Software Development for u-Healthcare services and Its Applications

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Contents

1. u-Healthcare overview
2. u-Healthcare case
3. Technology trend & Future Scenario
4. Software development for u-Healthcare
Definition of U–Healthcare

- **Concept in Narrow Sense**
  Medical staff utilizing IT to communicate with other medical staffs in remote area regards to medical knowledge or technology

- **Concept in Broad Sense**
  Providing medical service to the public anywhere, anytime in regards to prevention, diagnostic, cure, aftercare, etc.

  - **u–Health**: Ubiquitous + Healthcare + Health

  - Broaden concept of traditional remote healthcare, Healthcare, e–Health
Classification of u-Health

Healthcare (Focused on Curing the disease)

- u-Hospital
  - Mobile Hospital
  - Telemedicine b/w hospital and clinic
  - Hospital Information/Appointment Mgmt
  - Smart Card

- Home/Mobile Healthcare
  - Mobile Remote Mgmt
  - Location Tracking Service
  - Silver town health mgmt
  - Remote Patient Monitoring
  - Mobile Prescription

Wellness (Health maintenance / Improvement)

- Wellness
  - Counselor Visual Consult
  - U-Fitness

- Mobile Stress Mgmt
  - Mobile exercise check
  - Mobile Obesity mgmt

Institute

Private
Healthcare paradigm is evolving ...

Today
- Treatment of patients
- Provider centric
- Episodic approach, curative
- Hospital based
- Invasive, uncomfortable

Tomorrow
- Health of citizens
- Patient centric
- Lifetime care, preventive
- Decentralized, Community based
- Less Invasive visualization & treatment

健康管理概览
U-Health care 서비스 분류체계(1)-대분류

건강상태평가

* 건강검진
* 건강위협도 평가(HAA)
* 정신기능 평가 등

건강인
- 예방 및 건강증진
  * 예방접종
  * 운동
  * 스�а/마사지
  * 기타

위험인자 보유군
- 생활습관 개선
  * 위험인자 상담 및 모니터링 (비만, 음주, 흡연, 스트레스…)
  * 생활습관 개선 교육 및 지도 (운동, 영양)
  * 기타

유질환군
- 만성질환군
- 급성질환군

건강관리 영역

의료 영역
U-Health care 서비스 분류체계(2)-중분류

의료-처치
- u-진료(상담, 처방, 지원, 자문 등)
- u-교육·지도(질환관리교육, 복약지도, 운동·영양지도, 원격재활교육 등)
- u-시술(원격수술, 케어로봇, 나노-바이오수술로봇 등)

건강관리-처치
- u-건강정보 제공
- u-건강교육·지도

의료-평가
- u-모니터링(생체정보파악, 운동량파악, 위치파악 등)
- u-판독(방사선영상, 병리화상 등)
- u-예측/맞춤의학 (질병 발생 예측, 맞춤형 3D가상수술 등)

건강관리-평가
- u-생체/생활 정보 기반 건강평가 및 건강위험도 분석
- u-바이오 정보 기반 건강위험도 예측

의료서비스
건강관리서비스
u-Healthcare overview

Healthcare market forecast – 1

u-Health Market Size: Anticipated to be 7.026 Million Population by 2011

- Serviced by Medical Institution: 6.128 Million Persons
- Personally Subscribing User: 1.362 Million Persons
Healthcare market forecast – 2

U–Health Revenue

- Anticipated to be 1.075 Billion USD by 2011
- Serviced by Medical Institution Revenue: 562.4 Million USD
- Personally Servicing Revenue: 513.2 Million USD

New Market Creation

- Knocking Chronic Disease Management & Well–Being service market (Diabetic, Obesity, Hypertension)
- Support Muti–Media (PC, IPTV, mobile) in real time and service with profession and realistic methods

(Source: Institution for Information Technology Advancement, U–Health Demand forecast and Market Development, Feb,2006)
Related Law & Policy

Article 21–2 (Electronic Medical Record)
① Doctors or healthcare institutes can create and save medical record data in forms of Electronic Medical Record with approved electronic signature.

Article 30-2 (Telemedicine)
① Doctors or medical staffs can provide medical knowledge and techniques to patient in remote place using computer or IT technology.

Amended medical law (2002. 3. 30 announced / 2003. 3. executed)
Newly added articles
CNSI 2011 년도 u-Health 시범사업

2007년도 u-Health 시범사업

- 이동형 u-진료
  - 해상이동 u-진료
    - 병원선 및 도서지역 보건진료소
      - 건강진단서비스
      - 원격영상 서비스
  - 육상이동 u-진료
    - 진료장비 및 사회복지시설
      - 진료방문서비스
      - 원격영상 서비스
    - 만성질환 모니터링 서비스

- u-생활습관관리
  - 메디컬 피트니스
    - 아산시 및 논산시 보건소 내
      - 순환운동 프로그램
      - 활동관리 및 운동관리
      - 원격영상 서비스
    - u-생활습관관리
      - 진료장비 및 사회복지시설
      - 진료방문서비스
      - 원격영상 서비스
      - 만성질환 모니터링 서비스

2008년도 u-IT 확산사업

- U-원격진료 서비스
  - 의료진료시스템
    - 전자체결 및 약국택배
      - OCS 연동 RFID 인증
    - 진료료 정산 및 생활정보

- U-방문간호관리
  - 디지털화 된 생활정보
    - 생활습관 정보
    - 지속적 생활정보 측정

- 재택 건강관리
  - u-Health 통합사이트
    - CDSS 분석정보 제공

- 지원시스템 및 연계 서비스 강화
  - 통합사이트 기능 강화
    - 홍보사이트 개편
    - 관리기능/통계 강화

- 환경정보시스템 연계

- 공인인증 및 보안모듈
  - 인증서/개인키 관리
  - 자가증명 인증
  - 진서 데이터 암호화

- 통합생활시스템
  - 서비스간 데이터 연동
  - 의료진료정보 데이터연동
  - 사용자 별 통합 관리 UI 제공

- 환경정보시스템
  - 통합정보 통계정보

- 선택

u-Health 통합사이트
- u-Health CDSS
- 생활습관 개선 시스템

- u-Health Framework
- 환경간호 측정 시스템
- 자가문진 시스템
- 진료기기 연동시스템
- 전화위험요인 판독 시스템

Chungnam(Boryung city)
u-Healthcare case

Kyungbuk(Yeongyang gun)
u-Healthcare case

Medical Care Continuity (MCC)

• Serviced to patients who need consistent care
  – Italy (4 companies), France (6 companies), Belgium (3 companies), Poland (2 companies) initiated operation as Consortium (’05.2 ~ ’06.7)
• Recovering patients at home after treatment of Cancer or New disease
• Diagnose exact status of the patient thru telemedicine system.
  – Telemedicine staff monitoring and checking on the patient 24/7
  – Patient information shared b/w hospital and related personnel
u-Heathcare case

Remote Presence 6

- RP6 (Remote Presence 6) Robot: Medical professional using wireless technology to communicate with patient in remote place.
  - Imperial Univ. and Intouch Health Corp. of the U.S. has developed in 2005 and implemented in St. Mary's Hospital as pilote project
  - Robot's role is to connect b/w patient and doctor, not to physically diagnose the patient directly.
  - Doctor can see the status of the patient, communicate, and view the medical record or X-ray results in remote place thru controlling the robot with joystick
u-Healthcare case

- HomeMed LLC: Automation & Solutions

- Expanded operation to diseases such as Hemorrhagic Cardiac Failure, hypertension, coronary, diabetic, chronic lung disease...
Technology trend & Future Scenario

First Wave: Mainframe 1980's

Second Wave: PC 1990's

Third Wave: Ubiquitous Computing Concept 21st Century

- Scientific/Engineering Calculation
- Word Processing
- Intelligent Services & entertainment

Network

- Wide spread use of Internet
- Wireless

Building-size Mainframe

Box-size Personal Computer

Portable Devices

Disappearing Devices

Ubiquitous Computing
Home Healthcare Scenario
CNSI 2011

E-Toilet

Personal Vital Sign (weight, body fat, urine)

Weight Measure

body fat

Urine

Invisible Check vital sign data

Measure vital sign data through non-feeling, non-restriction sensing technology which is not burden at all to user

Health info. DB

Vital sign analysis (weight, body fat, urine)

Health Care Server

Health info. Analysis

Analysis and store acquired vital sign data

Check health status by analyzing accumulated acquired vital sign data through sensor
CNSI 2011

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**Smart Watch**

**Smart Shirts**

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**Cope with emergency**

- Pinpoint the location of patient
- Search near hospital, transfer medical data
- Reserve bedroom, doctor, nurse

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**Emergency Processing**

Quick processing for patients in case of emergency situations

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**Vital sign** (breath, ECG, pulse)

**Vital Sign** (blood-sugar, heart rate)

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**Emergency**

- Analyze vital sign
- Search near hospital, transfer medical data
- Reserve bedroom, doctor, nurse

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**Transport patients**

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**Search near hospital**

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**Patient data transfer**

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**reserve bedroom, doctor, nurse**

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**Smart Shirts**

**Smart Watch**

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Technology trend & Future Scenario

Digital Hospital

- Hospital to Data Warehouse
- Doctors’ role to Data Mining
- Diagnose converts to AI based system
- Convergence Tech. Contest
- Information System based value creation
Technology trend & Future Scenario
소변검사를 통해 조기 발견 가능한 질환들

| 비뇨기질환 | 신장질환, 신장염, 방광염, 신장중양, 신증후군, 신우신염, 요로감염, 요로결석, 방광결석, 요로출혈, 신결핵, 알카로시스 |
| 성인병 | 황달, 간질환, 담도질환, 담석증, 간경변, 체장염, 고혈압 |
| 만성질환 | 당뇨병, 신성당뇨, 만성신장염 |
| 기타질환 | 갑상선기능항진증, 발열성질환 |
뇌질환 진단 및 치료

전체 시스템 구성도

양/한방의학

한의학

양의학

뇌질환 진단 및 치료

오감정보처리기법 및 뇌파를 활용한 사용자 적응 영 임상진단/치료시스템
출원번호 : 10-2007-0091771

양의학
한의학
한국 노령환자 맞춤형 인공 슬관절 개발

저출력 레이저를 이용한 침 람융합기기 개발
Software development in u-Healthcare
Software development in u-Healthcare

- Patient Mgmt Program
- Prescription communication system
- e-mail
- Homepage
- visual Consult

Select Hospital, Doctor

- Insurance Claim
- Patient Mgmt(CRM)

Doctor's Office (Off-Line)

- online study
- Visual Consult
- Remote image read

Homecare nursing business
visual consult service
Doctor in charge

HOME-CARE
Software development in u-Healthcare

- Insurance
- Online Claim
- Inspect/Pay Hospital
- Pharmacy
- OCS Logistics
- Hospital
- Doctor
- Hospital A
- Hospital B
- Share medical record
- inspection

EMR

(DataWareHousing)
Software development in u-Healthcare

- Nurse Info. system
  - Data Search
  - Prescription search/view

- Expanded Space
  - Patient record Input
    - (ID, Temp, Weight, BP)
    - Search/view

- Emergency device
  - Patient ID, Bio signal input, communicate with center

- Device for Patient
  - Appointment search, mail, e-commerce info search

- Round-of-visit
  - Patient ID, status search/IPD, progress, drug search

- Education Device
  - Medical books (eBook)
  - Medicine search
  - Terminology search
  - Treatment Simulation

- Health Mgmt Device
  - Body nature, diet, exercise mgmt
  - Chronic patient mgmt
  - Elderly & handicap service
Software development in u-Healthcare
Software development in u-Healthcare

u-Health service platform
Software development in u-Healthcare

Sensing Technology

- Non-restrictive, non-conscious Bio signal extracting technology
- Bio signal analysis and verification technology
- Bio signal handling technology
- Bio signal system miniaturization technology (BioMEMS)
- Multidimensional sensor integration technology
- Sensor System integration technology

Campus Micro Technologies, Germany

인체삽입혈당센서, 메디트로닉사
Software development in u-Healthcare

Wireless Communication Technology

- Sensor network that allows to gather real-time info.
- Wireless gateway technology
- Home network
- Body Area Network (BAN) for personal healthcare
Software development in u-Healthcare

AI & DB Technology

- Context Awareness Technology
- Disease pattern analysis and forecasting
- Decision supporting system
- Ontology-based data representation
- Datawarehousing for Healthcare
Software development in u-Healthcare

- Basic technology development stage
- Development & pilot project stage
- Commercial production stage

Funding:
- Easy
- Difficult

Public sector
- Lab enterprise
- Death Valley

Private sector
Research project

Thank You