of Functions. The other half is the development of information about these Functions that reveals insight about what happens as they are performed. During Action Analysis, insights are sought about why things go wrong in performing some Functions, and how other Functions manage to be performed well. These insights are uncovered in the Design Factor Description procedure and developed in documents that become part of a qualitative knowledge base. Activity Analyses record information at the Activity level; Design Factors document insights and ideas associated with Functions.

To capture as fully as possible the ideas suggested on Design Factors, Solution Element documents are written in the Solution Element Description phase of Action Analysis. These are one-page documents designed to capture enough detail about ideas to give them substance when they are needed later. They have three important sections: “Description” — a short explanation, “Properties” — what the idea is, and Features — what the idea does. The Solution Element form is the tool used for committing ideas to paper.

The product of Action Analysis is three sets of critical information: a set of Functions (the Function Structure), a set of insights (Design Factors) and a set of preliminary ideas (Solution Elements).

III Information Structuring
Paradoxically, as useful as the Function Structure is for establishing coverage, it is not the best form of organization for developing concepts. Reorganizing information for use in concept development is the job of two computer programs, RELATN and VTCON.

The controlling factor for whether two Functions are associated from the planning standpoint is not whether they are categorically “related” in some manner, but whether a significant number of their potential solutions are of concern to both. Which Solution Elements are of concern to each Function is established in an Interaction Analysis procedure. The RELATN program then uses this information in a Graph Construction process to establish links between Functions.

Another program, VTCON, completes the information structuring process. The graph establishes paths through the Functions by linking them when they are related, but, unlike a road map, a graph is not naturally arranged nicely for visual comprehension. In the Hierarchy Construction phase, VTCON finds clusters of highly interlinked Functions and organizes them into a semi-lattice hierarchy, a very general form of hierarchy most appropriate for planning. The hierarchy is called an Information Structure.
IV Synthesis
In its form from the VTCON program, the Information Structure is simply a hierarchical organization. Nodal points do not have names. The task of **Means/Ends Analysis** is to create labels for all nodal points in the hierarchy. Moving bottom-up from the known Functions in the bottom level clusters, the question is asked, “To what end are these Functions means?” The answering purpose, in turn is grouped with its sibling nodes and viewed as means to a higher level end. The process continues to a completely labeled **Information Structure**.

The process is then reversed as a top-down, structured brainstorming procedure: **Ends/Means Synthesis**. In this process, the planning team asks of high level nodes, “what means do we need to meet this end?” As means are established, they are treated in turn as new ends for which means must be found, until the means become concrete enough to be described as final elements of the system (**System Elements**). Solution Elements originally conceived for the Functions involved are constantly reviewed as possible end products. New ideas, however, are encouraged, and original ideas are modified or combined in the light of the means that evolve.

In the **Solution Evaluation** phase, features of the System Elements are evaluated for their contribution to fulfillment of Functions in their part of the Information Structure. If there are unfulfilled Functions, this is the signal to return to the Ends/Means process for additional development.

**System Element Interaction** compares System Element with System Element in a search for additional synergies that can contribute to systemic qualities. More than simply recognizing relationships, the planning team proactively seeks out ways for System Elements to work together — to the extent
of modifying one, the other, or both. Changes are incorporated in the properties and features of the individual System Elements.

The last task, System Element Description, completes the write-up of System Elements as specifications, including a succinct description, all relevant properties and features, and extensive Discussion and Scenario sections that contain detailed expositions of the ideas in both conceptual and operational terms.

V Communication
Because the result of the Structured Planning process is a complex system, usually with a number of System Elements, a Communication Structure is frequently included as an aid to understanding. This is created in the Concept Organization phase by the VTCON program from an assessment of how important the System Elements are to each other’s operation. Using this structure, the reader can understand the system and navigate its concepts with greater efficiency.

The product of the Structured Planning process, assembled in the Project Completion section, is a Conceptual Plan, made up of an Overview that provides background and introduces the system, the System Elements that describe the ideas and their relationships, and Appendices that contain all relevant support information, including the Charter, Defining Statements, Design Factors, Function Structure and Information Structure.
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Currently, many questions face the health care system in the United States. Health care costs are spiraling out of control forcing a growing number of individuals and families to drop their coverage, while for professionals, shortages of nurses and medical staff continue creating a hectic environment where health care professionals are overburdened. Emergency rooms have become the doctor’s office for those without insurance and a vast majority of the diseases that stricken and sicken citizens each year and drain resources from the health care system are preventable in nature, and in cost cutting moves pressure is being placed on individuals to assume more responsibility for their health.

The following are some issues that are compounding problems facing individuals, families, the medical community and associated professionals.

Healthcare professionals are deluged with information on research findings, new drugs and innovative treatment options, but are unable to assimilate the entirety of this wealth of information; creating an environment where new and more efficacious ways of treatment may be missed. Meanwhile, due to increased litigation and pressures associated with insurance companies many professionals have adopted conservative strategies and have become defensive, placing their needs before their patients’.

Additionally, despite technological advances across the field, documentation of patient information—patient records, prescriptions and medication charts for example—largely remains paper-based making it difficult to access, update and share. While organization that have adopted electronic record systems have done so on an individual level and with proprietary technology, so that accessing, updating and sharing information is easy only within their organization.

Meanwhile, a media barrage of medical advances is increasing expectations of what individuals expect from the health care community. The amount of information, sometimes conflicting in content, helps to add to confusion over what is possible, as well as plausible, and at worse generating dissatisfaction with the healthcare system.

Further complicating the problems facing the healthcare system is the reversing of the trend to move to the suburbs. Many suburbanites are leaving their homes and moving to city centers creating a situation where medical institutions and physical resources and capabilities are mismatched to needs.

In the wake of these realities exciting opportunities exist. The continued expansion of the Internet, networks and encryption technology gives hope for a unified health network that can support the needs of individuals, families, the medical community and associated professionals from a distance as well as in person. We can see glimpses of what is possible by looking at sites such as WebMD and other online health portals, as well as reviewing the emerging push towards paperless hospitals. These advances, while noteworthy, are inherently fractious and disconnected when viewed against the entire healthcare field failing to take advantage of the net’s connectivity—though strides are being made. Nevertheless, a powerful opportunity exists to leverage that connectivity through a unified systematic solution of tools and services for support.

Opportunities also exist to support the shift towards greater individual responsibilities. In part due to
pressures to reduce medical costs there exists a greater trend towards greater individual responsibility in regards to healthcare. Harvard University president Larry Summers has a saying, “No one in the history of the world has ever washed a rented car.” In many ways individuals view their health as a rented car, something they have but do not have ownership over due to a disconnect between the information known and the information made available to individuals. Connecting individuals with information, however, is not enough. Again, leveraging the nature of the Internet, an opportunity exists to connect individuals with personal health information and tools tailored to enhance the information as to make its meaning relevant and accessible.

Our solution is a system of applications which leverages new and existing digital technologies to provide improved access to information, collaboration, and information interpretation capabilities for all users of the system: both individual and professional in maintaining health, preventing disease, and solving medical problems. Four domains of use have been identified for the system: personal, public, portable and professional. Applications from all four domains contain elements that enable collection and interpretation of information and also enable collaboration and sharing of information. The system of applications is a system of support, a system to support those in need, to create a connection between the public and the healthcare community… between individuals and the information needed.
**Personal Health Portal**

Description:
The **Personal Health Portal** is a web-based personal health management site that can be accessed from anywhere with a secure connection. The site contains personal records, tailored information and a suite of applications for managing and maintaining personal health.

Properties:
- Secure personal health management portal
- Accessible anywhere from a secure connection
- Health information convergence site
- Collection of personal health applications including the **History Tracker**, **Condition Identifier** and **PreventNet**
- Schedule creation and alerting software
- Customizable information for user’s needs or interests
- Gateway for medical knowledge and health exploration
If there is going to be a shift in the health care process that asks individuals to be responsible for managing and maintaining their own health, then they need the necessary tools, information and support to do so. Using the Personal Health Portal, a web-based health management site where personal and general medical knowledge converges, users are now able to do this.

The information gathered and displayed in the portal is stored on secure HealthNet servers that can be accessed by individual users or authorized medical personnel. Because of this, both the user and the health care community are connected at all times.

Accessing the page by signing in through a secure connection, users are able to review their current medical condition as well as their medical history. Patients will no longer need to spend hours or days tracking down their medical records as users control them from the site.

The Personal Health Portal makes managing health care easy. Basic functions of the site allow users to contact their physician with questions, make appointments for physical or virtual consultations, check on their current insurance plan, fill or refill prescriptions for pick up or mail delivery, create and monitor prevention or maintenance schedules, and create alerts for when certain conditions occur or when activities need to take place.

Users can choose to customize the content of the site based on their interests, or if they choose to forgo this step the site will "learn" about users through use and

**Features:**
- Contains personal portable health record
- Shares information with health server which can be accessed and reviewed by health care professionals
- Displays updated personal information
- Updates user with personalized news and information relevant to his/her condition or interests
- Lists goals or target activities as determined by user or health care professional
- Lists and sorts personal test, procedure, and prescription history
- Lists and sorts current and previous health care providers
- Accesses, interacts and links information with MedApplets History Tracker, Condition Identifier and PreventNet
- Connects with pharmacies so users can order their prescriptions through the portal
- Connects with health care facilities to schedule appointments with professionals
- Highlights medical terms that may be unfamiliar and gives explanations or definitions if desired
- Creates calendar-based schedule from information input from user or health care provider
- Allows user to set parameters on certain information, creating an alerting function that can be delivered by means of choice

**Discussion:**

If there is going to be a shift in the health care process that asks individuals to be responsible for managing and maintaining their own health, then they need the necessary tools, information and support to do so. Using the Personal Health Portal, a web-based health management site where personal and general medical knowledge converges, users are now able to do this.

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It is 8:15 a.m. and Katheryn Santiago, a real-estate agent, is in a rush because she is supposed to be showing a property on the north side of the city at 9:00. It has been a few days since she has used her Home Diagnosis Center so she decides to quickly test her vital signs; after all it only takes a few seconds. She decides not to go over the results because of her time constraints. This does not bother her because she already plans to look them up once she settles into her office later this morning through her Personal Health Portal.

Kathy's morning is more hectic than she had planned. She had a last-minute appointment that kept her up north and a lunchtime appointment she forgot about until she looked in her planner. At 12:30 p.m. her cell-phone vibrates, she has a new message. It is the alert she set up through her Personal Health Portal to remind herself that she has to take her pills for hypertension. She has been on this new prescription for two weeks and it seems to be helping. She is in the middle of showing a property, but she doesn’t want to risk forgetting again so she excuses herself for a second and takes her medication. While doing this Kathy notices she only has four pills left and makes a mental note to order a refill when she is back in the office.

Thank goodness that morning is over! Kathy’s feet are killing her, and no one bit on the available properties. She settles into her office and boots up her computer while microwaving her lunch. After checking her e-mail and voice-mail she decides to look over her Personal Health Portal while eating her lunch. After logging in she looks over her results from earlier this morning. Her blood pressure has dropped again and is closing in on the normal range. This is great news. She decides to run History Tracker to see what her
blood pressure levels look like from when she started her new prescription until today. She can see a positive trend and it makes her feel good about herself and her doctor. For kicks she decides to chart her progress over a six month period, that truly is quite a drop off over the past couple weeks.

Looking at the charts reminds her that she needs to refill her prescription. The doorstep delivery option seems like it would arrive too late and she doesn’t feel like paying for additional shipping so she instead selects for her local pharmacy to refill it; she can pick it up on her way home. After completing this task Kathy is informed that she has only one refill left after she picks this one up. It then becomes her responsibility to maintain her blood pressure and hypertension by herself.

Her home page is aware of this information and has selected recent news items about hypertension and some steps she can take to help keep her blood pressure levels in check. She reads about these activities while she finishes her lunch. Intrigued by what she has read she decides to further research her condition through PreventNet. She is hoping to avoid doing an exercise regiment, though she knows it is best for her, so she is hoping to find out what she can change in her diet to make her less dependant on daily exercise. After work, the last thing she wants to do is walk around some more, she just doesn’t think she has it in her, though she still puts in her schedule 40-minute walks after dinner three days a week. This is her health and well being she is talking about, so she owes it to herself to try.

Before signing off Kathy sends a quick e-mail to her doctor with her latest results. She knows her doctor will get those results soon regardless, but she wants to share her progress with her, and ask a few questions about a preventative plan she is forming. Kathy’s doctor usually gets back to her within a day and it is helpful to her doctor that they are able to share information; it takes a lot of guesswork out it the process. Kathy hopes her doctor is as excited about her progress as she is.

Once signed off, but before returning her attention to her work Kathy thinks to herself she appreciates that this service exists. She likes it to her online banking. She likes the control she has in her health care, and that the process has been demystified. She is no longer afraid of what she will find out when she visits her doctor. Kathy doesn’t mistake herself as a doctor, but she does feel capable handling this role. In fact she considers herself a partner in the process instead of a passive receiver. Maybe that was the motivation she needed to feel more accountable for her condition. Regardless, she can’t imagine what it would be like to go back to the old system, though there is no time for that thought because the phones have started ringing again and it is time to get back to work.
Description:
Prevent Net is a software applet with the up-to-date, searchable databases for preventive health information. Accessed through a Personal Health Portal, people can receive information on preventive measures through searching for symptoms, risks, treatments, as well as viewing medical animations.

Properties:
- Preventive educational software accessed through a Personal Health Portal
- Searchable symptoms and risks database
- Searchable medical condition database
- Reliable reference source for individuals
- Information bank for self teaching
- Tutoring software capabilities

Features:
- Allows individuals to educate themselves on preventive medical information
- Provides easily accessible medical facts
- Provides accurate and up to date information reducing probability of false or outdated information
- Provides individuals with pertinent information for hypothesized self diagnosis
- Provides individuals with pertinent information to assist others with treatment
- Uses information from Personal Health Portal to help form preventive diagnosis
PreventNet is a software applet program that educates individuals on preventive medical information. It equips people with the knowledge to understand various conditions and to become knowledgeable of the symptoms to be aware of. The information is applicable for that individual, or it can be used to assist someone else in need.

Within Prevent Net, there are searchable databases for individuals to research information on symptoms, illness, and treatments. For example, a person can enter the disease and select the type of search desired and sort the findings. Options are then available for searching for facts on the conditions, as well as suggestions on various types of lifestyle alterations to prevent illness. Once conditions are discovered through the Condition Identifier, they can be further researched per physician’s request or personal decision.

Prevent Net also has a recall feature for quick returns to previously viewed information. Individuals have the option of bookmarking information to refer to the material later. Working in conjunction with the quick reference is a built in tutoring component of the program. It allows individuals to ask questions if the information read is not understood. It is capable of simplifying the meaning of various medical terms and jargon in order for the individual to full comprehension.

Information viewed in PreventNet is not strictly text, in order to provide an additional means of educating. There are options ranging from animations to photo series to drawing and even personal testimonies. This gives the learning environment various dimensions, making it easier to understand such compelling topics.

Discussion:

Scenario

Susie Lee has just learned that the number of children diagnosed with diabetes is increasing. After meeting with her daughter’s pediatrician, Susie is informed that her daughter Cynthia is at high risk for this condition. However, Susie wants to do her own personal research on the topic to get a better understanding and determine what are her preventive options.

Because Cynthia is under age, her parents are the overseers of her healthcare. Susie logs onto her Personal Health Portal and connects to her daughter’s page through her family link. She accesses the PreventNet program to discover ways to lower Cynthia’s risks of being diagnosed. She is such a young girl and of course her mom wants her to be able to live her life to the fullest. Susie does a condition search on diabetes and refines the search to “preventive measures of child diagnosis.” Not realizing this was a growing epidemic, Susie was greatly surprised at the amount of information on this topic. She stumbles upon a support group for Mothers of Diabetic Children (MDC) and quickly logs on to chat with them. She bookmarks her information to review it later with her husband.

Later on in the afternoon, Susie’s husband arrives home and she takes him through her bookmarked pages on PreventNet. They overlook the diagnosis information entered by the doctor and review Cynthia’s potential risks. They begin to develop a schedule for their daughter and plan of implementation on her Personal Health Portal. After reviewing everything, they are confident that they will get through this together. After finding all of their treatment and maintenance options, they feel assured that Cynthia will live a healthy life. Finally they bring Cynthia in the room and show her an animation about children diabetes allowing her to understand. Thanks to PreventNet, they are better equipped for the future.
History Tracker

Description:
A software application for personal or professional use, which synthesizes individual’s medical test history information into easy to understand diagrams and animations which illustrate patient’s trends over time. History Tracker also tracks family medical histories, provided the information is made available, to detect patterns and predict risks.

Properties:
- A full-featured software application for medical use
- A limited-featured software application for personal use
- A research tool for tracking personal health trends
- Tool for graphing and charting personal medical history
- Tool for tracking family medical history

Features:
- Locates past patient tests results and gives options based on information available
- Interprets data and images
- Synthesizes past test results into easily understood diagrams
- Displays past results in static or dynamic manner
- Allows for customization of tracking through different tracking parameters
- Runs cross platform
- Locates family medical history, if information is made available by family members
- Assesses user’s condition based on trends from their medical history and family trends

Collect past tests and results
Test results of a patient from five or even ten years ago are just as relevant as the last results in compared in the proper context. **History Tracker** compiles past results and showcases the results in a way that creates a living history. This feature, which displays compiled prior test results in a static or dynamic manner, transforms tests into a powerful forecasting tool, predicting future health issues before they arise and tracking individual health trends.

The **History Tracker** is a two tiered program. **History Tracker Pro**, for professionals, is capable of being run on medical computers, **Clipboard 2.0**, and displayed on the **Dynamic Charts** through the **Clinic 2.0** system; While a limited function web applet version is available for individual use through the **Personal Health Portal**.

Using **History Tracker** both medical personnel and personal users can see test results animated over time, creating a powerful agent for change. The tracking period is adjustable, so trends can be tracked from the past ten years if a more historic perspective is desired, or a day view could be tracked if that would prove more helpful. Another feature of the application is an ability to view results against composite averages of individuals with similar backgrounds or national averages (when applicable).

When dealing with images rather than data, **History Tracker** works by displaying the collected categorized images, such as X-rays, MRIs, internal or external images. These images can then either be displayed sequentially, “head to head” for comparison, or animated to watch for change or growth.

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**Discussion:**

**Scenario:**

“Why in the world did I buy this organic oatmeal toothpaste? It tastes awful!” Ted thinks to himself after inserting his toothbrush with the new offensive toothpaste in his mouth. Ted knows he bought it in an attempt to live a healthier lifestyle, but he feels a little foolish about it because he has a sneaking suspicion that he will end up throwing out the entire tube before the week is over. What he doesn’t feel foolish about is using his **Home Clinic** to monitor his health. To concentrate on something other than the awful taste in his mouth he studies the reflection in the mirror of the testing glove of his **Home Diagnosis Center**. He has made a habit of wearing it while brushing his teeth in the morning, that way he kills two birds with two stones; oral hygiene and a personal “check-up.”

In checking his results, none of the numbers look out of the ordinary, in fact, they look down right good. Some numerical threshold must have been crossed because Ted is not content with these results. He knows they are good but they are higher than he remember. An old memory is stirred in his mind. Ted recalls the first time his scale relayed the information to him that he weighed over 170 pounds. He was still within the BMI index zone for his height and weight, but, again it was the crossing of a threshold that he did not want to cross. Today he is experiencing a similar feeling.

Ted decides to run the **History Tracker** to check his latest numbers against past results. He woke up early this morning so he decides he has enough time to connect to his **Personal Health Portal** through his home PC which is located in his living room. After logging in and running his data from this morning back to two years ago, what he finds is alarming.
While the latest numbers are still categorized as “good” he notices a disturbing trend that the results are outpacing the typical increases that come with age. This information is presented in a simple line graph, the presentation may be simple but the information is powerful.

Mixed emotions flood Ted’s mind. On one hand he feels justified in his suspicion and that he is not being a hypochondriac, on the other hand, he is genuinely concerned for his health and well-being. Hands pulling his hair back, Ted takes a deep breath and ponders the situation. Ted’s right-brain takes over and begins to rationalize the situation. It isn’t that Ted is unhealthy or even at risk, instead Ted’s brain has decided to classify Ted’s body as “at risk of being at risk.” He chuckles after thinking of it and wishes someone else was around to hear him repeat it out loud, though he knows this is no laughing matter. Though to keep the spirit light he decides to play doctor and writes a prescription for himself on the yellow pad of post-its by his desk. He writes in large bold black letters “Check PreventNet tonight and call me in the morning,” flourishes it with an illegible signature and slaps it on his monitor.
The **Condition Identifier** is a software program that assesses an individual's condition based on the data input by him/her as well as information received from monitoring and testing devices. It is also a searchable database for research on conditions.

**Properties:**
- Software program accessed through **Personal Health Portal**
- Searchable condition database
- Condition interpreter
- Pattern recognition program
- Customizable alerting mechanism
- Searchable database
- Create-A-State program

**Description:**

The **Condition Identifier** is a software program that assesses an individual's condition based on the data input by him/her as well as information received from monitoring and testing devices. It is also a searchable database for research on conditions.

**Features:**
- Provides accurate condition interpretations assisting in self diagnosis
- Analyzes observed information/symptoms input by the individual
- Analyzes monitoring information received from **Home Clinic, Pocket Doc** and/or **Clinic 2.0**
- Compares input data with medical history of individual and family
- Recognizes patterns in previously identified conditions
- Predicts probability of condition relapse
- Determines individual's target “healthy” state using the Creat-A-State option
- Alerts individual when “unhealthy” zone is approaching and is reached
- Allows individuals to search conditions database
The **Condition Identifier** is an applet program that assists in determining an individual's condition. It identifies conditions based on the built-in analysis software that can interpret results received from the **Partner Health** system and **Home Clinic**. Once conditions are identified, the individual is capable of further research on the condition to create a foundation of knowledge. This foundation may assist in self-treating the condition, stabilizing the current state, or just knowing how to prevent the condition from worsening.

In some instances, individuals may not have results from a monitoring device to alert them of conditions. They then have the option of entering observations of themselves and their current status. Using the input information, the program determines probable conditions for the individual and leads them to the **PreventNet** for further details.

All of the conditions that are identified are then logged into the medical records within the **Personal Health Portal**. These records are then available through the **History Tracker** program which is also accessed through the **Personal health Portal**. Patterns are then recognized to further dissect the person's medical condition.

Realizing the fact that there is no standard "healthy state" because of individuality, the program addresses each person in reference to themselves. Thus, a characteristic of the **Condition Identifier** is the ability to interpret what a relevant "healthy" state is for each particular person. It is capable of doing this by analyzing the person's medical history and family medical history to find trends. These trends can then be compared against current information on the individual. It assists in recognizing when a problem occurs or is predicts when one is approaching.

**Discussion:**

David Johnson, father of five has just left his doctor's office and found out that he is suffering from high cholesterol. As he is driving home, he cannot stop thinking about the news he just received and how his family is going to take it. Once he gets home, he talks it over with his wife and immediately she is alarmed as well.

Together, they log onto his **Personal Health Portal**, to do some research. They access the **Condition Identifier** to get more information about David's condition. Because of their knowledge that his condition is the result of cholesterol, they have some background knowledge. They review the information transferred from the doctor's **Clipboard 2.0**. Now that they are familiar with his diagnosed condition, they are able to compare his condition to those of individuals. They began to watch an animation of what happens to an individual's body as their condition worsens. Expressing their concern about preventing David's condition from getting worse they are relieved to view the section on Condition Control. It gives them advice on measures David can take to lower and maintain a healthy cholesterol level.

After scheduling another appointment, David visits his physician again. This time regarding his interest in possession of the **Home Clinic**. During his initial visit, his doctor suggested this application in order for him to do testing and monitoring at home. Appreciative that he able to purchase a **Home Clinic**, he is confident that using this device will assist him in determining which direction his condition is going in. The **Condition Identifier** allows him to maintain his awareness of his stages of the condition, by picking up reading from his tests with the Home Clinic. Realizing he is at risk for a heart attack, David is definitely determined to take charge of his health. He vows to commit himself to monitoring his condition for himself and the sake of his family.

**Scenario**

David Johnson, father of five has just left his doctor's office and found out that he is suffering from high cholesterol. As he is driving home, he cannot stop thinking about the news he just received and how his family is going to take it. Once he gets home, he talks it over with his wife and immediately she is alarmed as well.

Together, they log onto his **Personal Health Portal**, to do some research. They access the **Condition Identifier** to get more information about David's condition. Because of their knowledge that his condition is the result of cholesterol, they have some background knowledge. They review the information transferred from the doctor's **Clipboard 2.0**. Now that they are familiar with his diagnosed condition, they are able to compare his condition to those of individuals. They began to watch an animation of what happens to an individual's body as their condition worsens. Expressing their concern about preventing David's condition from getting worse they are relieved to view the section on Condition Control. It gives them advice on measures David can take to lower and maintain a healthy cholesterol level.

After scheduling another appointment, David visits his physician again. This time regarding his interest in possession of the **Home Clinic**. During his initial visit, his doctor suggested this application in order for him to do testing and monitoring at home. Appreciative that he able to purchase a **Home Clinic**, he is confident that using this device will assist him in determining which direction his condition is going in. The **Condition Identifier** allows him to maintain his awareness of his stages of the condition, by picking up reading from his tests with the Home Clinic. Realizing he is at risk for a heart attack, David is definitely determined to take charge of his health. He vows to commit himself to monitoring his condition for himself and the sake of his family.
The Home Clinic is a medical attention base for the home. It allows individuals to have virtual consultations with professionals as well as perform self diagnosis and assist with minor treatment procedures.

**Properties:**
- Virtual consultation program
- Analyzer of testing results
- Assistance for self diagnosis
- Program of directions for personal treatment
- Condition monitoring system

**Features:**
- Assists patients in performing diagnostic and treatment procedures at home
- Connects individual to a virtual professional
- Allows individuals to receive consultation in the convenience of their homes
- Relieves some of the health care patient trafficking, by educating and training individuals to perform simple tasks
- Uploads information to HealthNet server for access by Personal Health Portal to file with medical history
- Allows individuals to maintain awareness of their medical condition
- Recognizes when further attention is needed and connects to health care facility
Home Clinic

The system focuses on allowing individuals to take charge of their medical health. The Home Clinic supports this by providing individuals with the power to test, diagnose, and treat themselves at home. By doing this, they are becoming more involved in their healthcare process. The HealthNet system is intended to relieve physicians, nurses, and professionals from their daily stress of patient overload. It also links the information from the Home Clinic to the Personal Health Portal for information analysis.

The Home Clinic is the system that supports the Diagnosis Center by connecting individuals with professionals to provide virtual consultations. It allows the individual to interact with a professional through question answer sessions and well as analysis of testing information. There is a display screen in which the image of the professional is displayed. A camera is also incorporated in order to capture visual information for diagnosis or to provide video if a video consultation takes place.

Using the Home Clinic, an individual also receives instructions for personal treatment. After diagnostic testing, the Home Clinic provides advice on the next steps that should be taken. The treatment usually takes place using the Smart Aid Kit. The directions are electronically transmitted to the kit in order to assure the individual remembers the procedure.

By allowing individuals to perform this process on their own, they are also learning how to diagnose and treat themselves relying less on professionals. The Home Clinic reduces the need for individuals to unnecessarily see a professional for every single ailment.

Discussion:

Barbara Johnson has just learned that she is suffering from sickle cell anemia. After receiving the news and consulting with her primary physician, he suggested that she should obtain the Home Clinic so she could oversee her condition. Alarmed by her news, Barbara agrees a consistent knowledge of her health would be of benefit. With such a potentially severe condition, she must always monitor her condition in order to catch any warning signals that may occur.

Once Barbara receives the Home Clinic, she sets it up on her bedroom dresser. Now, every week she can perform her own tests and record the information to have her condition evaluated within the comfort of her own bedroom. Being an on-the-go at home mom, she is constantly busy running errands and rarely has time to tend to herself.

After about a week, Barbara notices that she is feeling rather fatigued and her joints are aching. A little nervous about her first time using the Home Clinic, she sits on the edge of her bed to perform her first consultation. She activates the Diagnosis Center and places the glove on. It then test her vitals signs and she reads her results on the display screen. Unsure about what these numbers mean, she connects with her virtual physician. He then informs her about what her “normal” level readings should say. Slightly alarmed because of the drop in numbers, she alerts the physician about the results. The physician then begins an interactive discussion with Barbara to further assess her current condition. He then directs her to the Smart Aid Kit to retrieve her medication and instructs her to ingest her pills. Following her medication, she is instructed to perform a follow-up within two hours to update her status. Within time she returns to the Home Clinic, feeling better, she notifies the physician and is pleased with her new system.
The Home Diagnosis Center is an interactive unit, capable of transmitting information to the Home Clinic, that allows individuals to perform diagnostic tests to assist in identifying their condition. It allows diagnosis for minor ailments to take place at home relieving burdens on medical professionals.

Description:
- Allows patients to perform a proper self diagnosis with virtual consultation assistance from the Home Clinic
- Educates individual on performing self diagnostic tasks
- Prevents patients from relying on nurses and hospital visits for diagnosis
- Allows patients to perform a range of tests in the privacy of their own home at anytime
- Allows patients to record, store, and send test results to physician and upload to Personal Health Portal via HealthNet server
- Alerts medical professionals if test results yield a harmful stage

Properties:
- Testing glove for recording: temperature, pulse, blood pressure, blood samples
- Body scanner
- Flat screen display
- Interface for data input
- Optional voice recognition

Features:
- Allows patients to perform a proper self diagnosis with virtual consultation assistance from the Home Clinic
- Educates individual on performing self diagnostic tasks
- Prevents patients from relying on nurses and hospital visits for diagnosis
- Allows patients to perform a range of tests in the privacy of their own home at anytime
- Allows patients to record, store, and send test results to physician and upload to Personal Health Portal via HealthNet server
- Alerts medical professionals if test results yield a harmful stage
Discussion:

The *Home Diagnosis Center*, a component of the *Home Clinic*, allows the user to perform various tests that would normally take place at a nurse, physician or medical specialist in the privacy of their own home. The preliminary tests results are sent to the individual’s *Personal Health Portal* and the HealthNet server. It is also used in order for the virtual physician to evaluate and diagnosis the individual.

With the *Home Diagnosis Center*, an individual may perform various preliminary self tests. These tests may consist of, for example measurements of blood pressure, pulse, temperature, and cholesterol. Another feature is the body scanner which is a handheld device to examine specific areas of the body. The center can also be equipped to obtain blood samples for minor test procedures. These tests are performed to monitor conditions that have previously been diagnosed as well as test for potential conditions that may arise.

The information obtained by the *Home Diagnosis Center* can be used in conjunction with the *Condition Identifier*, to assist in identifying the patient’s condition. Once the data is gathered, it is compared to previous results and assesses the condition based on progress, lack of progress or condition standstill. During this stage patterns of results are recognized and used to predict probable paths for the individual, by way of the *History Tracker*.

If the results of the performed tests are alarming, a message is transmitted to the server to identify a problem. It alerts emergency staff, through the *Home Clinic* to respond to the individual’s potentially life threatening results.

Scenario

Lawrence Scott has recently been diagnosed with high blood pressure. Realizing he has just approached the senior citizen status, he acknowledges the fact that his healthcare is of great importance. Lawrence constantly thinks about his grandchildren, who he holds so dearly, and knows he wants to be able to stick around to share many more experiences with them.

Abiding by his doctor’s request, Lawrence promptly obtained a *Home Diagnosis Center* as a part of the new HealthNet system. He immediately set up his testing center within his bathroom at home. He was instructed to consistently test and record his blood pressure to monitor his condition. He wanted to prevent his readings from reaching a harmful range.

In order to familiarize himself with the *Home Diagnosis Center*, Lawrence began to explore the device. Unsure of his ability to test accurately, he turned on the center and decided to attempt to test his vital signs. With ease, he places the testing glove on his left hand and begins running the tests. Instantly his vital readings are displayed along the screen. He selects to store these results to his medical history records on his *Personal Health Portal*. Pleased with the ease of this process, he is now confident in his ability to oversee his condition.

Days later, Lawrence goes back to his *Home Diagnosis Center* to perform his routine testing. After placing the glove on his hand, he reviews his results. Unsure if his readings have changed, he pulls up his last results. The system then compares the data and displays that his readings have increased. Alarmed about the change, he activates the virtual physician to discuss his condition. He recites the information to the doctor, and is relieved to hear he should not be alarmed. A chart is then displayed showing his high risk zones and he is aware of his boundaries.
The Smart Aid Kit is a first aid kit that connects with the Home Clinic to assist in suggested treatment from the virtual professional. It may also download treatment directions from the HealthNet Infrastructure.

**Description:**
- **Features:**
  - Allows individuals to treat themselves at their home or away from home
  - Obtains downloadable directions to assist individuals through procedure or action
  - Provides storage for sterilization equipment, healing tools, and minor treatment equipment

**Properties:**
- Treatment kit for minor ailments
- Incorporated screen to display treatment information
- Wireless connection for data storage and download
- Portable kit
- Storage for containing medications as well as equipment
- Flash memory storage
The Smart Aid Kit allows individuals to perform minor treatments on themselves as directed via step-by-step instructions. The kit is composed of various treatment instruments and equipment that can be easily and quickly retrieved for immediate attention. It also stores various forms of medication such as pills, ointment, etc.

Once, a person has used the Diagnosis Center, a virtual physician provides further instructions for him/her to perform. This information can be transmitted into the Smart Aid Kit allowing for easy reference during treatment. The information is displayed on the inside lid of the kit in its open position. This assists the individual in adhering to the procedural steps properly. The Smart Aid Kit also functions as a stand alone advanced first aid kit that may be carried along with the individual during vacations, road trips, etc.

Use of the Smart Aid Kit can be connected to the Personal Health Portal. Each time an individual performs a treatment procedure, it could be logged into the patient’s medical history files. This information may be accessed in the future to evaluate previous treatment options in case side effects occur, treatment no longer works, condition worsens, or the individual would like to reference past treatments.

Although the Smart Aid Kit functions with the Home Clinic, it has capabilities to function as a separate entity. With one of its main qualities being that it is portable, the kit has the flexibility of being stored in a separate location from the Diagnosis Center. It is also easily transported if people want to bring it with them while travelling.

Discussion:

Scenario

Joshua O’Brien, architecture student at the University of Illinois, is preparing for a trip visit his high school buddies during his winter break. Prior to his trip, Joshua injured himself constructing a model for his final presentation. This injury left him wounded on his left hand. Upon his accident, he was rushed to the emergency room to receive immediate attention. He gave the nurse his Med Access Card and he was instantly seen. The doctor disinfected the wound and stitched the opening. After completing the protocol, he then entered the procedure onto the HealthNet server. Following his visit, the physician downloads follow-up instructions for Joshua to follow to assist in his recovery.

By the time Joshua has arrived home, his instructions were sent to his Smart Aid Kit. He opened the kit and the screen displayed instructions on cleaning his wound and replacing the bandaging. He was also instructed to take pain killing antibiotics, which he picked up on his way home and placed his medication in the kit. Knowing he must be careful to prevent infection Joshua saves the instructions for future referral.

After packing and arriving to his friend’s home in Phoenix, Joshua unpacks his Smart Aid Kit first. On their way home they picked up some food, but Joshua must treat his wound before eating. Reading the instructions, he removes the tape and gauze to expose the wound. He reaches into his kit and over the bathroom sink he rinses his hand with iodine. Once it is clean, he applies the prescribed ointment with a cotton swab. Finally he retrieves the more gauze and tape from the kit and recovers the wound. After eating, he returns to his kit and takes his medication.
The Med Access Card is a small, personal medical identification card that is used at kiosks to authorize access to their Personal Health Portal. The card is also used to swipe in and out at health care facilities to verify identity. In addition, it has payment and patient tracking capabilities.

Properties:
- Personal identification smart card
- Personal medical information card
- Personal Health Portal access key
- Portable storage device for medical information
- RFID tagging for locating patients inside facilities
- Payment gateway for medical visits and prescriptions

Features:
- Allows patients to access their Personal Health Portal from the Health Kiosk
- Verifies patient identity at various healthcare facilities
- Reduces probability of mistaken identity
- Allows professionals to locate patients within facilities
- Allows other individuals who possess the card, such as a spouse or guardian, to access the individual's medical records in the case of an emergency
- Allows patients to pay required co-payments when visiting facilities or purchasing prescriptions at pharmacies
The **Med Access Card** serves as an authorization key to personal records, as well as verification of identity for the individual. It is a smart card that grants individuals access to his/her **Personal Health Portal** when using the **Health Kiosk**.

One location in which the Med Access Card is used is when visiting a Health Kiosk. Similar to an ATM or debit card, the card provides access to the individual’s files when inserted into the machine. The card may be used at any **Health Kiosk**, expanding access points for HealthNet access.

Another situation where it may be used is when visiting various healthcare facilities. Similar to medical cards and insurance cards, the Med Access Card also contains personalized information. It verifies the patient’s identity as well as uploads pertinent information for insurance billing. Because the Med Access Card also has a tracking mechanism that activates once swiped at the facility. The physician is then able locate the room in which the patient has been placed. Once the individual leaves the facility, the card is swiped again deactivating the tracking mechanism. It assists in locating patients for procedures.

Currently, many people visit health care facilities and have necessary co-payments. Medical payments are now capable of being transacted through the Med Access Card as well. Whether it connects to checking or credit accounts, it may deduct based on the required payment. It also applies when the patients are purchasing prescriptions.

**Scenario**

Michael Horton has recently been informed from his physician about the new HealthNet system that is being introduced. He is one of the first recipients of the Med Access Card and is pretty excited about participating in the new system.

After playing his usual game of Saturday morning basketball at the local gym, he feels his usual lower back pain. He reaches into his gym bag to take his pain killers and realizes he is running low. Before he leaves the gym, he realizes they have added one of those Health Kiosks his father was talking about and stops to use it. He removes his Med Access Card from his wallet and inserts it into the kiosk. His Personal Health Portal is then displayed on the screen introductory screen along with some introductory directions. With ease, he is able to refill his prescription and picks it up on his way home.

After a week of realizing his pain is worsening, Michael decides he needs some medical attention. While at home, he logged on to the internet to access his Personal Health Portal. Within minutes, he scheduled an appointment with his physician for Friday. As Friday arrives, he remembers he has to leave work early to make it to his appointment on time.

Once Michael arrives, he gives the receptionist his Med Access Card. She inserts it into their card reader. The system pulls up his identification information and notifies the nurse that he is there. Unfortunately, Michael has a possible slipped disk and is forced to see his chiropractor for further testing. Before he leaves, he checks back in at the receptionist desk where she tells him his payment is due. He asks her to deduct it from his checking account and she swipes his Med Access Card again and he is out of the door.
Description:
The Health Kiosk is a one-user structure, located in enclosed public spaces (i.e. airport, shopping mall, library, etc.), used with the Med Access Card to provide access to the Personal Health Portal. It also provides educational training for HealthNet users.

Properties:
- Stationary information accessing machine
- Personal medical access point for public spaces
- Viewing machine for Personal Health Portal
- Input/output medical information machine
- Card reader
- Interactive display screen
- Display screen
- Printer

Features:
- Allows patients to access Personal Health Portal with Med Access Card
- Allows patients to view, edit, and upload information on Personal Health Portal
- Provides access to medical information in public environments
- Accommodates individuals without many resources at home
- Accommodates access to personal information for individuals while away from home
Similar to an ATM machine, the **Health Kiosk** is an interactive structure that allows individuals to access their **Personal Health Portals** in public spaces. Consisting of a display screen, card reader, speakers, touchscreen, and slip printer, the kiosk allows viewing, editing, and interaction with **Personal Health Portals**. When using the **Health Kiosk**, people may verify appointment times, request prescription refills, print out reminder slips, and retrieve other medical information.

In alignment with the purpose of creating multiple access points for an individual's medical information, kiosks are placed in a variety of environments. The **Health Kiosk** expands its venues from libraries and amusement parks to shopping malls, airports, and train stations. By doing so, it assists out-of-town guests in need, individuals without internet access at home or workplace, or individuals in passing who may need immediate access to their medical information.

The **Health Kiosk** is activated by entering the **Med Access Card** which then pulls up an individual's information. However, similar to the ATM, an additional step of entering a password is necessary to assure the correct individual is accessing the information.

As a receipt component, the individual may select information for printing on a slip of paper. This information may range from prescription names to pharmacy locations to even appointment times. Of course, reminders can be received via cell phone or e-mail, however some people may prefer physical documentation.

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**Discussion:**

**Scenario**

Shani Hall is on her way to visit her best friend and has just arrived at the Dallas, Texas airport. Unfortunately she has a four-hour layover and decides to get something to eat at a nearby restaurant. After she has finished eating, she notices that she begins to feel ill. Unaware of what is going on, she decides to go for a walk in hopes that she will feel better soon. While walking through the terminal, she is grateful to come across a **Health Kiosk**.

Fortunately, she has her **Med Access Card** with her and can stop to use the machine. Once she reaches her **Personal Health Portal**, she accesses the **Condition Identifier** to assess what may be wrong. Entering her symptoms of pain, nausea, and a slight fever, she realizes that she may have food poisoning. Realizing she needs to receive more information, she folds down the seat to make herself more comfortable and do some research.

Luckily her layover is for a few more hours, Shani has time to research the symptoms of food poisoning through the **Prevent Net** program. Assessing her condition and realizing she might be actually experiencing side effects that are described. She then remembers a similar feeling from a few years ago and decides to use the **History Tracker** to find out what was done to treat it back then. After discovering her previously prescribed treatment, she prints out a slip for future referral.
Now that Shani is aware of her condition, she decides to contact a professional to determine if she should take the same medication. Once again, the Health Kiosk is coming in handy because she then selects the virtual consultation is able to interact with an artificial physician to get a more accurate diagnosis. Within minutes, she has the proper treatment and accesses the pharmaceutical database to fill the prescription. She realizes that her boarding time is approaching, so she heads to her gate.

When she arrives to Los Angeles, she is relieved to see her best friend. Observing Shani’s appearance her friend, April, ask what is wrong. They quickly get her bags and leave the airport. Shani realizes she needs to have her prescription sent to a local pharmacy so they can pick it up before they arrive at April’s home. Fortunately, April knows where the nearest Health Kiosk is and they stop by on their way to the pharmacy near her house. Within minutes, the transaction is made, they obtain her medication which she takes right away, and she gradually begins to feel better. Pleased with such prompt service, feeling better by dinner time and is able to enjoy her vacation.
Body area network monitoring system that works in conjunction with the MedPatch monitoring device and the PocketDoc personal medical interpreter and communicator to inform users of their current and changing states. Additionally, it works to alert not only the user, but also the medical community, so medical problems do not go unnoticed.

**Description:**

- Monitors body information and connects that data with the user and the medical community
- Captures body information and transfers readings to output device
- Transmits messages to user and professionals
- Alerts user and professionals when emergency action is needed
- Alerts professionals to location of troubled user with use of the EMT (Emergency Medical Tracker).

**Properties:**

- Body area network monitoring system
- Personal monitoring protocol
- Data transfer and interpretation application
- Location tracking software via GPS system (optional)

**Features:**

- Monitors body information and connects that data with the user and the medical community
- Captures body information and transfers readings to output device
- Transmits messages to user and professionals
- Alerts user and professionals when emergency action is needed
- Alerts professionals to location of troubled user with use of the EMT (Emergency Medical Tracker).
Our bodies are resilient and many times our minds are stubborn. Because of this combination many people have the tendency to overestimate their abilities and underestimate their risks. They are not aware of their current condition: how their body is acting (or reacting) to the situation they are in or the activity they are doing.

**Partner Health** is a body area network health monitoring system that connects users and medical professionals, with real-time information about their condition or current state. Comprised of the MedPatch monitor and the PocketDoc information translator and transmitter, the Partner Health system takes continuous readings of the user’s vital signs and optionally monitors additional information, for example, blood sugar or cholesterol levels.

There will be two primary types of users for the **Partner Health** system, the first being those in need of constant monitoring. This may include users in outpatient recovery, users currently in home care, and those who have a medical condition that requires monitoring. The second being users who wish to monitor their condition at will.

Use of the **EMT (Emergency Medical Tracker)** function extends the functionality and ability of the Partner Health system through use of GPS capabilities to provide the location of the user if an emergency is detected. Additionally, the **EMT** can be used in certain monitoring situations to interpret the movement patterns with the information being collected by the MedPatch to discern if the user is in need of assistance, even if the user is unable to communicate with others, due to a fall, injury or medical complication.

**Discussion:**

Spending a day with her grandchildren at her home is a luxury Rose wouldn’t be able to have if she moved to a nursing home three years ago like her youngest son, who lives on the East coast in Baltimore, suggested she do. However, instead of going to the nursing home—which would have been depressing, her doctor outfitted her for a **Partner Health** system, which included a MedPatch monitoring device and a small interactive PocketDoc with the **EMT** function. Because Rose is in need of constant monitoring of her health she is part of the mobile monitoring program that allows for her to live her life in her home—with her belongings and on the schedule of her choosing.

She finishes packing the chocolate chip and pecan cookies she made for her grandchildren and hands a small tupperware container with the cookies and a slice of sandwich bread (to keep the cookies moist) to Timmy, John, and Betty. What lovely children. Rose says goodbye to her daughter Sarah and says she hopes they will come back next weekend. They hug and Rose locks the door behind them after waving to the kids in the car.

The kitchen is a mess. Rose should have been doing the dishes throughout the baking process, but instead she was trying to teach those three how to bake and there wasn’t time to do both. Now that the cookies have cooled, however, she decides to sample them and see if there is a future in the culinary arts for her grandchildren. The cookies are spectacular, but then again it is her recipe. Those kids could all get three Michelin stars if they always used their grandmother’s recipes. As good as these cookies are, they are not magical as the kitchen still remains in disarray. Rose decides a nap would give her the energy she needs to make her kitchen sparkle once again, so she heads to her bedroom on the second floor.
The stairs are becoming difficult for her with age, but she manages. This is her home and she is just as likely to move into the nursing home as she is to move all of her belongings into a ranch style home or apartment. Timmy and John must have been playing “Giant Inca Temple” on the stairs again, Rose realizes after she steps on two of the matchbox cars that were forgotten by the boys. The toys they make today aren't like the ones they made when Rose was growing up, toy cars now are shaped like animals and have spoilers which are quite painful and sharp when stepped on. The pain combined with the surprise is too much for her to handle. Her arms and hand frantically search for the railing again after being launched into the air but to no avail. Her body, like most objects on this planet, loses the battle with gravity and falls backwards down the stairs, coming to rest on the floor. She doesn't know this yet, for she cannot be aware of anything while unconscious, but she is knocked out and her left leg is broken.

The MedPatch monitoring device captures the physiological details of her fall and the following trauma, while the PocketDoc interprets and transmits the data. The PocketDoc can tell from the data that something has happened and is vibrating and making noise in an attempt to get Rose’s attention. It is a vain attempt as she cannot hear anything right now. She’ll be out for at least a couple of hours and when she wakes up she’ll wish she was still unconscious... at least she didn’t realize the pain then. The PocketDoc is also transmitting her data and her movement, or in this case non-movement, to the HealthNet servers that also detect something wrong with the data and an alert is sent to Rose’s primary care physician’s clinic. Terry, who works at the clinic and is familiar with Rose notices the alert and views the data. He phones her house as it has been confirmed that she is there, but there is no answer. Terry is hesitant to send out paramedics to Rose’s house in case it happens to be a false alarm, so he tries to contact her through the PocketDoc, a simple question appears after an alert on the screen of the PocketDoc, “Press here if aid needed, Press here if nothing is wrong.” Again, no answer from Rose. Since a life may be on the line and Rose is part of a high-risk category, Terry would rather be safe than sorry and dispatches an ambulance to Rose’s house. They should be there in less than five-minutes.

The front door is locked, but the shades are drawn and through the windows the paramedics can see poor Rose unconscious on the floor with her left leg in an ungodly position. They are too far away to tell if she is still breathing, however, they know she is alive because the signs are still being recorded and transmitted by her Partner Health system; it is a relief she isn’t dead because from twenty feet away it would be easy to be fooled.

When Rose wakes up she finds herself in the hospital surrounded by her family, including two very shy and red-faced grandchildren whose eyes are red and puffy from crying and guilt. Everyone is happy to see that she is okay, and after she hears what happened she is also thankful to be alive and well. Rose isn’t looking forward to speaking with her power-broken son from Baltimore who is going to use this incident as an excuse to convince her that a nursing home is best for her. As long as she doesn’t have a serious condition where she physically and mentally unable to take care of herself she will not consider a nursing home. She will, however, consider those ranch style houses or an apartment, as long as she has her Partner Health system and there are no stairs to climb.
MedPatch

Description:
Wearable, removable patch that monitors vitals signs and body data, which is then transmitted through a body area network to the PocketDoc which interprets the information and connects it to the HealthNet servers.

Properties:
- Wearable, removable, water resistant patch
- Monitoring component of the Partner Health body area network
- Customizable to individual health needs
- Smaller than a 2” x 2” square
- Body area transmitter

Features:
- Samples user's body information and transfers the data through a body area network to the PocketDoc for interpretation, display and transmission
- Takes readings constantly while being worn
- Allows for customized data to be tested
- Uses body's electrical current to power device
The MedPatch is an inconspicuous personal monitoring device, powered by the body's electrical charge that is transferred by electrolytes. Light-weight, water-resistant and durable, the MedPatch monitors user's vital signs and certain condition information and transfers the information across a body area network, the Partner Health system, to the PocketDoc for translation, display, and transmission to the HealthNet servers.

The MedPatch takes readings of signs and information in real time and then pings them out to the PocketDoc at preset timed intervals. This function is unnecessary not only for the transmission and viewing function the PocketDoc possesses, but also because the MedPatch does not have the ability to store information. The MedPatch is a symbiotic device. It relies on the users to power it and on the PocketDoc to interpret, store and transmit the information. This relationship helps the MedPatch to remain small, lightweight and inexpensive.

Discussion:

Bill knows he shouldn’t take another bite but the flourless chocolate cake tastes too good. Bill and his wife Helena are out to dinner with some friends they made when they were sweethearts in high school, who they haven’t seen in years. God bless the class of ’55. He had only planned to sample a bite of his wife’s dessert, anymore than that could be dangerous as Bill has Type II Diabetes. It is a tip of his hat to the pastry chef, risking his health by taking another bite.

In the past, Bill would have excused himself from the table in order to go the restroom and test his blood sugar levels. He has lived with disease for many years now but he is still self-conscious about it and he prefers to conduct his testing in more private settings, even though it is accepted by the general public these days. It is no longer necessary for Bill to excuse himself since he started using the Partner Health system and wears a MedPatch Monitoring device.

Before the dessert course arrived Bill pulled his PocketDoc from his pocket and checked his blood sugar levels. These levels were being collected and transmitted in “real-time” from the MedPatch monitoring device worn above his left hip, hidden so no one would see or suspect. His levels were well within the acceptable range, not close to crashing at all. He knew he could sample the sugar-laced treat if he liked and even a second bite if he dared.

Actions and consequences have become clearer to Bill since he started living with Diabetes. Pushing the limits is something Bill tries to avoid when it comes to his health, but occasionally he will let something slide. Tonight it was cake, but because of the constant monitoring of his body by the MedPatch and his connection with his Partner Health system, Bill feels much more informed and therefore in more control of his life and actions as some of the guesswork is taken out of them. And taking a bite of cake is no longer a roll of the dice.
PocketDoc

Description:
Pocket sized symbiotic device that responds to changing physical state. Displays a character, the default being a doctor, that graphically interprets the user's physical state by communicating with the user's monitoring device, and subsequently encourages the users on progress, asks questions or alerts the user depending on the situation.

Properties:
• Pocket-sized device with buttons for navigation
• Color display
• Health data interpreter
• Virtual friend/doctor/companion
• Vibration/sound alarm
• GPS transmitter

Features:
• Interprets data from MedPatch monitoring device
• Displays friendly character who updates user on condition and progress
• Interacts with user and gives advice for activities, or health tips relative to information being received from MedPatch
• Informs user of current conditions
• Alerts user when potential complications arrive
• Works with EMT (Emergency Medical Tracker) feature to alert professionals to the whereabouts of user
Providing patients with personal medical information is meaningless unless it is put in context for the user. The PocketDoc fulfills this function by receiving and interpreting the data collected by the MedPatch monitoring device, and relaying that information to the user by means of a “virtual” doctor displayed on the screen. The data received by PocketDoc is then transmitted to the HealthNet servers and is filed in the user’s account to be accessed by the user through the Personal Health Portal or by authorized health care professionals.

The PocketDoc interprets the stream of data being sent by the MedPatch through the Partner Health system, and interacts with the user; by being prompted by the user or by alerting the user when predetermined parameters are breached or troublesome trends are noticed, for example blood sugar levels rapidly dropping. Users are first alerted by vibration and sound, to get their attention, and then by voice or text interaction with the “Doc” depending on their preference. Alerting the users functions as an early warning device to catch problems or situations before they become fully problematic or damaging.

While one of the primary functions is alerting the user and health care professionals of a user’s condition, another important feature is the ability to interact and communicate with the user. The “Doc” offers users advice based on information interpreted from their changing physical state, helping them manage their condition and their health.

Users are also able to check up on their status at any time and anywhere because the PocketDoc runs off a body area network. If in a situation when a signal is lost to the server, like when in an underground subway for example, the PocketDoc caches the data sent from the MedPatch and sends the stored bundled data once a signal is obtained again.

Scenario
The cracking of leather can be heard echoing through the canyon of houses on this suburban street after the baseball connects with Ned’s catcher’s mitt. His son, Danny, is trying to make the starting rotation of the Junior Varsity team this year as a freshman in high school. Ned wishes he had a radar gun because that last pitch was absolutely smoked. While he can’t quantify the speed, he is able to calculate the pain in his hand after stopping the ball’s motion and now he wishes for aspirin more than a radar gun.

Ned feels lucky every time he plays catch with Danny. Last year he suffered a massive heart attack that resulted in a quadruple bypass. He has recovered, but he takes his health and the affiliated warning signs seriously; and he doesn’t take his family for granted. Ned knows, being a “Type A” personality, that he has a tendency to over do things. For this reason he has cultivated a special relationship with an unlikely character, his physician friend who “lives in” his PocketDoc.

He was outfitted with a Partner Health system after his bypass surgery so his EKG, heart rate and stress levels could be monitored. Ned could have opted to stop using his Partner Health system six months ago, but he found it to be a necessary part of his life and a device that would help him witness his son being drafted in the first round by a major league team, hopefully after college.
CRACK! Ned wasn’t expecting such a loud sound to be the result of such a nasty curve. That was what they call a 12-to-6 curve, he can’t wait to brag to his friends about his son’s “filthy stuff.” They have been only playing catch for twenty minutes, however, Ned is feeling fatigued. Sweat is gathering on his forehead and his throws are becoming labored. If there happened to be a bullpen for fathers he might have made a call for a reliever. Alas, there is no such bullpen and Ned knows how much this tryout means to Danny so he decides to ignore how he is feeling. Under different circumstances he would have taken a break and checked his signs on his PocketDoc, but if he pulled it out Danny would get worried and stop practicing.

Ned’s throw to Danny ends up rolling to Danny’s feet. Ned plays it off that his hand was wet from the dew from the grass and that the ball slipped. The following throw happened to be a repeat performance, at least he is consistent. He was going to make the same excuse and try to continue, however, his PocketDoc begins its alert functions and Ned understands the jig is up.

Ned tells Danny he cannot continue while pulling his PocketDoc out of his back pocket. His PocketDoc tells Ned that he is at risk of injury if he doesn’t alter his actions because of his elevated heart rate and blood pressure. It also suggests a quick cool down period and then rest. He acknowledges this advice, walks over to Danny to tell him he is okay and that there is nothing to worry about and to compliment him on his curve.

His PocketDoc is always looking out for him. Its only concern is for his well being, which is nice to have and is the reason he decided to continue using the Partner Health system, he considers it to be a friend. He also likens it to the strict catholic nuns he knew growing up who wouldn’t allow him to get away with anything, while looking out for his best interest. With his PocketDoc on his team his odds are greater that he’ll be around to witness his wish when Danny is drafted in the first round by the San Diego Padres.
Clinic 2.0

Description:
Clinic 2.0 is a gateway application suite that links medical professionals with the necessary networked tools and information stored on the local infrastructure and external HealthNet servers, which are connected through the Clipboard 2.0 and Dynamic Charts devices. Working as an interface, Clinic 2.0 contains a comprehensive and focused set of features based around professional needs.

Properties:
- Software application suite
- Collection of tools and applications for medical professionals
- Graphical user interface
- Handwriting recognition software
- Voice recognition software

Features:
- Connects machines without data storage with requested information
- Compiles and links professionals with the software tools they need
- Enables professionals to access relevant data quickly and easily by consolidating applications and functions and connecting them to the HealthNet Infrastructure
- Runs on Clipboard 2.0 and Dynamic Charts
- Uses context sensitive feature, Oath Enforcer, to remind professionals of actions that could or should be completed
Discussion:

Time is a luxury that many medical professionals currently do not have. Any new system or routine that adds time or complexity to activities will either not be adopted or lead to increased hours needed by professionals or a reduction in the quality of care. The Clinic 2.0 system connects professionals with the tools and information they need, which supports their roles and activities by consolidating their needs into a single system.

The Clinic 2.0 system is a low-memory intensive gateway application suite for the Clipboard 2.0 and Dynamic Charts which resides as a shell in those devices and as a full scale program on the local infrastructure. Additionally, as a “software only” suite it can be installed and run on existing desktop machines. Through an easily understood graphical interface professionals are able to access files, test results and images, other professional—both within and outside their institution, the MedKnowledge Net, and their patients.

The system also contains medical productivity applications as part of the software suite. Included are History Tracker Pro, which aggregates and synthesizes past medical data; Condition Identifier Pro, which includes a symptoms database and a visual ailment database for expediting the diagnosis process; and the Oath Enforcer applet that acts like a second set of eyes to inform the professional of other actions that could be taken or if certain actions were not followed.

Using this system on a Clipboard 2.0, a doctor, for example, is able to roam the hospital and access pertinent information from virtually any location. Said doctor can access her patients’ files on route to visiting with them, and makes notes to the files. It also allows for access to other physicians through the system and video discussion with them or sending messages via electronic messaging. Clinic 2.0 accesses files and consequently stores and writes files to the proper server(s).

Scenario

The call came in at 3:21, there has been a major accident on the expressway involving twelve cars and an overturned Greyhound bus on route to Memphis. Dr. Andrews contacts the head of the ER to check on the availability and to relay the news so preparations can begin. He is able to communicate with his colleague via video by using the Clinic 2.0 system on his Clipboard 2.0. Dr. Andrews contacts a few more of his colleagues to prep them on the situation, and then turns his attention externally.

Dr. Andrews has never experienced coordinating a disaster like this before. He knows he can handle the pressure, but he would like to not get caught off guard by a curve so using the video consult function of the Clinic 2.0 system he contacts his friend at Beth Israel who has had experience with situations like this, with the seven minutes he estimates that he has before the injured arrive. His friend Ric throws him a few tips in the time that he has. In the heat of the moment Dr. Andrews forgot that Beth Israel is much closer to the crash site than General is. Ric leaves him with a parting thought, which is he should have as much help as possible because anything is possible.

Heading to the ER, Dr. Andrews receives a message that General has approximately 27 injured coming their way, including 7 who are in critical condi-
tion that Beth Israel did not have room for. This is going to be a long afternoon, and Dr. Andrews is now starting to fear there may be media coverage and he hopes they have the sense of decency to stay out of the hospital. This thought is the least of his worries, and he discusses his real worries with Jane, the head of the ER, with whom he is now standing beside.

Waiting is the hardest part. It is like the calm before the storm, staring at the doors knowing that a deluge of injured men, women and children will come spilling through any minute now. It is almost like torture. He wants it to begin because he believes the sooner they are able to start helping the sooner those people will be better.

The doors fly open followed by a whirlwind of EMTs. An old woman identified as Patricia Hall, age 67 is flat lining. It appears she has severe head trauma and is most likely bleeding internally. The defibrillator is out, but it is of no use, she is gone. Not a good start.

He and Jane have coopted a Dynamic Charts system and turned it into their mission control for this crisis. They pull up on screen the patient files which have been transferred by the EMTs who transported them here. They quickly review their medical histories for allergies to medications, and to see if any of them have special conditions which could complicate treatments. Jane sends out a notice to her staff which appears on their Clipboard 2.0s, on highest priority. The notice is about the incoming patient slated for bed 19, D. Ozark, he has Hepatitis C and bleeding badly, extra care should be taken around him.

Watching the action both on the screen and in real life is a bit surreal for Dr. Andrews. One is filled with motion and emotion, the other is comprised of data and information. After 15 minutes of chaos and confusion the scene starts to settle down and become manageable. After 35 minutes all injured except one are stabilized, even though six are still in critical condition. Walking the room he overhears someone saying that the Oath Enforcer helped him avoid making a huge mistake by questioning whether he had attached an IV to the woman he was tending to, which he had forgotten to in the rush and confusion.

He realizes that there is an incoming message from Ric so he accepts it. Dr. Andrews doesn’t have much time, but he is also curious to the situation at Beth Israel. Ric asks is there is any assistance or advice he could give, as the situation is under control on his end and he was concerned about his friend. Dr. Andrew explains that things are fine at General, though he is saddened they were unable to save Ms. Hall. The conversation with Ric must be cut short as he catches word that the overturned bus exploded from a fire, setting off a small chain reaction and sending some firefighters with severe burns his way. It is time to prep for the second wave.
Clipboard 2.0

Description:
A wireless clipboard-like input device that medical personnel can use to access and input information. Input is entered by use of stylus, voice command, or through the optional keyboard. Recharging takes place when attached to the dock.

Properties:
- Lightweight personal networked computer
- Stylus
- Approximately 8” x 10”
- Recharging dock
- Thumbprint scanner
- Video input device
- Carrying strap
- Wireless transmitter
- “Kick stop” stand, so it can be used upright even when dock is not present

Features:
- Recognizes and converts handwriting
- Accepts voice command
- Accesses patient and medical information
- Stores and transmits data
- Communicates with medical personnel’s specific files
- Communicates with local intranet
- Communicates with external internet
- Runs medical as well as scheduling and productivity software (Clinic 2.0 interface)
- Can be used to control Dynamic Charts system
In a hospital or clinic setting there are formal areas for work; offices, examination rooms and conference rooms, just to name a few. However, collaboration and sharing of information takes place out of these formal areas, in unexpected places at unexpected times. Traditional computers, desktop and laptop alike, are woefully unprepared for these tasks, but the future of health care relies on electronic records.

Clipboard 2.0, a lightweight portable color screen tablet, makes it possible for medical professionals to input and access information anywhere within a hospital or clinic through a wireless connection. Clipboard 2.0 runs programs, stores information to, and transfers information from the internal hospital infrastructure. Thus negating the need for extra components which would add bulk, weight, and an additional security risk associated with storing sensitive data on the machines.

Professionals are now able to access patient files, as well as annotate and makes changes on them from nearly anywhere in their workplace, even if they are walking around. Using the Clinic 2.0 system professionals can pull up charts and test images, such as X-rays, through their Clipboard 2.0. They are also able to run medical productivity applications such as the History Tracker (Pro) and access the MedKnowledge Net, and even use the Oath Enforcer to provide assurance and assistance throughout the medical process.

Accommodating fluid situations, there are three main modes of input for the Clipboard 2.0. Writing, with the handwriting recognition software; Voice commands, using the voice recognition software; And keyboard entry when the optional keyboard is connected.

Video may also be captured using the embedded video camera. This function will help professionals confer with each other, either by allowing for a “video chat” or by visualizing the topic of conversation. These functions work both locally and with professionals located at a distance through the Clinic 2.0 and Comsurance (HealthNet Infrastructure component) systems.

**Discussion:**

“It is time to get back to work,” Dr. Williams tells her colleagues in the cafeteria as her self-imposed 20-minute lunch break ends. She has a few more patients to see before a 4:30 meeting later this afternoon. She slings her Clipboard 2.0 over her shoulder as she stands up, says goodbye and begins her walk back to the office. While taking lunch she put her unit to sleep, effectively turning it off though still remaining available in case of emergency contact. She decides to wake the unit from sleep to check if the images taken by radiology for her patient Mr. Cho have arrived, by tapping the power button. The unit responds instantaneously and requires her to verify her identity, which she does easily by placing her thumb on the built-in print reader. As expected by Dr. Williams she is verified to be herself, while it sounds silly this always comforts her in a strange existential way—it is nice to hear that you are you.

Radiology did not let her down. Her “home page” shows that the files and results have been sent to her and asks if she would like to review them. In her estimation she has a good three minutes before she...
reaches her office where she will quickly regroup and then check in on her patients, so she decides to view the images and accompanying notes from radiology. So far so good, all results look fairly normal... nothing to get worried about. However, on the fifth image she notices an area which seems odd. She is not an expert but has seen enough MRIs to essentially know what to look for and this image troubles her. Knowing that her schedule for the remainder of the afternoon is tight, she decides to pass on the idea she was entertaining in her head to review the image larger on a Dynamic Charts system and instead opts for contacting Dr. Xumsai, who sent her the results and worked with Mr. Cho earlier, in radiology directly.

While continuing the walk down the long hallway that leads to her office Dr. Williams quickly scans her contact list for Dr. Xumsai who appears to be online and available. Dr. Williams sends a request to confer with Dr. Xumsai which is accepted almost instantaneously, and now there is a live audio and video link between the two. Looking at the screen of the Clipboard 2.0, Dr. Williams now has two windows displayed on her screen, one with the video feed of Dr. Xumsai and the other which displays the dubious image. Circling the area which she questions, Dr. Williams asks for Dr. Xumsai’s opinion on that image and that area. Dr. Williams knows there is no doubt of the area she is speaking of because by circling the area of the image on her machine is transferred and displayed for Dr. Xumsai to see. Dr. Xumsai reviews the image for a second and tells Dr. Williams that she doesn’t believe that there is reason to worry about this anomaly because radiology ran the images through History Tracker Pro, but since the area is suspect she will examine it more closely and get back to Dr. Williams within the hour. Dr. Williams thanks her friend in radiology and closes the personal exchange.

Time sure flies when you are busy! Dr. Williams is right in front of her office, she almost doesn’t remember how she ended up here... she hardly remembers leaving the cafeteria. Looking down at the screen she catches a glimpse of her schedule. Right, her appointments this afternoon, it is time do regroup and prepare for them. She could have done all of this on the go with her Clipboard 2.0 system, however, the dry winter air has cracked and irritated her lips so she opts to prepare in her office where she would also be able to get her lip balm which seems like a fair compromise.

The rest of the afternoon is spent consulting with a couple of her patients. She no longer needs to carry around the paper files and charts, though some days she misses them. Not so much for the charts them selves and the paper, but for the rainbow-coded coloring system, she misses the colors. With this new system she can access her patients records, add to them, and even write them prescriptions all from her Clipboard 2.0. Noticing a clock, she realizes it is time for her 4:30 meeting, time to run.
Description:
Flat panel wall display, connected to a local intranet and external internet, that is able to display patient information, charts, animations and video for personal consultations or professional conferences. The display surface is touch sensitive, allowing for data input and annotations. One side of the system has a “bulletin board” for posting papers and a port for a detachable printer.

Features:
• Runs Clinic 2.0 interface system
• Displays Charts and records
• Plays videos and animations
• Accepts notations and data input
• Supports video conferencing
• Accesses internet and intranet
• Display natural image (like clouds) when not in use to appear like a window

Properties:
• Wall mounted flat panel color display
• Appx. screen size of 18” x 48”
• Stylus
• Touch sensitive screen
• Camera that can be used for video input
• Smart card reader
• Wire and/or wireless connection
• Clipboard 2.0 compatible
• Bulletin Board for papers
• Detachable printer
A quality diagnosis and consultation is one in which not only proper data and information is collected but also accessed and discussed.

Using Dynamic Charts in conjunction with the Clinic 2.0 system, medical professionals have a powerful new tools at their disposal for accessing, displaying and sharing information. Patient records and test results can be displayed and edited in real time on screen. Imaged test results are also able to be displayed eliminating extra traffic and scheduling difficulties in obtaining the test results from particular departments of the hospital. It also rid the need of transferring bulky files which could be lost or damaged in transfer.

The large screens of Dynamic Charts allows for many people to see and interact with information. The screen can be segmented so to have a live video feed connection professionals or patients who are not in the vicinity side by side with information. Additionally, discussions can take place over the images locally, if so desired, to involve the patient more in his/her own health care.

Notations can be added either by “writing” directly on the screen, or externally with Clipboard 2.0. Notations added through these methods are recorded and then added to the files which are sent to the servers for storage. Thus, providing professionals another method for collaborating and data collection.

Discussion:

The door closes behind Dr. Williams after she enters the conference room. She is the last to arrive even though she is right on time for the meeting, a punctual 4:30 entrance. Similar to the examination rooms in the hospital, this conference room is equipped with a Dynamic Charts system. Dr. Phil, who called the meeting, means business today. Charts and files are already displayed on the screen when she walked in. While sitting down she notices that he is using his Clipboard 2.0 to control the flow of the information on the Dynamic Charts, he is doing this while pacing the room. What could be bothering him?

Her mind drifts from the meeting at hand to the consultation she just had before coming to this meeting. She was meeting with her patient Nancy to assess her progress after her emergency appendectomy. Dr. Williams, like Dr. Phil, used her Clipboard 2.0 to access Nancy’s files and display them on the Dynamic Charts system. This way she can share the information with Nancy through the Dynamic Charts system in the treatment room, but is still able to control what is displayed.

Nancy is recovering, but still has another day or two before she’ll be comfortable walking around. Dr. Williams explains this to her and pulls up two short videos on the screen to share with Nancy. The first video explains the cause of appendicitis and how they removed her appendix. The second explains some effects that Nancy might experience in the upcoming days, and how she could rehab from her surgery and what actions to avoid.

Dr. Williams asks Nancy if she understood what she watched and if she had any questions about her
status or the instructions given to her. It turns out that Nancy has more than a few questions about her condition and what it means. Dr. Williams tries to answer the questions in the order they were asked, but in retrospect she may have skipped one by accident. Her explanations must have been satisfactory, however, as Nancy seemed to be content when she left. Some of Dr. Williams responses were verbal explanations, though some were more complex and required visual references. The Dynamic Charts system was indispensable in this regard as she was able to annotate on the screen to help illustrate her point and to draw attention to the important areas of information on screen. Using this feature made her feel like a sportscaster, but its use goes far beyond novelty, a thought reinforced by the meeting she is currently attending.

Dr. Phil has the charts and files of a patient named Ben on the display and is asking people’s opinion of what the next step for treatment should be for Ben. Ben was admitted an hour ago, the first of three patients who arrived bearing similar symptoms. Dr. Williams now realizes why Dr. Phil is so anxious. This meeting wasn’t supposed to be about Ben or the other two patients recently admitted, it couldn’t have been. This meeting was planned for yesterday, this has the signs of an impending crisis.

The first thought on everyone’s mind, in this day and age, is this might be some sort of biological attack. All three patients are experiencing uncontrollable diarrhoea, high fever, severe abdominal pain and vomiting. The fact that there is more than one case also draws attention to it.

Dr. Phil decides there is nothing more that can be gained from seeing Ben’s past medical history and uses a function to split the screen into three sections. On the left side he pulls up Ben’s vitals for monitoring. In the center he contacts nurse Hamlin who is watching over Ben currently so there is a link to the patient’s room, and on the right he accesses the Condition Identifier Pro and begins to run the symptoms nurse Hamlin reads off to him. He uses a special feature to check for biological agents on the first pass and additional illnesses on the second pass. If there has been an outbreak they need to know right away.

The results are displayed within seconds and are listed in descending order with the most probable listed first. The most probable cause listed is a biological agent, but the doctors huddled in the conference room are relieved nonetheless. It appears that there is a case of bad meat going around and these three poor souls have a bad case of salmonella. The word is passed on to nurse Hamlin and the other doctors so they can tailor their treatment to the proper condition. In the meantime, Dr. Phil concludes the meeting and contacts the FDA to report these cases while hoping this is not a widespread outbreak. Looks like salad is for dinner tonight.
Description:
Web-based database of credible medical knowledge for health care professionals. The **MedKnowledge Net** links professionals with pertinent information and provides tools for assisting with their activities and responsibilities.

Properties:
- Searchable database of medical knowledge, stored as written, pictorial, audio and video information
- Compatible with medical productivity applets: **Condition Identifier** and **Oath Enforcer**
- Database accessed and run by the **Clinic 2.0** system

Features:
- Opens channels of communication and learning for professionals by providing credible information and the ability to communicate with others around particular topics or information
- Connects professionals with information and offers supporting information based on the data input by the professional providing a “second opinion” or suggestions for the professional
- Runs on the **Clinic 2.0** system, which can be accessed by the **Clipboard 2.0** and **Dynamic Charts** devices as well as authorized personal computers
- Works in tandem with context sensitive feature, **Oath Enforcer**, to remind professionals of actions that could or should be completed
The MedKnowledge Net is a searchable collection of medical information for health care professionals that can be accessed through the Clinic 2.0 system. Information is collected and posted to the system by health care professionals, creating a central source for quality information. The system also creates and opens channels of communication and learning by connecting professionals with other professionals around topics of interest, research, or need.

Physicians can reference information on the fly, if needed through Clipboard 2.0 or Dynamic Charts, allowing them to access information that they might have otherwise had to research and locate. Since the data on the MedKnowledge Net is stored in a variety of formats, professionals are now able to instantly compare, for example, a inconclusive MRI test result that was just run against other MRI results with similar results and check for similarities and the final diagnosis of those cases.

If confronted with a situation or condition that is new to the professional, he/she can access the MedKnowledge Net and search for information. If she needs to understand the condition urgently, he/she can combine the MedKnowledge Net with the Condition Identifier Pro to identify the probable condition and the related information documented on it.

Easily searchable with powerful information in an accessible central location makes the MedKnowledge Net a powerful support tool for health care professionals.

Discussion:

The two boys being rushed into the ER by their mother look to be no more than eleven and thirteen respectively. Dr. Barlow has worked the ER for the entirety of his career and has seen just about everything, from severe trauma, open wounds, broken bones, “unfortunate events,” to drug overdoses; so many drug overdoses. Seeing these two boys being dragged in by their hysterical mother makes him sad. He ponders, how can the youth of today start experimenting so young, shakes his head and mumbles to himself, “are childhoods extinct?”

Pulling himself out of his thoughts he regroups mentally and rushes over to help them. First he has to try to calm the mother down in order to extract the information he needs to help the children. Tears running down her face and her voice raw and cracking, she tells him that the boys had just come back for lunch from playing in the woods behind their house. They had been out there since early in the morning playing, it was their favorite thing to do on the weekends when they did not have to be at school. She tells him that the boys were fine and were acting normal though they did mention that they felt a little dizzy.

That is when it happened, she says. Michael, the younger of the two began shaking and then vomiting. Stephen, the older brother, started to help Michael when he passed out and then vomited. If she happened to be more rational at the time she might have considered calling the poison hotline to see if she could get information, however, these are her children and they have both fallen mysteriously ill in a terrible way, coming here was her only choice.
Though he doesn’t want to sound accusatory, Dr. Barlow still suspects that kids might have overdosed. He tries to tip toe around the subject with the mother while her kids are set up on cots and are tended to. His focus is on speaking with the mother, but he notices something out of the corner of his eye. There seems to be strange burn marking and patterns on the children’s arms and hands, the attending nurse notices this as well and calls Dr. Barlow over. Nurse Hamlin who is helping Michael shouts out “temperature 101.3 ºF.” Dr. Barlow has seen enough OD’s in his career to know this doesn’t seem right and thinks, Dorothy I don’t think this an OD anymore.

The boys medical data has already been loaded onto his Clipboard 2.0 by accessing their MedAccess cards at the front desk. Dr. Barlow starts feeding the symptoms and information noticed and collected by himself and the ER staff about the kids and their condition into their file and the Condition Identifier Pro. “Radiation poisoning, what the hell?!?” He has said this a little too loudly and some of the patients seem visibly concerned and disturbed. Something new to add to the long list of what he has seen in the ER. However, this is a serious situation, more serious than he had imagined and he realizes that he is unprepared for this. Following the link from the Condition Identifier Pro to the MedKnowledge Net he is connected with the foremost knowledge from the medical community on the condition. If he wasn’t in a rushed situation he could read up on the latest findings and treatments around the topic, however, this is not the time as everyone in the ER may also be at risk of exposure because of them.

He accesses and reads through the “what to do in case of...” checklist. The boys have been hooked up to an IV to combat their dehydration from vomiting, which is good, but unfortunately they need to be disconnected. Their clothes and skin may still have radioactive material on them and need to be cleaned or disposed of. The mother’s clothes also need to be disposed, and she is not happy about this. She argues the issue while her boys clothes are cut off and taken away along with the sheets and bed they were lying on. Dr. Barlow puts on the hazmat suit and gives the boys a decontamination shower. He needs to do this quickly, as the boys may have killed off a majority of their white blood cells and could be at a very high risk of complications.

The boys are dried, clothed and reattached to the IVs. A request is sent to transfer them to the ICU. They should recover without any side effects, though they will be monitored throughout their lives for leukemia as they are now at a higher risk of developing it.

As the boys are being transferred to the ICU for care and recovery a hazmat team is dispatched to the woods behind the boys’ house with Geiger counters in hand searching for the radioactive substance, hoping that it is industrial waste and not the building blocks of a dirty bomb.
The **Med Patient Communicator** is a device for hospitalized/extended care patients to communicate with their loved ones and healthcare staff. It also allows the patient to view various entertainment mediums such as television, scenery, and music.

**Description:**
- Allows patients to communicate with loved ones via telephone, video, e-mail, and/or text message
- Allows patients to communicate with hospital staff to alert needs
- Provides assistance to healthcare professionals when attempting to locate patients
- Allows patients to view television shows, movies, and videos
- Displays visually pleasing images on walls and/or ceilings depending on the preference
- Allows patients to view aesthetic environmental scenes instead of focusing on the facility walls
- Allows patients to alter room conditions such as temperature, lighting, smell, and sound needs

**Properties:**
- Communication device for patients during extended stays at healthcare facilities
- Connection from patient to hospital staff
- Tracking mechanism for staff to locate patient in the hospital, when patient is in need of assistance
- Environmental therapy assistance
- Entertainment sound/display device
- Interactive display screen
- Voice recognition device
- Remote control

**Features:**
- Allows patients to communicate with loved ones via telephone, video, e-mail, and/or text message
- Allows patients to communicate with hospital staff to alert needs
- Provides assistance to healthcare professionals when attempting to locate patients
- Allows patients to view television shows, movies, and videos
- Displays visually pleasing images on walls and/or ceilings depending on the preference
- Allows patients to view aesthetic environmental scenes instead of focusing on the facility walls
- Allows patients to alter room conditions such as temperature, lighting, smell, and sound needs
The Med Patient Communicator is a unit that is placed in the rooms of patients who are restricted to extended stay at hospital. The communicator is intended to assist those individuals to keep in contact with their family and friends. It also provides a means for communication to medical staff. It is composed of an interactive display screen, remote control and has voice recognition capabilities.

Typically, nurses and physicians make their rounds within the facilities. Occasionally there may be some patients that do not need any attention and others that may require extra. The Med Patient Communicator allows patients to contact staff when needed and communicate their needs prior to the staff’s arrival. A component of this is the tracking system embedded in the device allowing the staff to easily locate the room they are in.

Realizing that there are regulations on using communication devices in hospital, a goal of this device is to allow patients to remain in contact with their family members. Using options such as hands free, voice recognition, memory, and varied displays patients may select means to contact their loved ones. The Med Patient Communicator allows them to send e-mails, text messages, and place traditional phone calls through phone lines and wi-fi technology to prevent disruption of medical equipment.

The Med Patient Communicator also functions as a display for entertainment. Using the device individuals are able to view television shows, movies, and even listen to music of their choice. With these capabilities, it assists in making the individual’s stay at the facility more comfortable.

Discussion:

Scenario

Tiffany Noble, a newly wed attorney from Chicago, has been experiencing lower abdominal pain for the past week. Because of her concern, she accessed her Personal Health Portal while at work and scheduled an appointment with her primary physician. After a series of tests, she was unfortunately diagnosed with acute appendicitis. Based on the requests of her physician she has decided to have her appendix removed, which will require her to stay overnight.

It is the day of the surgery and Tiffany checks in at the hospital and has her Med Access Card swiped to verify her identity and place her into the system. Her physician receives a notice on his Clipboard 2.0 alerting him of her arrival. She is transported to the operating room and within hours the procedure is a success and she is placed in a room with another patient.

After some rest, Tiffany regains her consciousness and realizes that she has made it through her surgery. Because of the post operation discomfort her movement is restricted. Because she recently relocated to Chicago, she does not have family here and knows very few people. Unfortunately, because her husband is out of town on business, unfortunately no one is there with her. In a matter of time her physician enters to check on her status. He explains the new Med Patient Communicator which allows her to place and receive telephone calls, access media, and contact the hospital staff. Pleased with such a great new product she is anxious to use it to call her husband.
Scenario: continued

Remembering the instructions, Tiffany says “phone” to activate the telephone. Once she hears the dial tone, she says her husband’s cell phone number and it immediately begins to call him. As he answers, she eagerly tells him about the Med Patient Communicator. After getting off the phone with him, she decides to watch the television to alleviate her boredom and loneliness. Unfortunately, her movement is still restricted and she activates the Med Patient Communicator by saying “television.” She searches through the channels by voice recognition, but does not find anything she is interested in watching. Instead, she recalls the landscape feature and decides to view an image of San Francisco which is where she was born and raised. After adoring her hometown environment, Tiffany is ready for her meal. She activates her nurse pager by saying “nurse,” and alerts the nurse to bring her lunch. She finishes her meal and begins calling other family members to tell them about her great gadget. After staying in the hospital for a few nights, she has recovered and is ready to go home. Pleased with her Med Patient Communicator, she wishes she could buy one at home.
HealthNet applications are an integrated system of tools and services to support the general public and healthcare professionals. The system addresses the following areas of concern with the existing healthcare system:

- Disconnection between individual and healthcare system
- Limited access to medical and technological resources
- Restricted activities because of medical conditions
- Distance barriers between over-exhausted professionals

With these issues in mind, the HealthNet Applications system addresses the areas of concern by targeting the following areas of use:

**Personal**
The system educates as well as allows individuals to perform procedures that would normally be conducted by a professional. Individuals become partners in the healthcare process, as the experience shifts from being mysterious to being transparent. People are connected with information regarding their condition, the risks they may face, and they steps they need to take to improve or maintain their condition.

**Portable**
The system allows individuals who need constant monitoring to remain active in their everyday lives. These individuals are able to regain control in their lives by having monitoring devices and receiving advice on their condition, removing the need for being watched constantly. With confidence that help will arrive if an emergency arises, the system allows individuals to remain connected to the medical community at all times.

**Public**
The system accommodates individuals who need access to their personal medical files while out in a variety of public locations. It expands the number of access points and resources available to the general public.

**Professional**
The system reduces the barriers of inefficient treatment (distance, lost files, inaccurate records, out-date information) by healthcare professionals. It allows professionals to share, update, and access files digitally, allowing for more accurate information and a greater ability to collaborate. With other health management tools to assist patients, hospitalized and non-hospitalized, professionals have more time to focus on pressing patient problems.