Software Development for u-Healthcare services and Its Applications

24 October, 2012

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AENG

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CATHOLIC UNIVERSITY OF DAEGU

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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

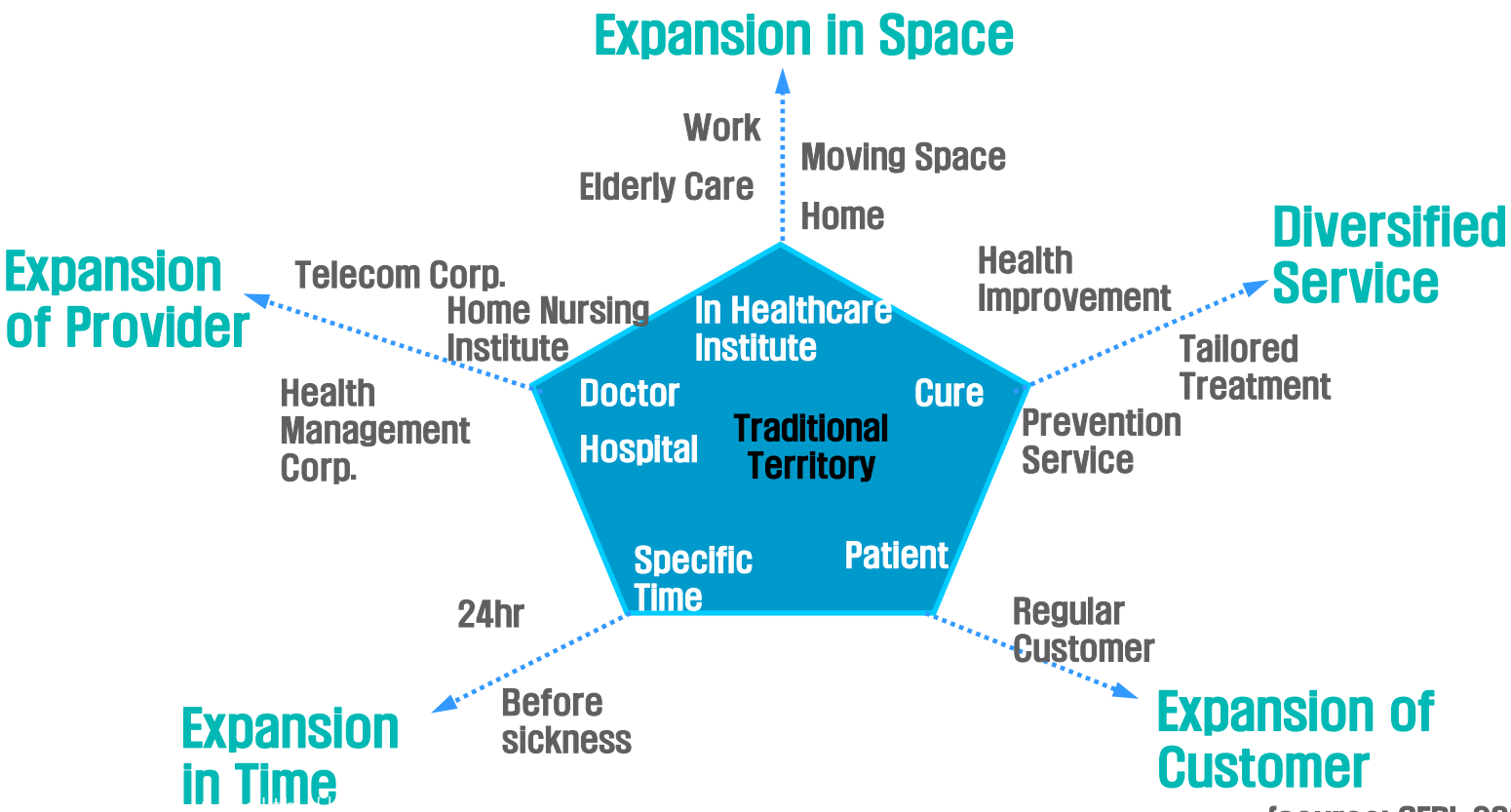
❑ Concept in Broad Sense

Providing medical service to the public anywhere, anytime in regards to prevention, diagnostic, cure, aftercare, etc.

- u-Health : Ubiquitous + Healthcare + Health

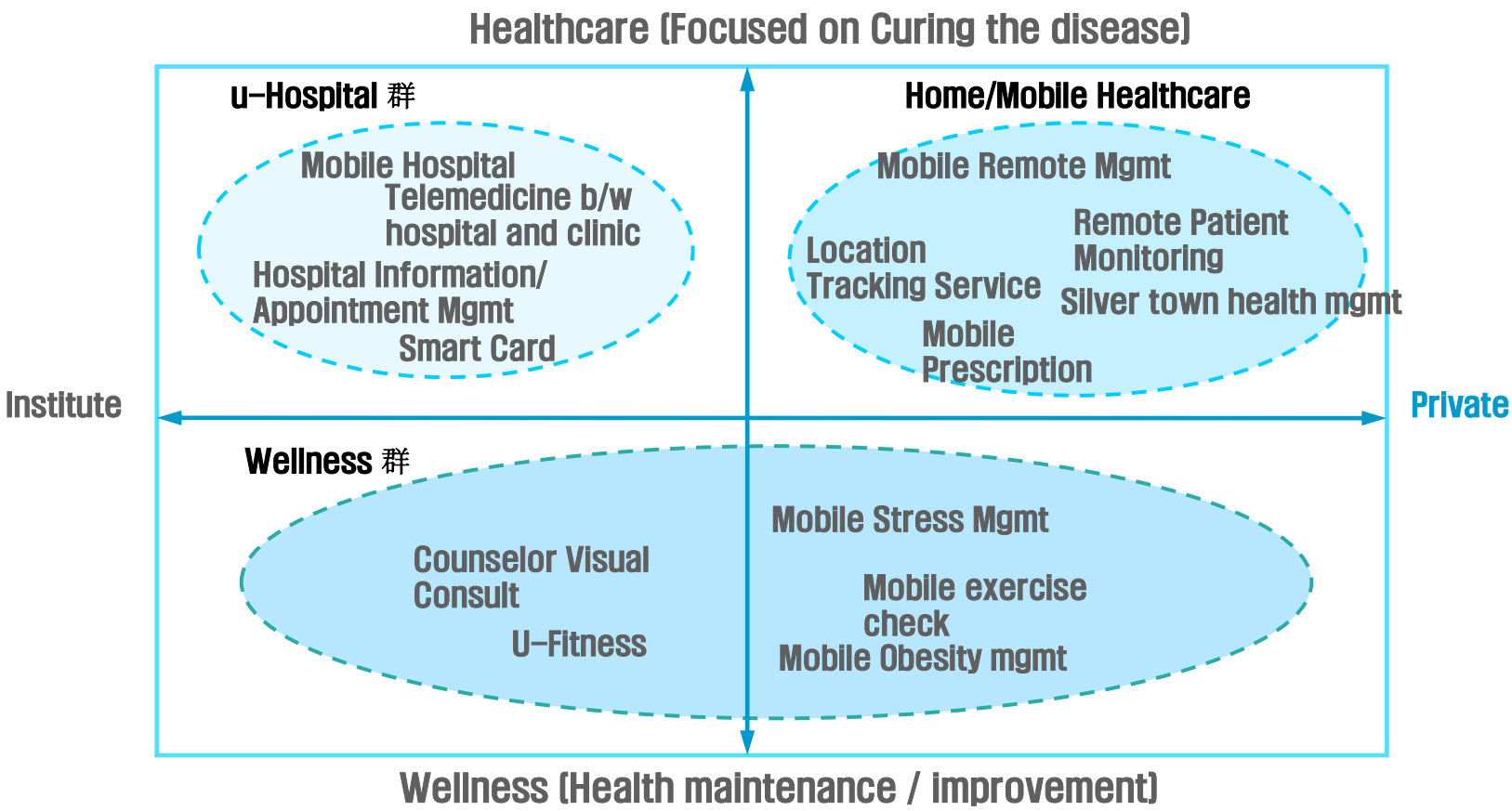
▪ Broaden concept of traditional remote healthcare, Healthcare, e-Health

Scope of u-Health



(source: SERI, 2007.5)

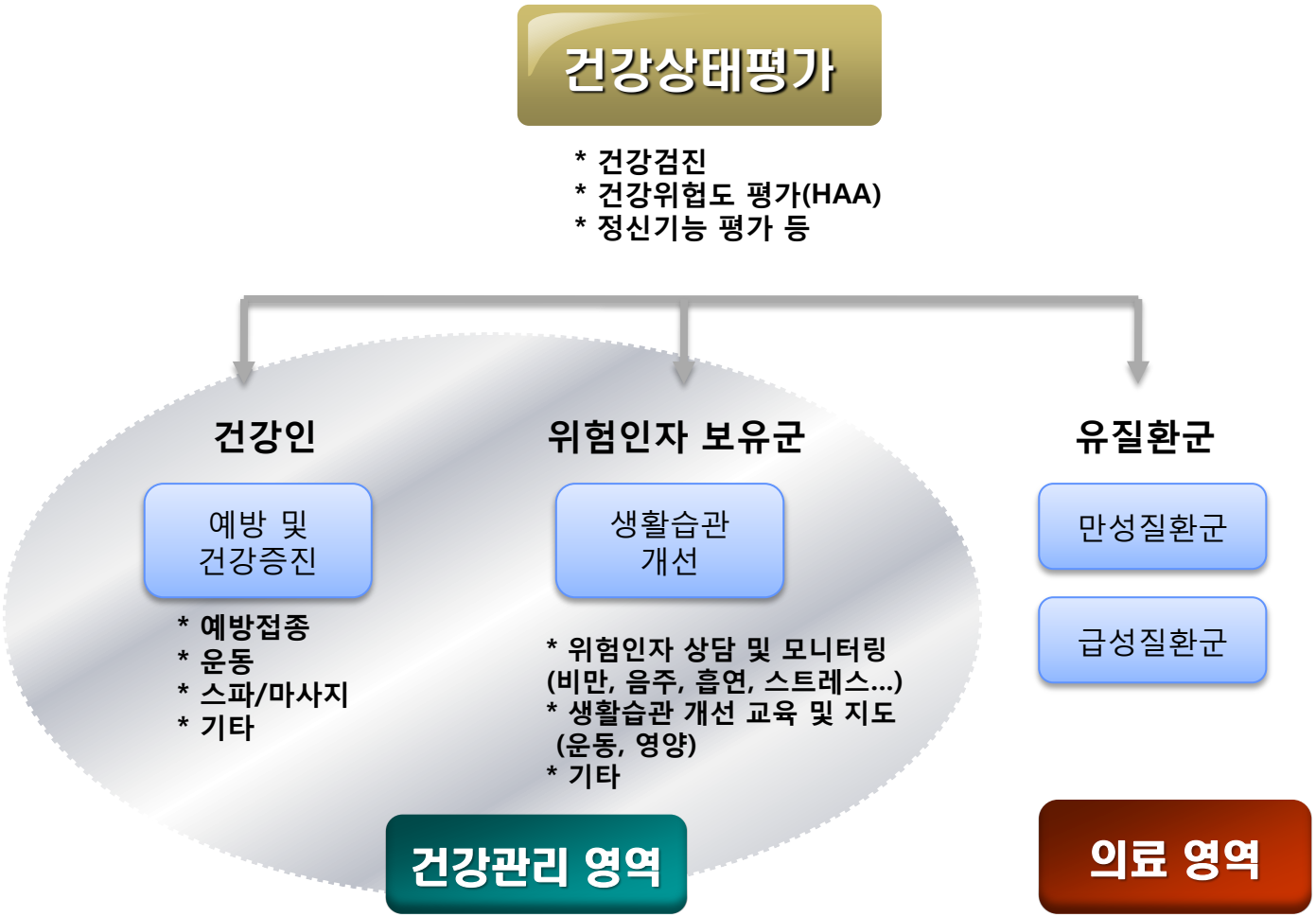
Classification of u-Health



Healthcare paradigm is evolving …

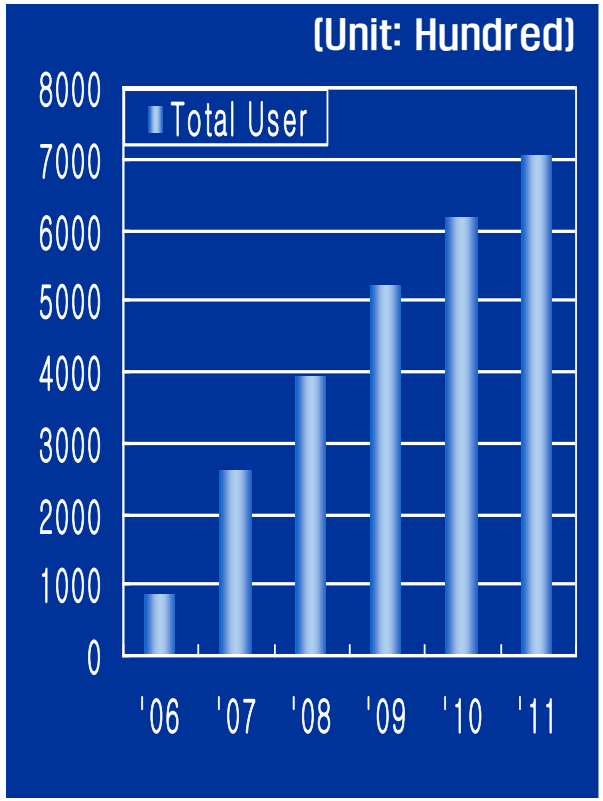
Today		Tomorrow
Treatment of patients	Paradigm	Health of citizens
Provider centric	Focus	Patient centric
Episodic approach, curative	Time Space	Lifetime care, preventive
Hospital based	Space scope	Decentralized, Community based
invasive, uncomfortable	Treatment	Less invasive visualization & treatment

U-Health care 서비스 분류체계(1)-대분류



U-Health care 서비스 분류체계(2)-중분류

Healthcare market forecast – 1

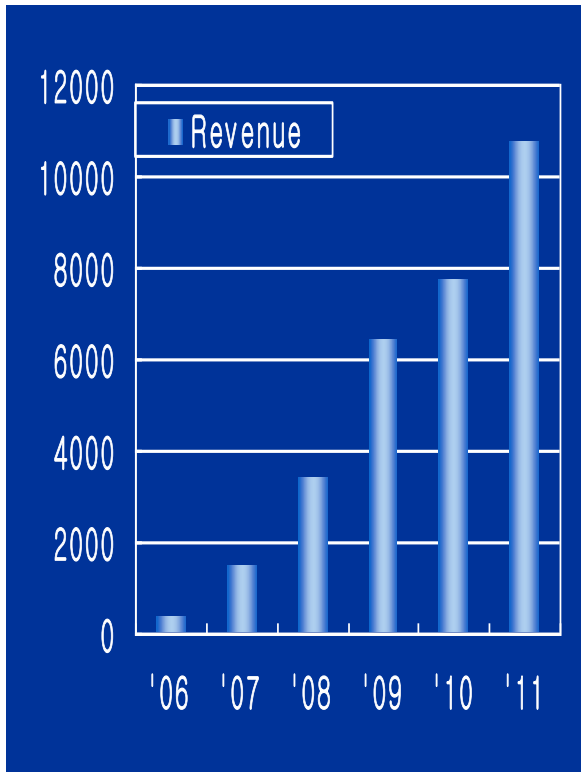


u-Health Market Size:
Anticipated to be 7.026 Million Population by 2011

❑ 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, Hypertention)
❑ 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

Chungnam(Boryung city)

기구축 시스템

2007년도 u-Health 시범사업

이동형 u-진료

해상이동 u-진료

병원선 및 도서지역 보건진료소

건강진단서비스
원격 영상 서비스

육상이동 u-진료

진료차량 및 사회복지시설

진료방문차량 서비스
원격영상 서비스
만성질환 모니터링 서비스

u-생활습관관리

메디컬 피트니스

아산시 및 논산시 보건소 내

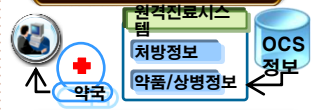
순환운동 프로그램
활동습관/운동 관리
원격영상 서비스

헬스케어 지원 시스템

- 상황실 및 지원센터 구축
- 통합서비스 사이트 구축
- 의료 콘텐츠 확보 및 활용
- 홍보사이트 운영 및 동영상제작

2008년도 u-IT 확산사업

U-원격진료 서비스



전자처방전 및 약국택배
OCS 연동
RFID 인증

U-방문건강관리

디지털화 된 생체정보
생활습관 정보
지속적 생체정보 측정

재택 건강관리

만성질환 및 심장질환자 관리
질환자의 상태 모니터링
CDSS 분석정보 제공

지원시스템 및 연계 서비스 강화

통합사이트 기능 강화
홍보사이트 개편
관리기능/통계 강화
신 보건정보시스템 연계

신규 구축 시스템

공인인증 및 보안모듈

- 인증서/개인키 관리
- 상호 인증
- 전송 데이터 암/복호화

u-Health 통합사이트

통합연동시스템

- 서비스간 데이터 연동
- 의료측정장비 데이터연동
- 사용자 별 통합 관리 UI 제공

연계 ↕ 연계

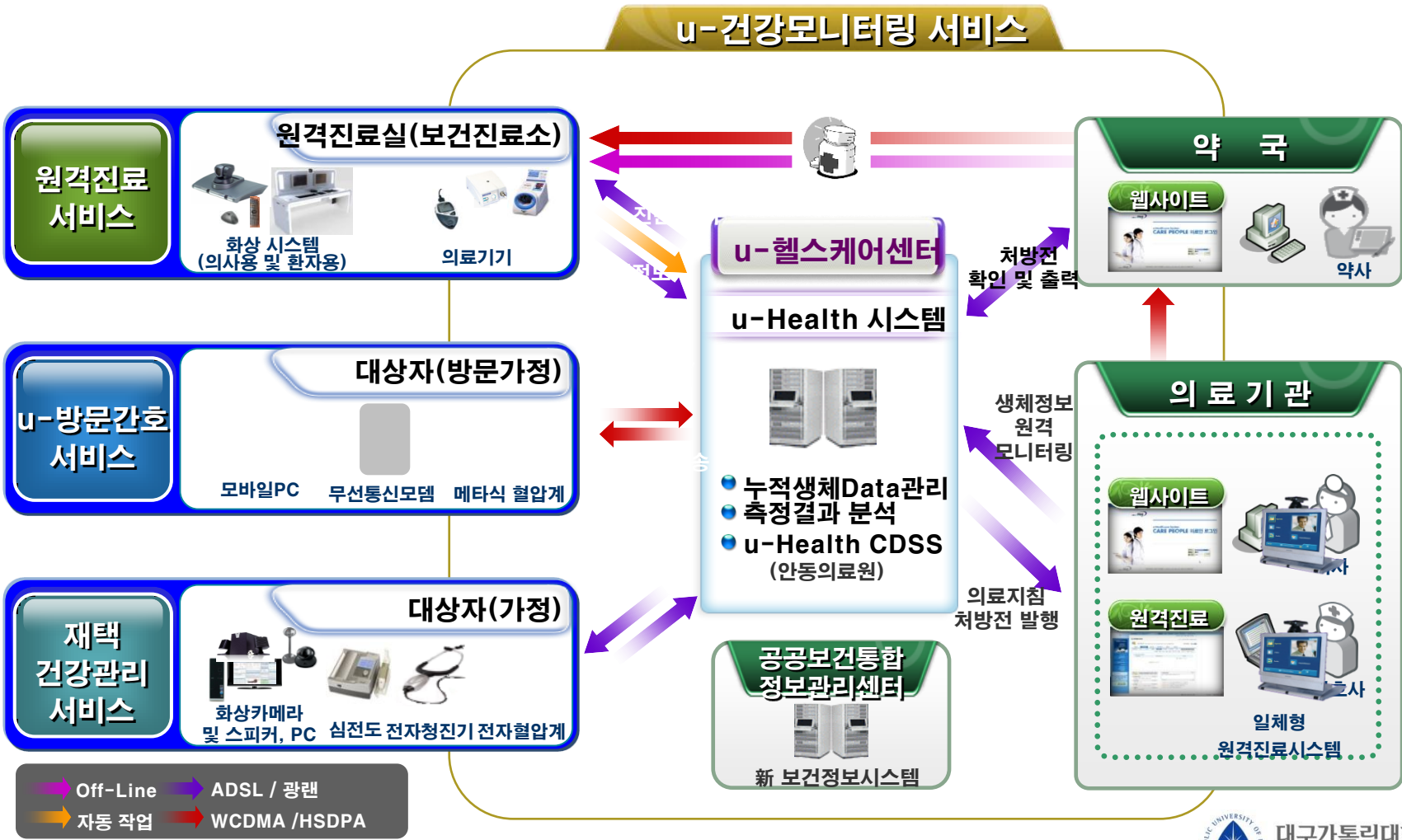
콜센터

상황실

u-Health Framework

원격건강 측정 시스템 | 자가문진 시스템 | 측정기기 연동시스템 | 건강위험요인 판독 시스템 | u-Health CDSS | 생활습관 개선 시스템

Kyungbuk(Youngyang gun)



Kangwon(Kangreung city)

의료지도의 구현

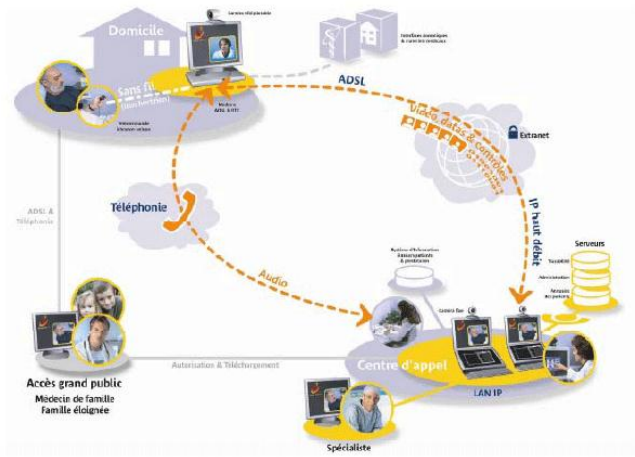
치매조기진단
허약노인 와병예방
만성질환관리
보건교육

방문간호

치매환자의 전문의 직접 진료
만성질환자 관리
방문간호 지원
의료지도
최신의약품 복약가능

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

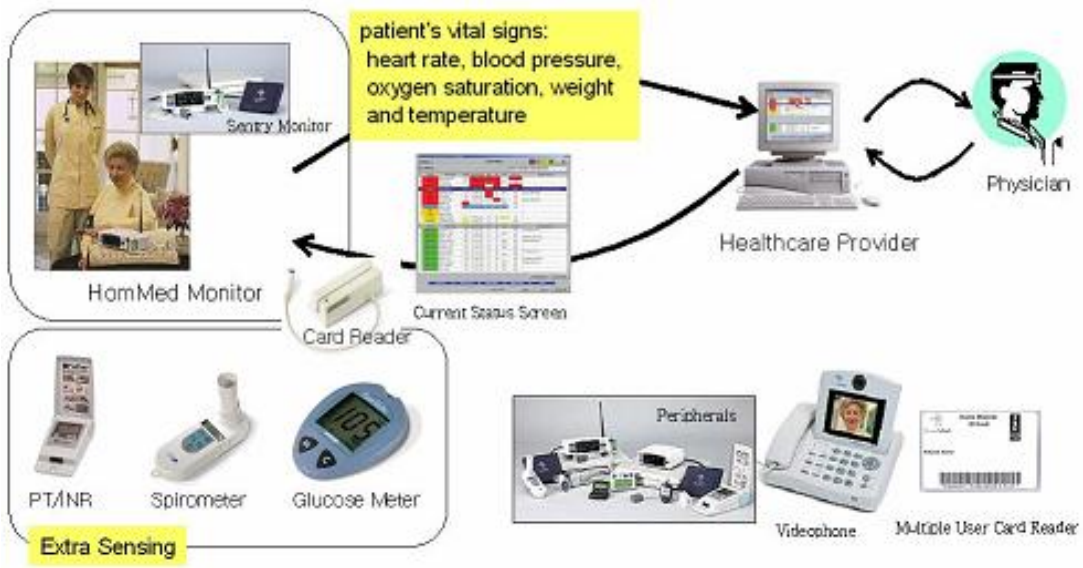


Remote Presence 6

- 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

Honeywell

- HomeMed LLC: Automation & Solutions
- Expanded operation to diseases such as Hemorrhagic Cardiac Failure, hypertension, coronary, diabetic, chronic lung disease…

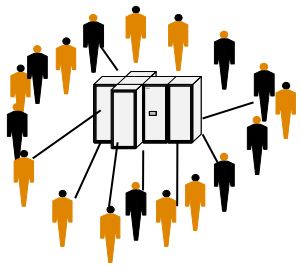


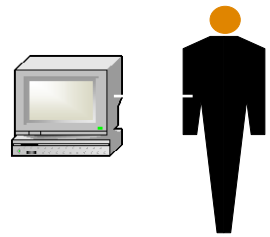
Technology trend & Future Scenario

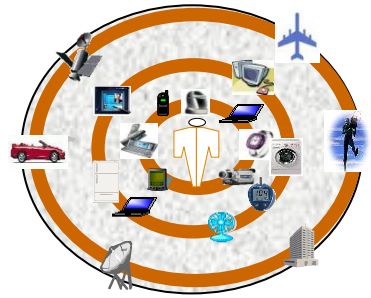
First Wave : Main frame 1980's

Second Wave : PC 1990's

Third Wave : Ubiquitous Computing Concept 21st Century







Wide spread use of Internet

Network

Wireless

Scientific/Engineering Calculation

Word Processing

Intelligent Services & entertainment

Ubiquitous Computing

Building-size Mainframe

Box-size Personal Computer

Portable Devices

Disappearing Devices

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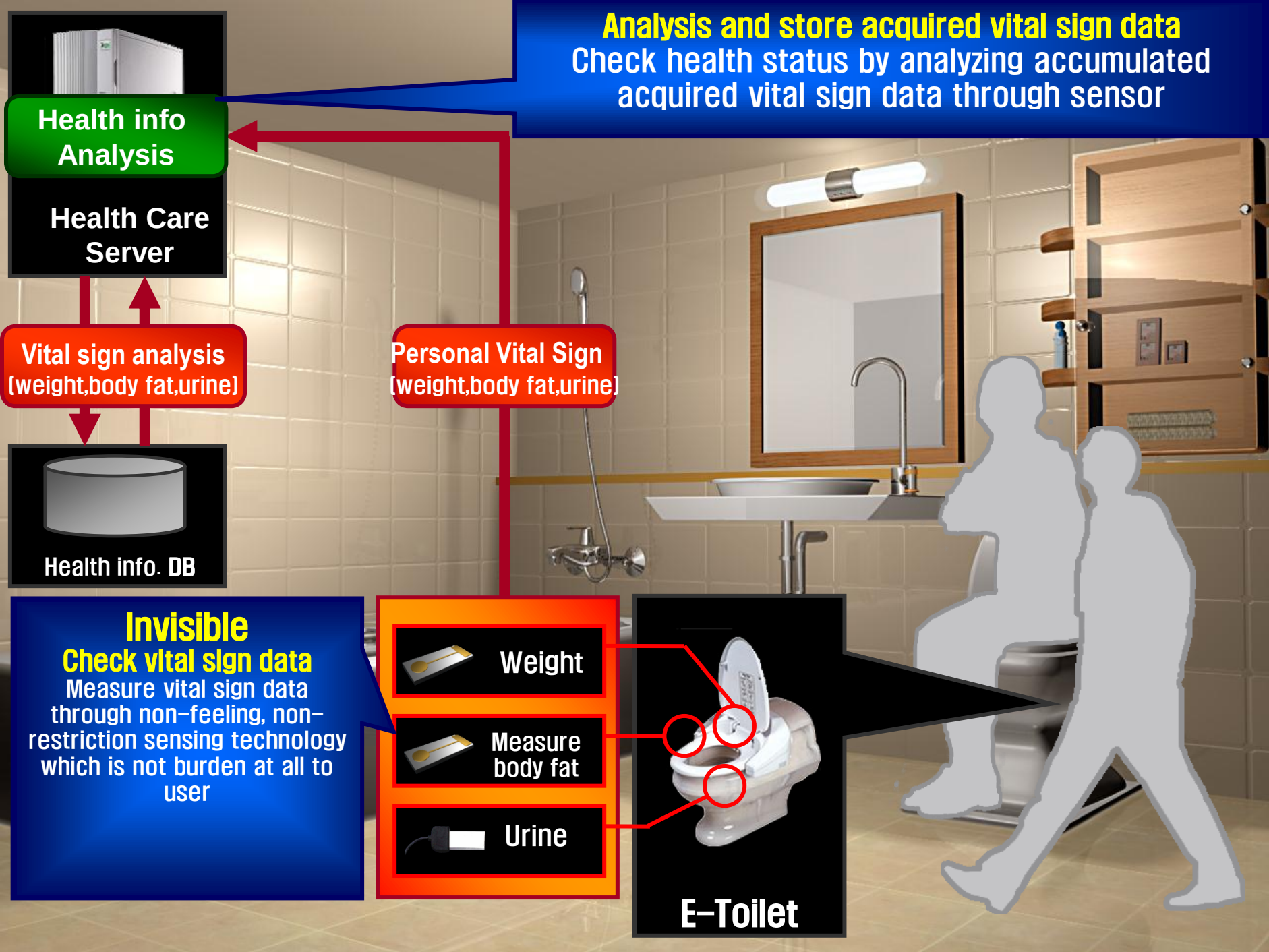
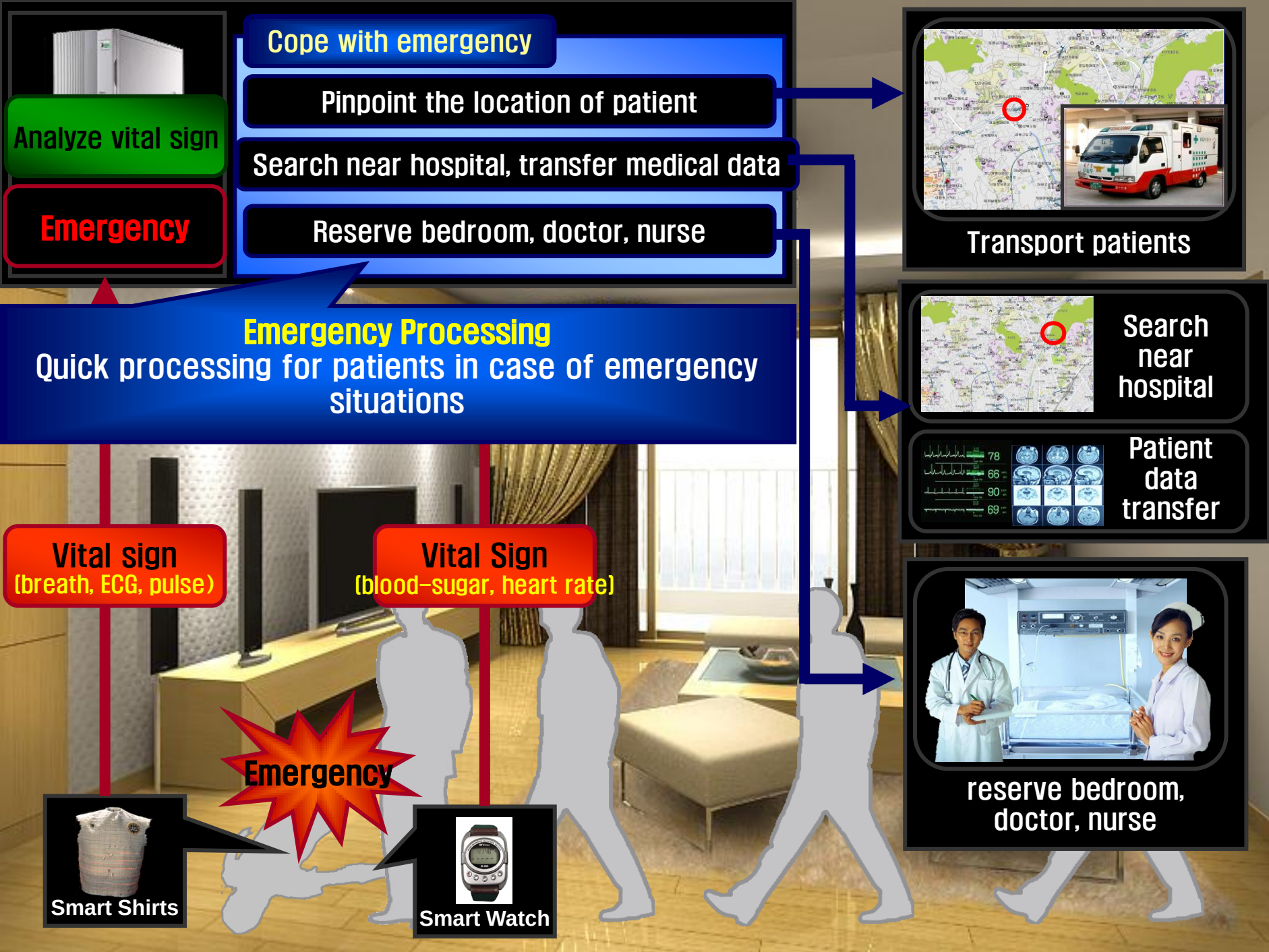
Home Healthcare Scenario


Analysis and store acquired vital sign data
Check health status by analyzing accumulated acquired vital sign data through sensor
Health info Analysis
Health Care Server
Vital sign analysis (weight,body fat,urine)
Personal Vital Sign (weight,body fat,urine)
Health info. DB
Invisible
Check vital sign data
Measure vital sign data through non-feeling, non-restriction sensing technology which is not burden at all to user
Weight
Measure body fat
Urine
E-Toilet


Analyze vital sign
Emergency
Cope with emergency
Pinpoint the location of patient
Search near hospital, transfer medical data
Reserve bedroom, doctor, nurse
Transport patients
Search near hospital
Patient data transfer
reserve bedroom, doctor, nurse
Emergency Processing
Quick processing for patients in case of emergency situations
Vital sign
(breath, ECG, pulse)
Vital Sign
(blood-sugar, heart rate)
Emergency
Smart Shirts
Smart Watch

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

첨단실버 서비스

- 소변분석 사용자 등록
- 소변분석 데이터 열람

연동

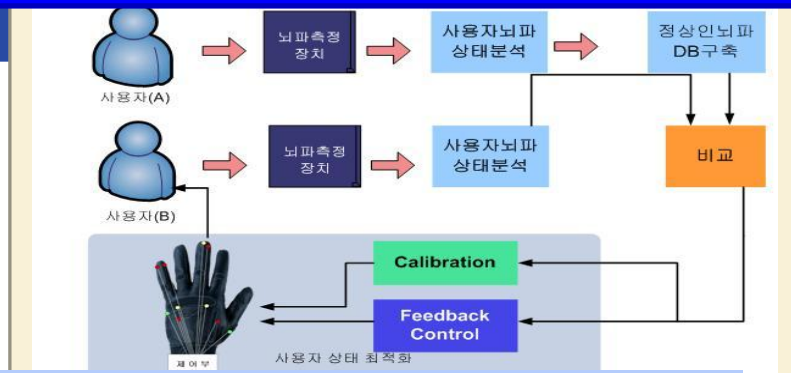
재택 모니터링

- 소변검사 및 분석
- 검사결과보기
- 사용자선택
- 검사결과 데이터 전송

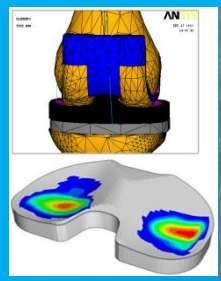
소변검사를 통해 조기 발견 가능한 질환들

비뇨기질환	신장질환,신장염,방광염,신장종양,신증후군,신우신염,요로감염, 요로결석,방광결석, 요붕증,요로출혈,신결핵,신장암,알카로시스
성인병	황달,간질환,담도질환,담석증,간경변,췌장염,고혈압
만성질환	당뇨병,신성당뇨, 만성신장염
기타질환	갑상선기능항진증, 발열성질환

오감정보처리기법 및 뇌파를 활용한 사용자 적용 형 임상진단/치료시스템
출원번호 : 10-2007-0091771



전체 시스템구성도



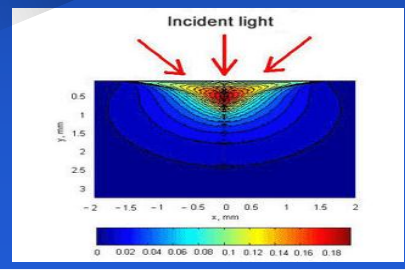
양방치료

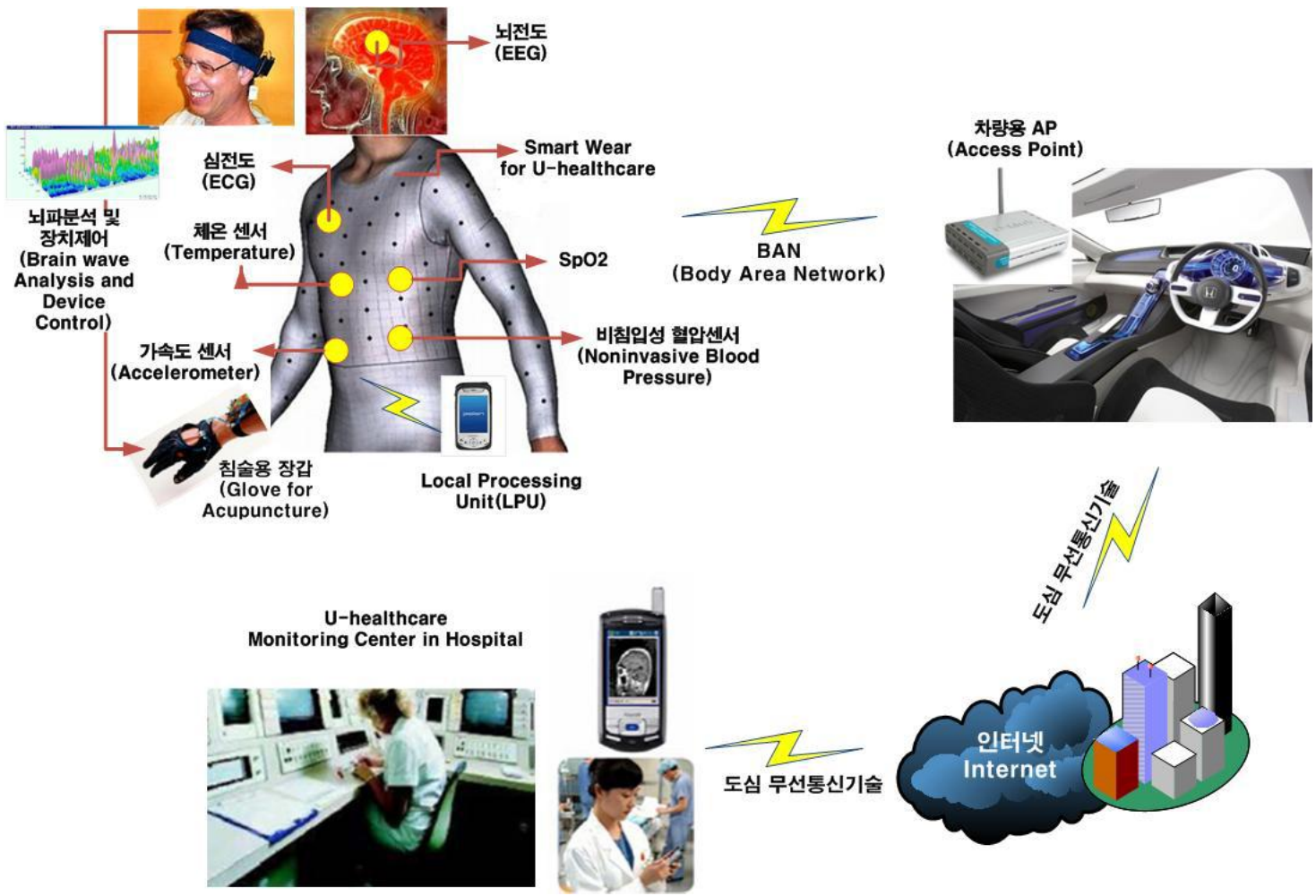
한국 노령환자 맞춤형
인공 슬관절 개발

노령환자
슬관절 질환

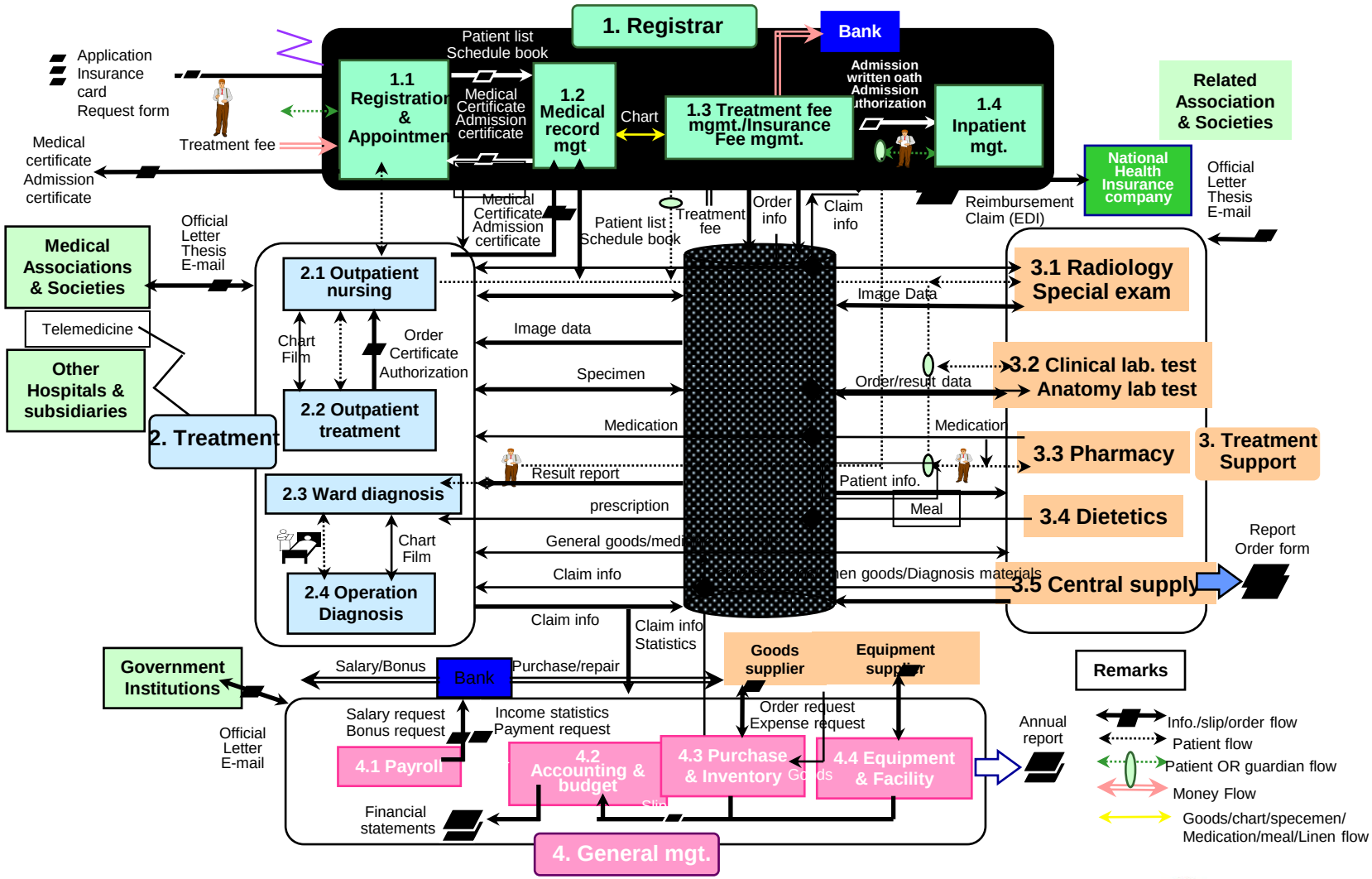
한방치료

저출력 레이저를 이용한
침.뜸 융합기기 개발




뇌전도
(EEG)
심전도
(ECG)
Smart Wear
for U-healthcare
뇌파분석 및
장치제어
(Brain wave
Analysis and
Device
Control)
체온 센서
(Temperature)
SpO2
BAN
(Body Area Network)
차량용 AP
(Access Point)
가속도 센서
(Accelerometer)
비침입성 혈압센서
(Noninvasive Blood
Pressure)
침술용 장갑
(Glove for
Acupuncture)
Local Processing
Unit(LPU)
도심 무선통신기술
U-healthcare
Monitoring Center in Hospital
인터넷
Internet
도심 무선통신기술

Software development in u-Healthcare



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Software development in u-Healthcare

- Web Info.
- Visual Consult

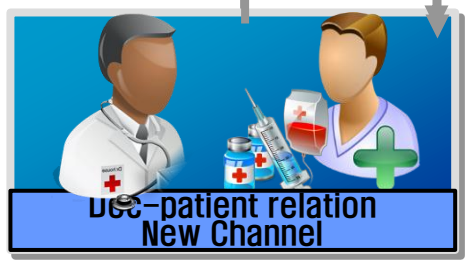
- Patient Mgmt Program
- Prescription communication system
- e-mail
- Homepage
- visual Consult

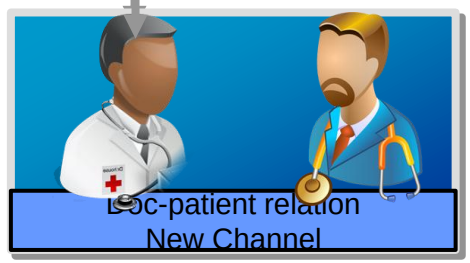
Select Hospital, Doctor

Medical Info. Search

Doctor's Office (Off-Line)

- Insurance Claim
- Patient Mgmt(CRM)





- online study
- Visual Consult
- Remote image read

HOME-CARE

- Homecare nursing business
- visual consult service
- Doctor in charge

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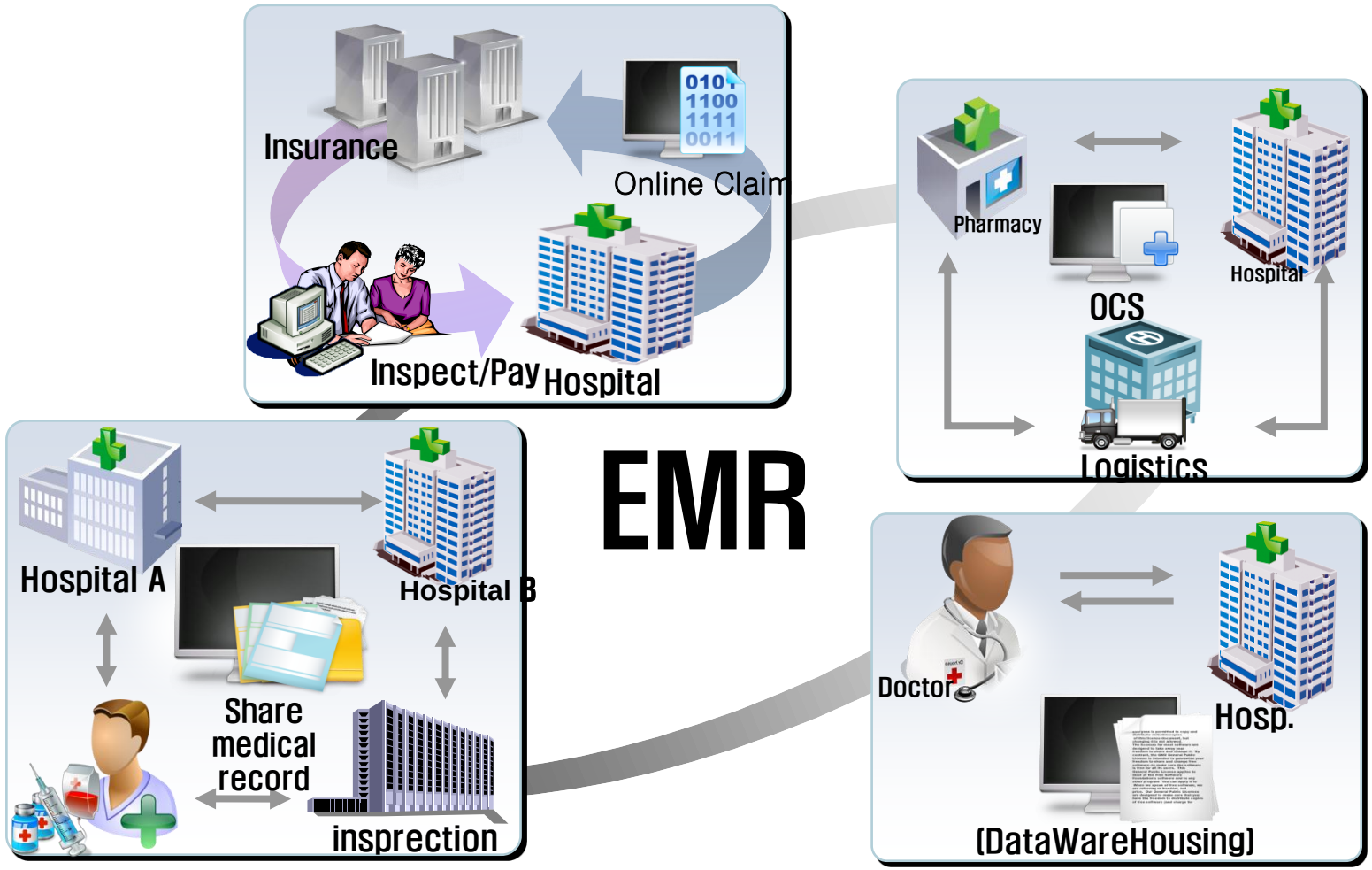
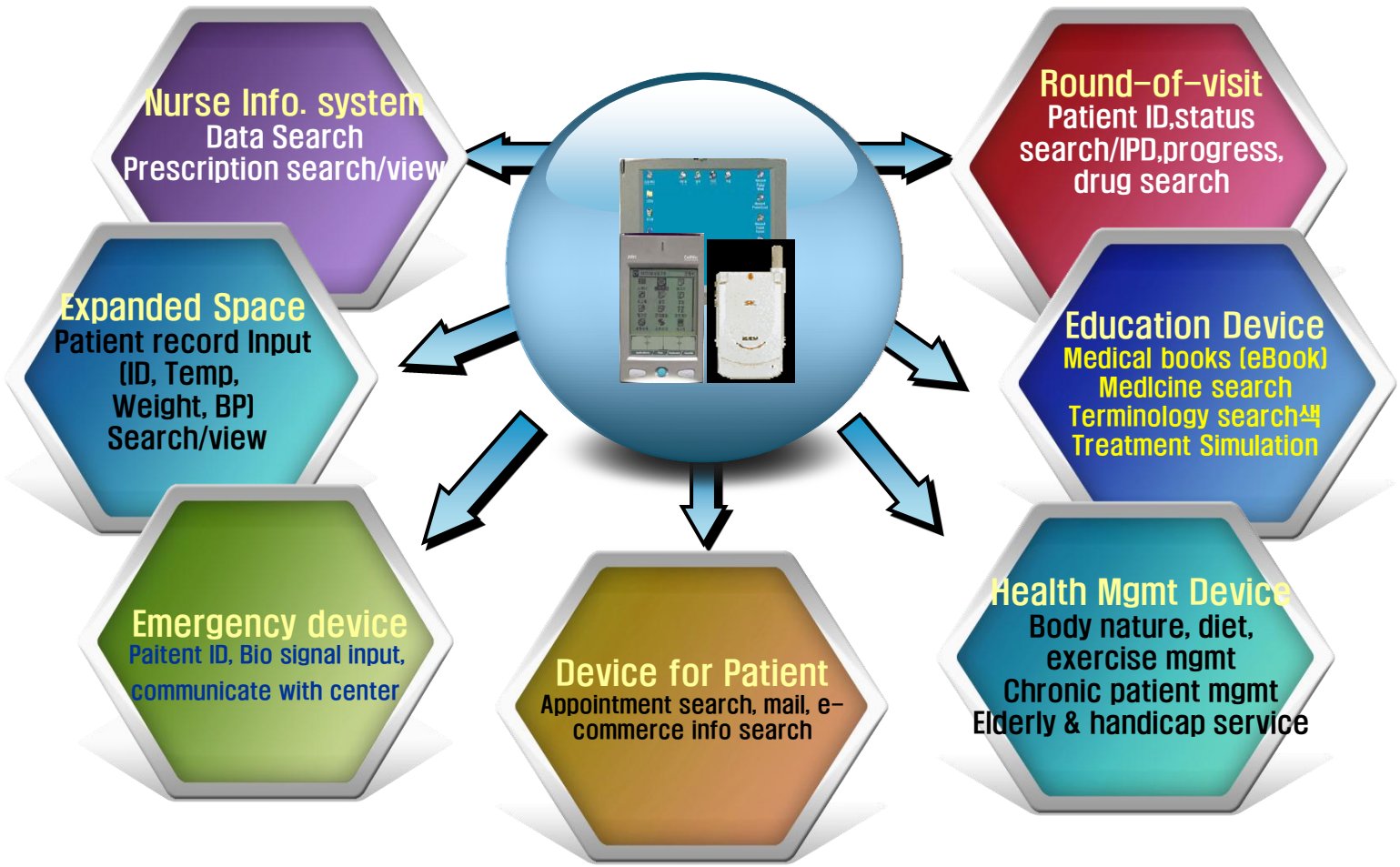
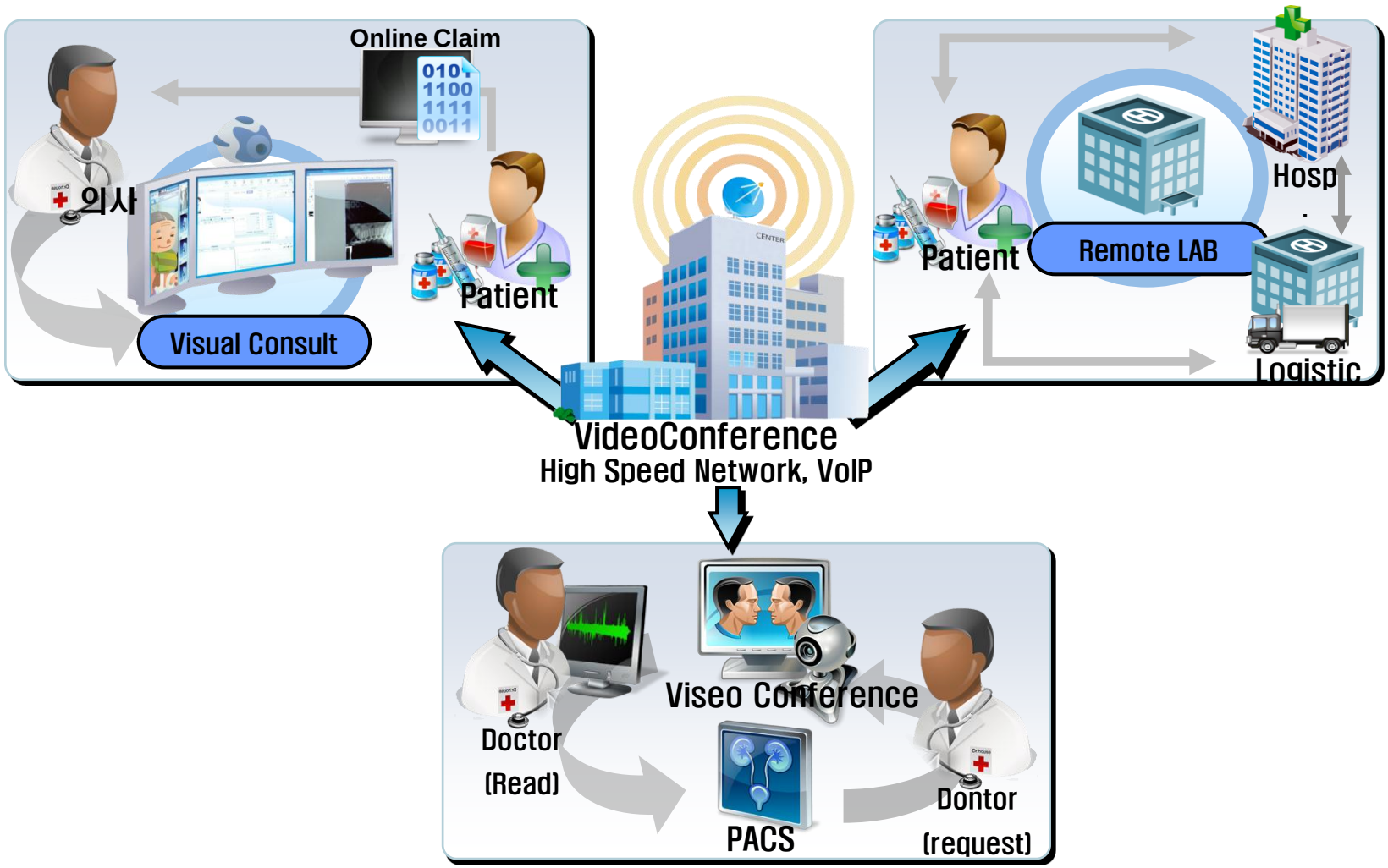
Software development in u-Healthcare



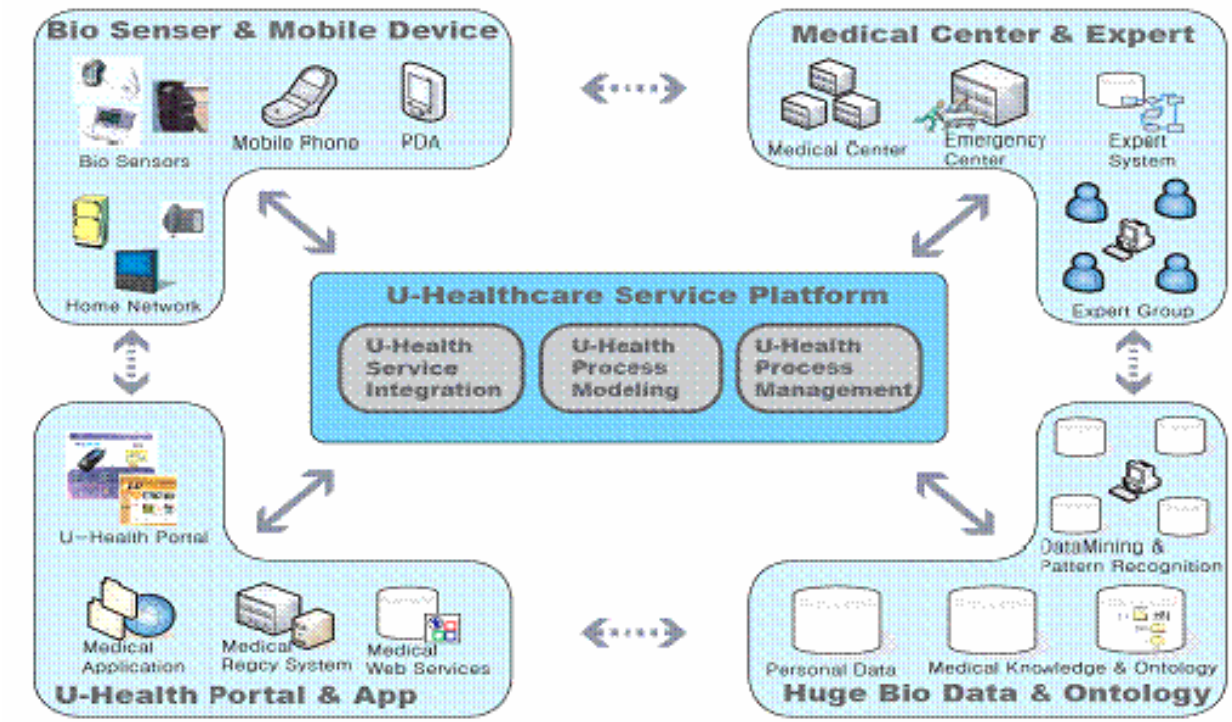
Software development in u-Healthcare



Software development in u-Healthcare

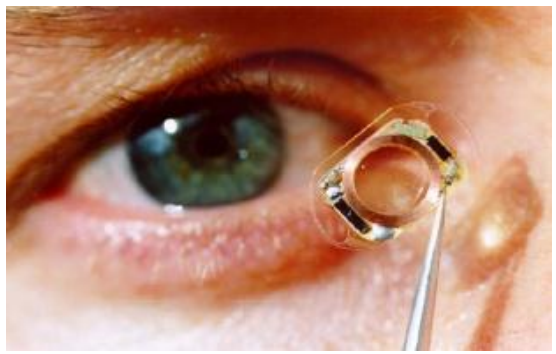


u-Health service platform

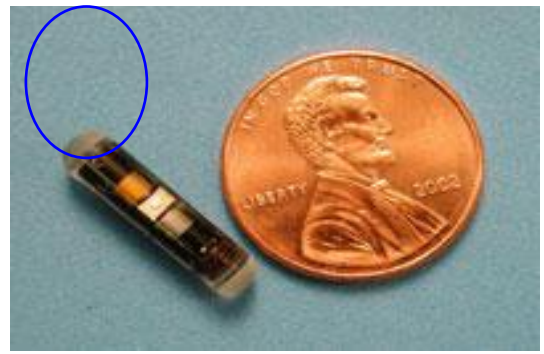


Sensing Technology

- ❑ 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



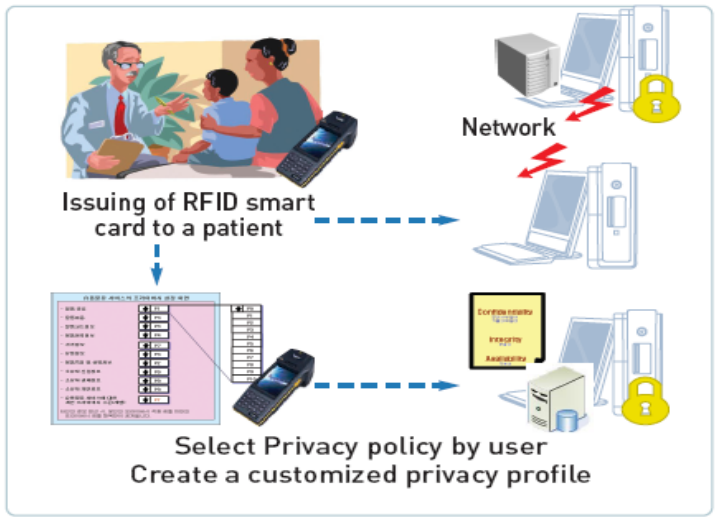
Campus Micro Technologies, Germany

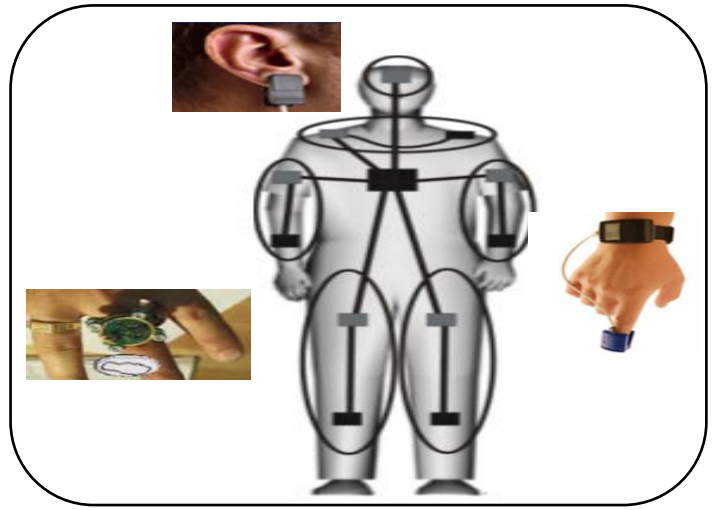


인체삽입혈당센서, 메디트로닉사

Wireless Communication Technology

- ❑ Sensor network that allows to gather real-time info.
- ❑ wireless gateway technology
- ❑ home network
- ❑ Body Area Network(BAN) for personal healthcare

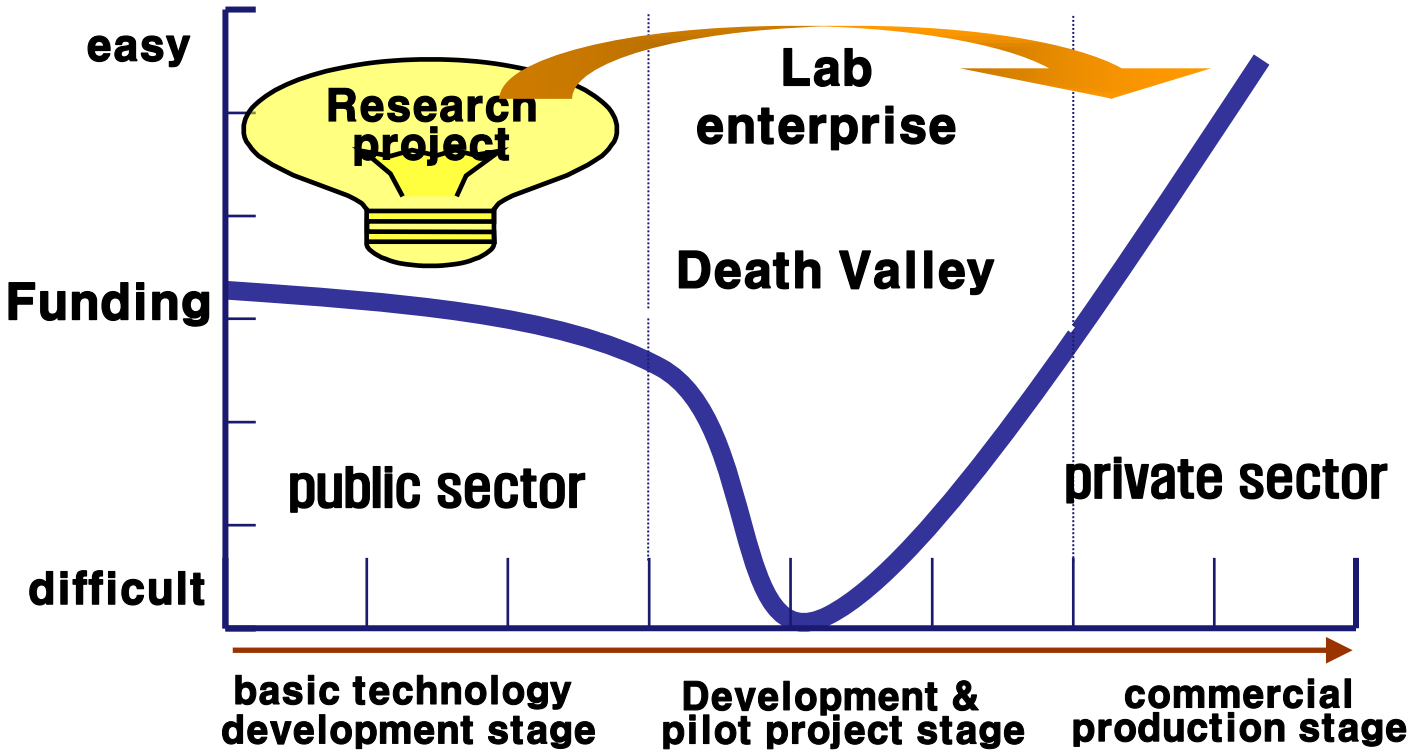




AI & DB Technology

- ❑ Context Awareness Technology
- ❑ Disease pattern analysis and forecasting
- ❑ Decision supporting system
- ❑ Ontology-based data representation
- ❑ Datawarehousing for Healthcare

Software development in u-Healthcare



(source : US ministry of commerce, OECD Work-Shop Dec. 2001]

Thank You