

A modern living room interior featuring a large wall-mounted aquarium, a dark wood coffee table with a bowl and a cup, two white sofas with green and white pillows, and a chandelier with four lights. The room is decorated with potted plants and a bamboo mat on the floor.

SMOOL

The Smart Space Modeling, Access and Deployment framework

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What's a **SMART SPACE**?

A smart space is *an environment* in which *devices interact* with each other to provide the users *added value services*.



SmartCityJaén



UNIVERSIDAD DE JAÉN

31 billion devices / **connected to the internet**
& 4 billion people by 2020

2020

2019

2018

2017

2016

2015

2014

2013

2012

2011

2010

2009

2008

2007

2006

2005

2004

2003

2002

2001

2000

1990

1980

1970

15 Billion
connected devices

5 Billion
connected devices

2 Billion
connected devices

93,047,785
connected devices

313,000
connected devices

188
connected devices

13
connected devices



Tablets take off with the launch of Apple iPad*

Launch of Google TV* and best-seller Freebox Revolution

BMW* offer full in-car internet

Sales of laptops overtake desktop PCs for the first time

Launch of the Amazon Kindle*

First connected TV, the Roku Netflix* player, is available

First connected smart energy meters are available

Facebook* is founded

Sony LIBRIé* arguably the first e-book reader, launched

Launch of Xbox LIVE*

Introduction of the first smartphone, the Palm Kyocera*

BMW* manufactures first connected car



First connected games console, the Sega Dreamcast* is launched

Google* founded

First web-based email service, Hotmail* is launched

World Wide Web is born



First laptop, the Osborne* is built

Launch of first mass market home PC and PC modem

Intel 4004, the first commercial processor, is launched



What are the main objectives of **SMOOL**?

- Manage **heterogeneity** among devices
- Provide a **Toolkit** to **design, validate and deploy** smart spaces
- **Flexibility** vs. ad-hoc solution
- Access through a **single application** to the smart space.

Infrastructure

- **SMOOL** is based on the well-known Smart M3 middleware. Branch of the Sofia Community.
 - Publish/Subscribe paradigm
 - Sematic Information Broker (SIB)
 - KP libraries (J2SE, Android, C++)
- Additional features developed:
 - **REST interface** for the SIB
 - **Persistency** manager
 - **Authorization** & user management

REST Interface

- The REST interface enables **read-only access** to (some) information stored in the SIB via HTTP
 - Responses are **JSON strings** with the triples
 - Queries are supported
- The main goal of the REST interface is to become a **gateway between hierarchically organized SIBs**
 - Local smart spaces can share data with smart spaces at a higher level

Persistency

- The SIB includes a **MySQL client** that connects to a database on start-up
 - Store persistent data
 - **Load and publish persistent data** to connecting KPs on start-up
- Persistency enables the **smart personality** concept in the smart space
 - The smart space stores the **preferences of the users** and shares them with the applications

Authorization and Users

- **SMOOL** includes **access control** with users, groups and permissions
 - Users and groups may define permissions to access produced data to other users/groups
 - Subscriptions may be linked to a user/group
 - “Guest” user may access limited data in the smart space
 - Communications on top of SSL
 - Users and permissions are only modified at design time

Development of KPs

- **SMOOL** has extended the SOFIA ADK:
 - A **single ontology** is used:
 - **Extensible**
 - Managed by the SIB (ensuring **backward compatibility**)
 - Improved KP generation wizard, including example application code:
 - Generation of **Model, SSAP and Connector layers**
 - **Direct compilation** to a shared library
 - **Simplified KP API:**
 - Easier discovery and connection control
 - Model layer helpers
 - **Unified API** for all supported languages

Modeling and Deployment Tool

- **SMOOL** provides an easy to use editor for non-expert users:
 - Model the devices connected to the smart space
 - Easily create smart applications
 - Define UI for smart-phone/tablet access
- The editor is currently under development, but...
 - ...let's [see how it'll look like!](#)

Conclusions

- **SMOOL** aims at becoming a **full-fledged framework** for smart spaces design and development.
- It is **based on the M3 middleware**, with some add-ons required for the implementation of the smart spaces concept:
 - REST Interface. Persistency and Authorization
- **Expert users** may create their applications with the **SMOOL** SDK, which extends the SOFIA ADK
- **Non-experts** will be able to create simple smart spaces without coding
- The **SMOOL** **Android application** will be released along with the smart spaces editor



THANKS

For more information visit:

<http://code.google.com/p/smool/>

www.tecnalia.com

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