

# A Context-aware Course Management System under Ubiquitous Computing Environment ULAN Project, Information Technology Center, Nagoya University

## Project Summary

"Development of fundamental software technologies for digital archives", i.e., "CC Society", is a research and development project on software technologies and standards required for utilizing and preserving intellectual properties in the fields of education, culture and the arts. The project comprises five subjects in the two major domains: Digital archive of cultural properties; Development of learning systems utilizing digital archives for educational institutions.

As one of five subprojects, Nagoya, Kyoto and Osaka Universities are forming a ULAN project to realize a next-generation Course Management System under ubiquitous computing environment. Especially, ULAN Nagoya team is focusing on developing a context-aware CMS under the collaboration with CSK Systems Corporation.

### Targets in 2004

**\*Development of prototype system that enables us to acquire user context (Nagoya University)**

Architecture design for the acquisition, integration and adaptation of user context, development of core technologies, and feasibility study using prototype system

**\*Investigation of the ability to extend functionalities and its validation (CSK Systems Corporation)**

Architecture design for the integration of Rich Client and vender-based CMS

### Requirements for Next Generation CMS

**\* CMS (Course Management System)**

CMS enables us to enhance teaching and learning in higher educational institutions, by totally supporting an educational process - course - not only for class time but also for outside of "class time"

**\* Main Functionalities of CMS**

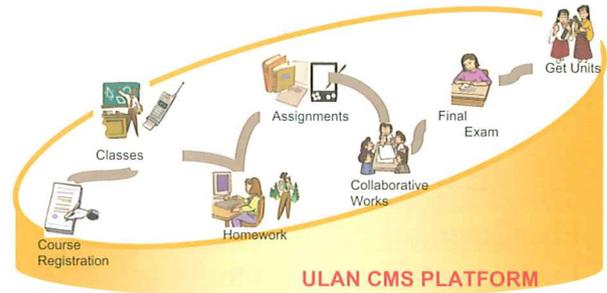
1. Functions to support teaching by faculty
2. Functions to support learning by students
3. Functions to support the management of course by faculty
4. Functions to support system administration

**\* Teaching and Learning Environment To Be Target**

Place: on-campus (large and small class room, library and so on)  
off-campus (home, office, subway and so on)  
Scale: from mass class to individual study

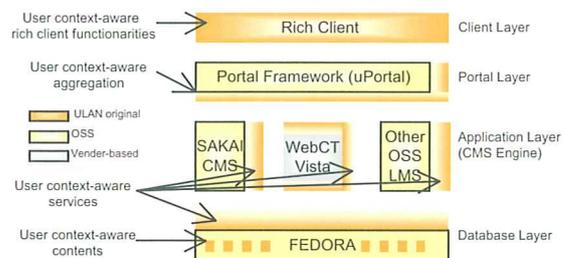
**\* Devices for Teaching and Learning**

PC with Large display, desk-top PC, note-book PC, PDA, cellular phone



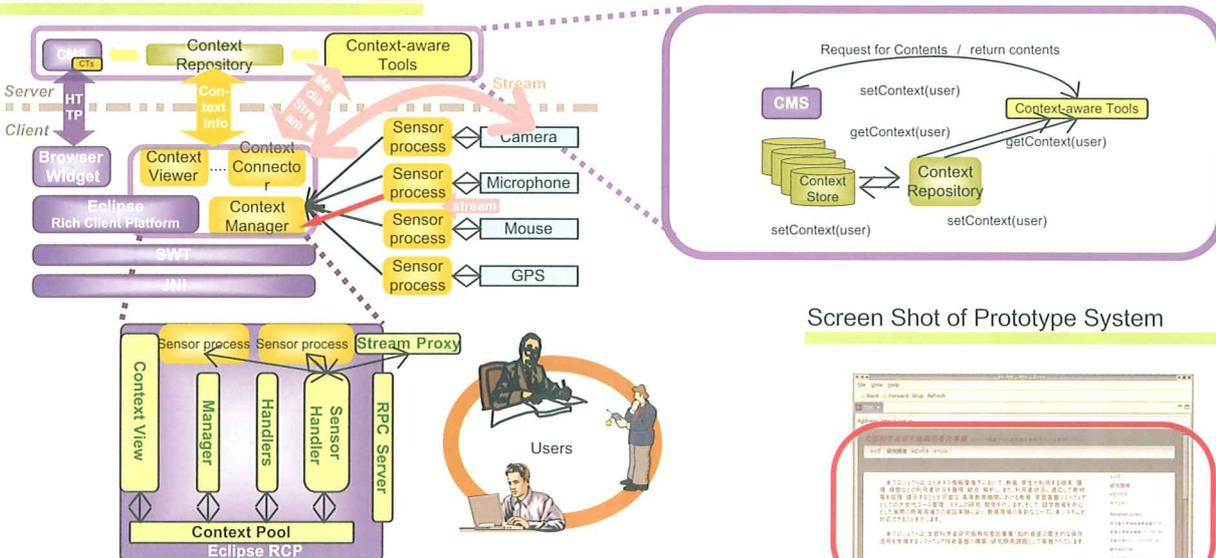
### ULAN CMS Architecture

- \* Four Layered Architecture
- \* Open Source Based
- \* Open System Based



## Prototype System of ULAN CMS Client Software

### ULAN CMS Client Software Architecture



### Screen Shot of Prototype System



**\*Acquisition of User Context**

- ◊ Sensor Process: register context to Context Manager using camera, microphone and sensors
- ◊ Context Manager: manage context from Sensor Process, and provide to Context Connector
- ◊ Context Connector: acquire context from specified Context Manager, and provide user authentication service to Context Repository

**\*Management of User Context**

- ◊ Context Repository: manage context, user authentication, context registration and lookup, and Context Store
- ◊ Context Store: provide persistent service for context, together with LDAP and DBMS
- ◊ Context Aware Tool: provide interfaces to use Context Repository

**\*Adaptation to User Context**

- ◊ Context Aware Tool implementations: the ability to build context-aware environment using defined contexts
- ◊ Registration of users for Context Repository: registration of users using admin ID and user ID
- ◊ Extensible context Definition (option): definition of new context
- ◊ Sensor Process implementations: required to implement sensor process for each context acquisition
- ◊ Context dependent Contents: contents that has context-aware components



Ubiquitous Learning Architecture for Next generation