

Health self-service to self-care:
*Building speech-enabled telephone service
for the underprivileged*

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What you will learn

- Socio-economic barriers for information technology
- Public benefit opportunities for speech technology
- Unique case study in healthcare

About iTriage.org

- 501(c)(3) public charity organization since 2004
- San Jose, California
- Studying and bringing technology solutions to help underprivileged
- Operated by 100% volunteers

Background

- Healthcare cost explosion
 - \$1.8 trillion in 2004 [1]
 - Increase rate 4 times of inflation
- Ideal solution
 - Health self-management, driven by information technology
- Reality
 - Unfair distribution of technology benefit
 - Socio-economic barriers

Today – Web centric, User exclusive

The screenshot shows a Mozilla Firefox browser window displaying a health website. The address bar shows "Welcome to [redacted] Health - Mozilla Firefox". The website has a yellow header with the "Health" logo and a search bar. Below the header, there are navigation links like "Home", "News Center", and "Member Services". The main content area features a "Weekend Guide: Get Fit" section with a photo of two women exercising, a "DOCTOR'S VIEWS ON..." section with a photo of a doctor, and a "QUICK PICKS" section with several article links. There is also a "TEST YOUR HEALTH IQ" section and a "LIVE EVENTS" section. The browser window includes standard menu items like "File", "Edit", "View", "Go", "Bookmarks", "Tools", and "Help".



Issues

- Computer ownership and usage
 - 75% of US households own PC (2005 estimate) [4]
- Internet access
 - 75% of US households have Internet access (2004) [5]
- Literacy skills
 - 45% of US adults (90 million) are Level 2 or below [6]
 - Health-related Web content requires Level 3 and above
- Life Style / Attitude
 - Reactive, no time to be proactive
- 80/20 Rule
- Inadequate technology



Tomorrow – Ubiquitous, Non-exclusive

Information should be

- **easy** => simple, accessible, understandable
- **fast** => anytime, anywhere, intuitive
- **inexpensive** => low cost to develop, maintain and operate



Universal Access

System Requirements for Universal Access

1. Multi-channel
 - Telephone, mobile msg, PC
2. Multi-language
 - English, Spanish, Chinese, Vietnamese, etc.
3. Multi-content
 - Healthcare, car troubles, tax advice, etc.
4. Automated system
 - Low cost to develop, maintain and operate

5. Simple, interactive interface



Understandable, actionable content

Solution

- Apply triage concept to information processing
- Triage
 - Common practice in disaster situations and ER
 - Rapid, approximate assignment of action priority
 - Large number of incoming patients
 - Limited time, equipment, process capability
 - *Must act now!*
 - For information users
 - Large volume of information, large number of users
 - Limited time, equipment, process capability
 - *Must act now!*

Information Triage

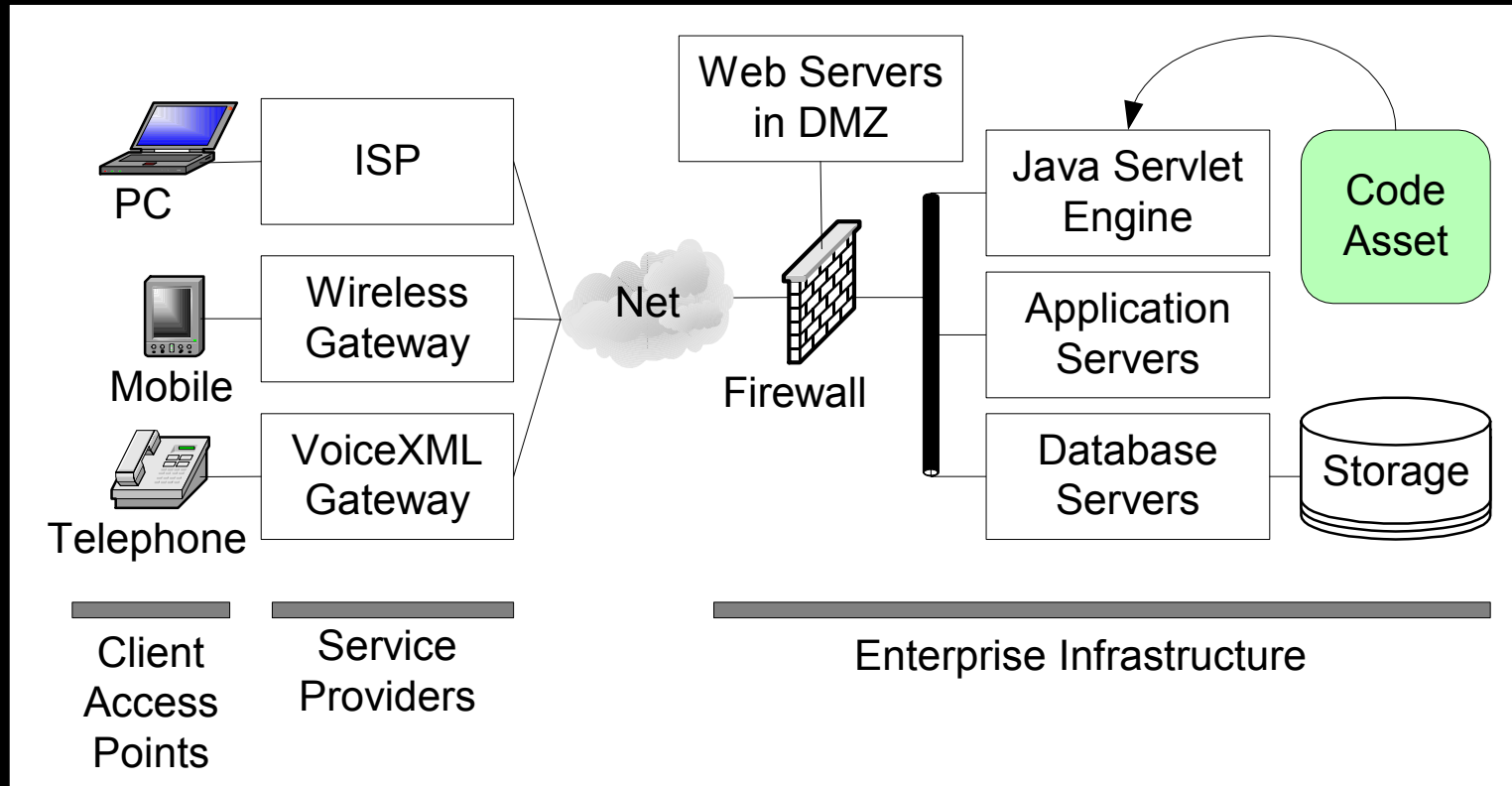
Information Triage

- Marshall and Shipman (1997)
 - Defined Information Triage as “*the process of sorting through relevant materials, and organizing them to meet the needs of the task at hand.*”
 - Visual and spatial affordance (VIKI) [7]
- Macskassy and Provost (2001)
 - Correlation between content and future events (prospective indication) [8]
- Isaka and Nguyen (2005)
 - “*rapid, approximate prioritization of information based on user interests, subsequent actions and available information*”
 - Triage policy control by decision tree schema
 - multi-modal self-service system (**iTriage**) [9]

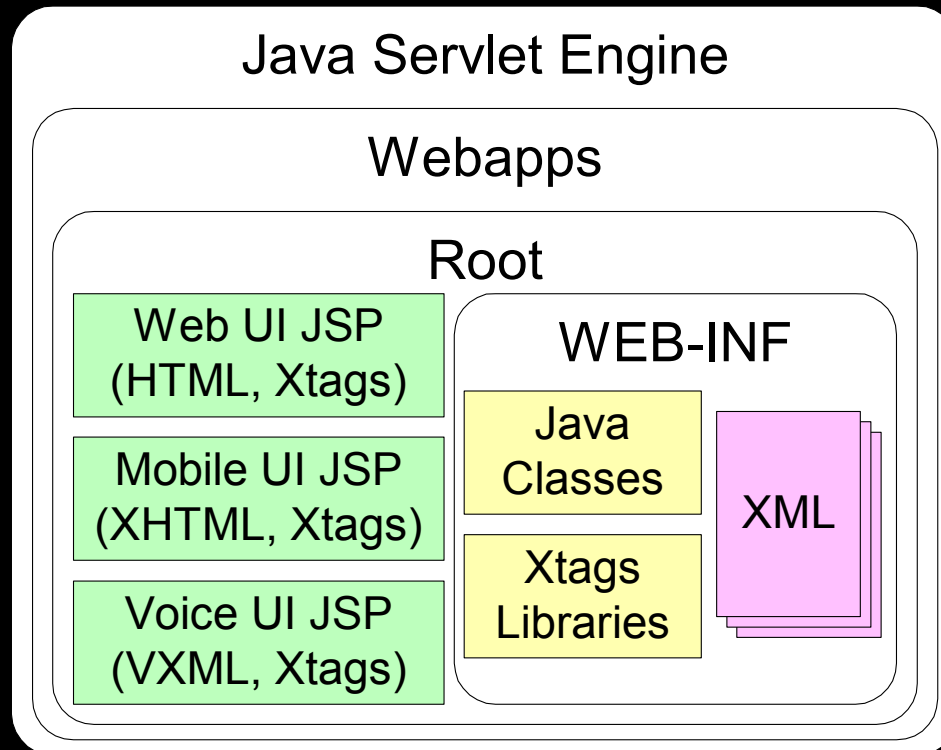
Self-service to Self-care

- A multi-purpose, multi-modal self-service system
 - Multi-channel (telephone, mobile msg, PC)
 - Multi-language (English, Spanish)
 - Multi-content (healthcare, car troubleshooting)
- Generalized decision tree schema in XML
 - Unification of representation and dialog
 - Closed (yes/no, which) vs. Open dialog (what, when, where, who, why, how)
 - Provides the simplest form of interaction in any language, culture or subject matters
 - Delivers actionable content in simple, interactive interface
- Automation
 - Low cost to operate and maintain
- Universal access system, not a medical triage system

System – Physical Architecture



System – Code Asset



Use Case



Telephone →

System

System: Is your baby less than 6 months old?

Caller: No

System : Does your baby have a rash?

Caller: No

System : Does your baby tug at either ear?

Caller: Yes

System : Code 384. Infection of the middle ear is a common cause of a raised temperature in babies. **Would you like to speak with a nurse?**

Caller: Yes

System : OK, one moment. Please mention the code 384 when you speak with a nurse.

Use Case



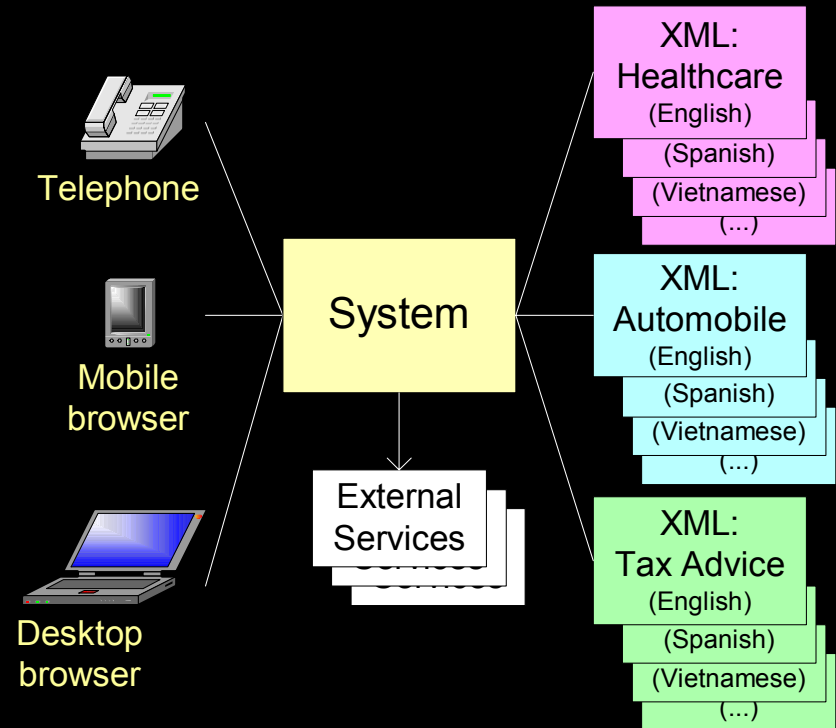
Mobile Web →

System



Applications

- Health self-management
 - Action priority assignment
 - Overcome literacy and socioeconomic barriers
 - Healthcare cost reduction
ROI 40:1
- Other domains
 - On-the-road car troubleshoot
 - Tax advice
 - Insurance application



Conclusions

- Speech and information technologies can help overcome literacy and socio-economic barriers
- Cost benefit of open source software, industry standards and hosted services
 - XML, VXML, XHTML, Tomcat
- Current and future works
 - Community-based pilot study
 - Language expansion (Vietnamese, Chinese)
 - Content expansion

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For more information

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