



Enabling Service Oriented Collaboration and Innovation on the Next Gen NBN

A/Prof Tham Chen Khong
Programme Manager
POISe (Services) Programme
Institute for Infocomm Research (I²R)
A*STAR
E-mail: cktham@i2r.a-star.edu.sg



Overview

- Services and Service-Oriented Architecture (SOA)
- Collaboration over SOA
- Innovation Value Chain
- Vision of Collaboration and Innovation on Next Gen NBN
- Some Challenges and Solutions
- Conclusion



Services and Service-Oriented Architecture (SOA)

- Encapsulate functions and processes into modules called “services”
- Services can be combined to form business models and applications
 - Agility: can adapt when conditions change
- Service Oriented Architecture (SOA)
 - enables services from different organizations in the value chain to be integrated, i.e. “service composition and orchestration”
 - services can be reused and information can be shared (over the Enterprise Service Bus (ESB))
 - provides framework for heterogeneous systems and processes in different organizations to interoperate in a homogeneous manner

Collaboration over SOA: SAP

- Industry Value Network (IVN) in many industries
 - Aerospace and defense
 - Automotive
 - Banking
 - Chemicals
 - Consumer products
 - Forest and paper
 - High tech
 - Industrial machinery and components
 - Logistics service providers
 - Mining
 - Oil and gas
 - Public sector
 - Public security
 - Utilities
- Industry ecosystem collaboration to better cope with increasingly complex and rapidly changing business environment
- Network of ISV, system integrators, technology vendors, executives from the industry
- Create and improve industry-relevant business processes and integrated end-to-end solutions
- SAP SOA-based NetWeaver as the technology platform for product and service innovation
- **Customers are co-innovators of new solutions**
- **Leverage web of expertise, solutions and capabilities of the different parties**
- **New level of interoperability and standards**

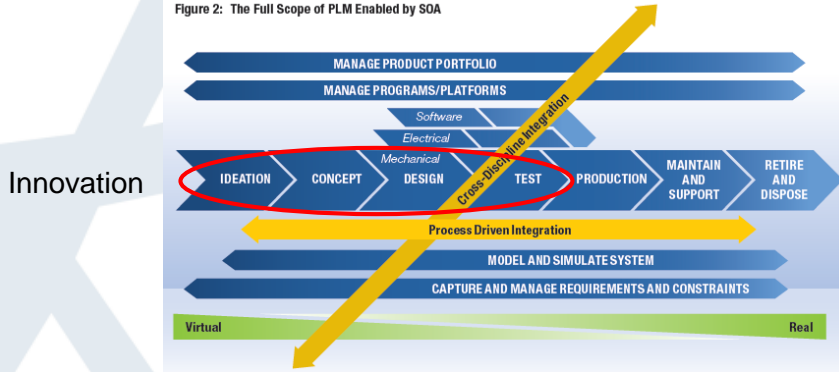
SAP NetWeaver[®] PROCESS INTEGRATION 7.1

enables process-centric collaboration among SAP and non-SAP business applications

Innovation Value Chain

- **Innovation:** “Process by which an idea or invention is translated into a good or service for which people will pay. To be called an innovation, an idea must be replicable at an economical cost and must satisfy a specific need.”

Figure 2: The Full Scope of PLM Enabled by SOA



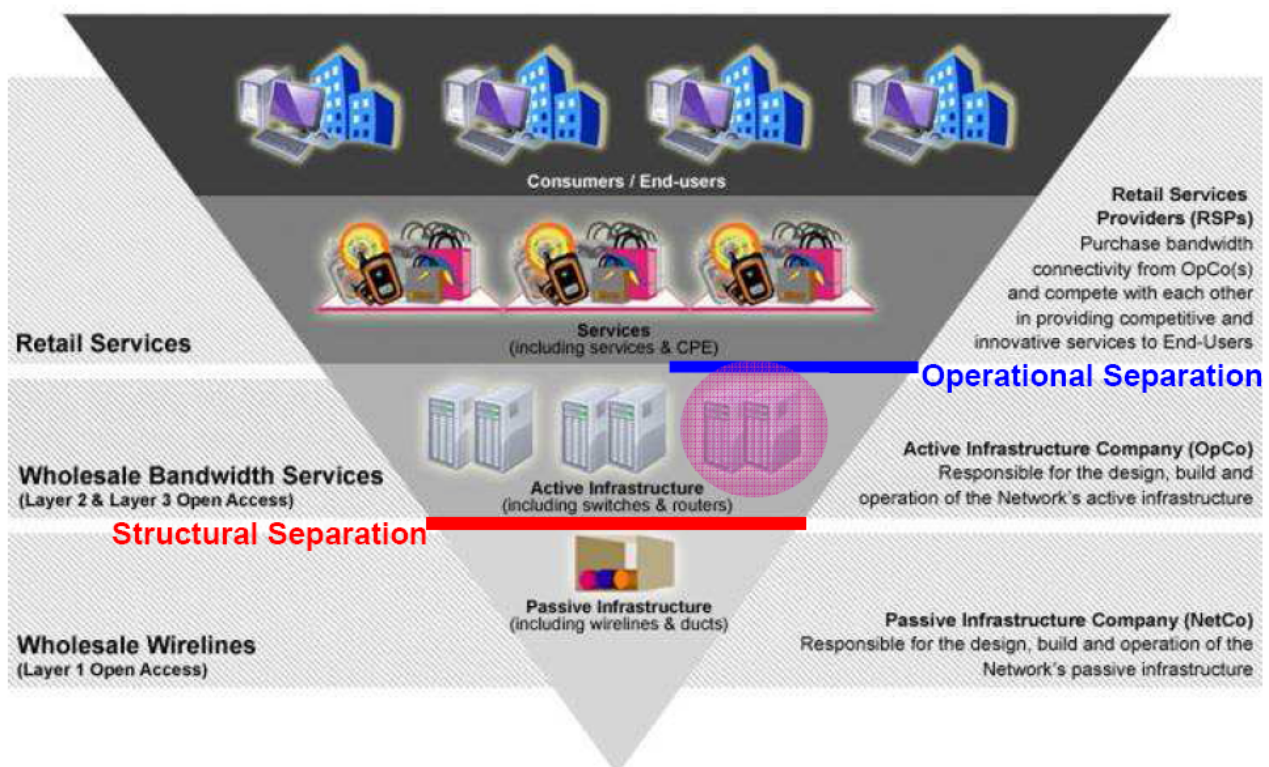
Source: IBM

- Increasingly, innovation can come from internal and external sources (open innovation) – in the areas of products, services & business models
- Process is usually iterative
- Using an SOA, each party can modify its contribution to the chain up to the end users and all parties can observe the effects
- UK and Korea have championed e-Science over SOA



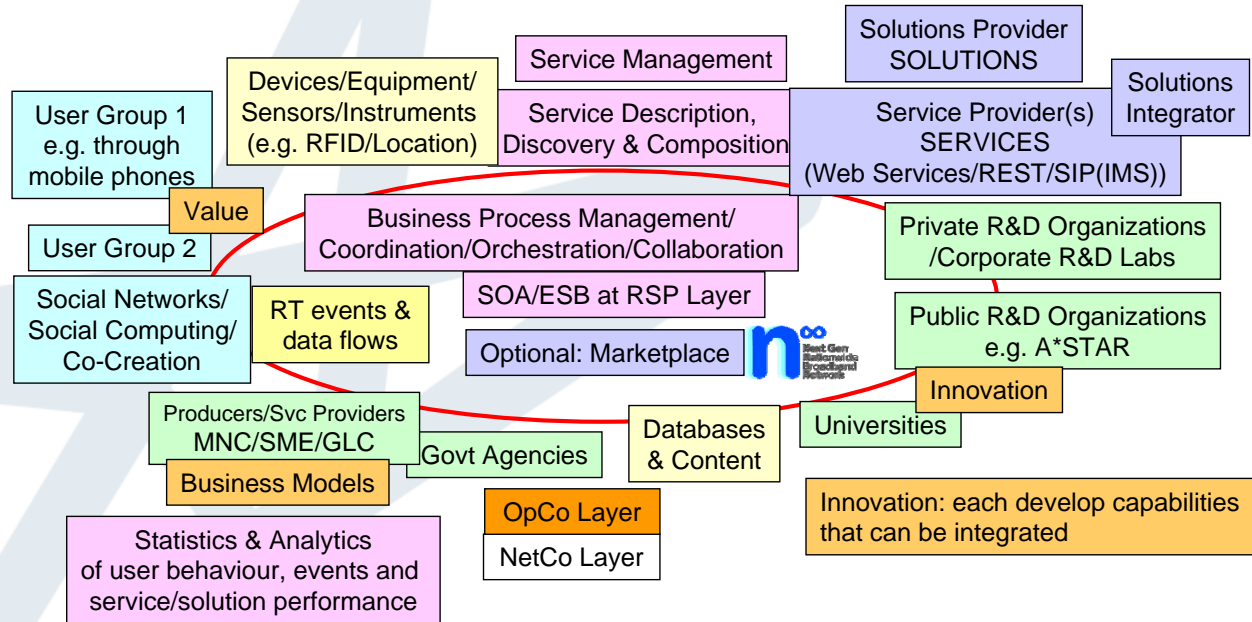
Next Gen NBN Project

Next Gen NBN Industry Structure



Vision of Collaboration and Innovation on Next Gen NBN

RSPs can operate the pink, purple and light yellow boxes



Services can be produced by R&D organizations, universities, Govt agencies, companies, and even users themselves (e.g. community-driven applications)!

© CK Tham I²R, IDA Lighthouse Ideas & Innovation Workshop, 8 Oct 2009

9



Some Challenges

- Integrating services from different parties is not straightforward
 - functionalities and process models for different types of services are described in different ways
 - need to determine the effectiveness of different integration (service composition) strategies
 - need to adapt when services fail, other better services emerge etc.
- Real-time data flows are usually not well-handled
- End users are increasingly using mobile devices

© CK Tham I²R, IDA Lighthouse Ideas & Innovation Workshop, 8 Oct 2009

10

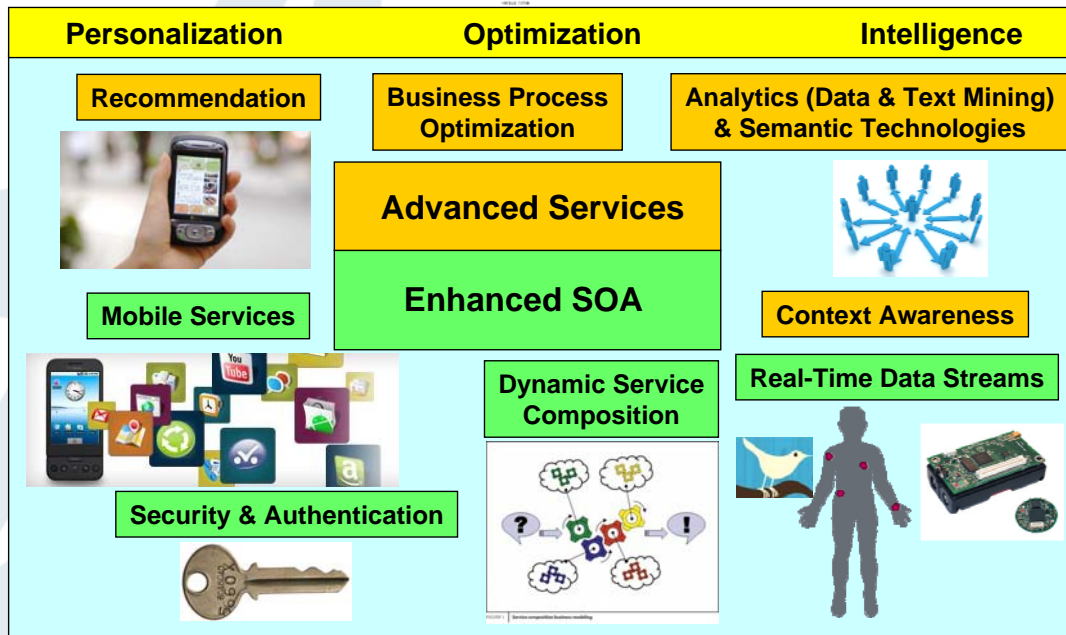


Personalization, Optimization & Intelligence through Services (POISE) Programme at I²R

Healthcare & Wellness Services



Other Service sectors, e.g. Transportation



Contact Person: Assoc Prof THAM Chen Khong, Programme Manager. E-mail: cktham@i2r.a-star.edu.sg, Tel. 6408 2242

11



Conclusion

- There are many advantages to deploying a large scale SOA/ESB at the RSP/OpCo layers on the Next Gen NBN for collaboration and innovation
- A*STAR can be an innovation partner





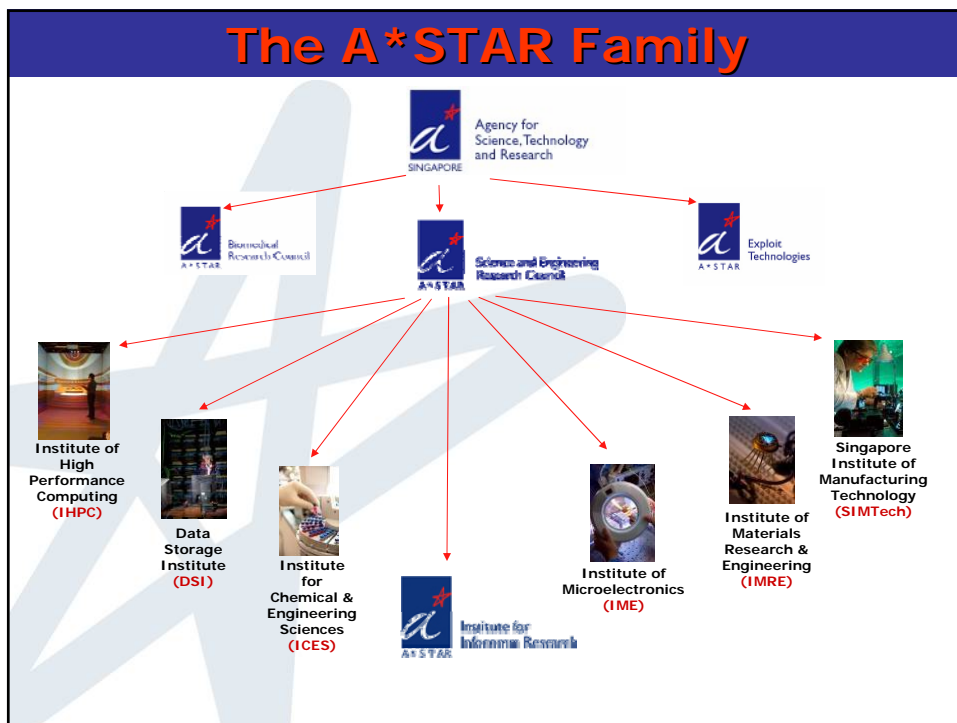
Thank You Questions?

Contact: Tham Chen Khong
E-mail: cktham@i2r.a-star.edu.sg



A*STAR - Partner in Innovation & Growth

Thursday 8th October 2009

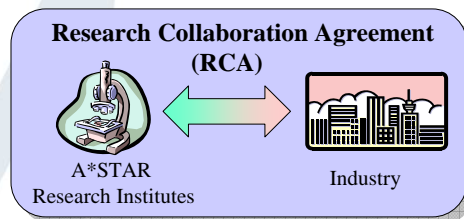


A*STAR – Engaging the Industry

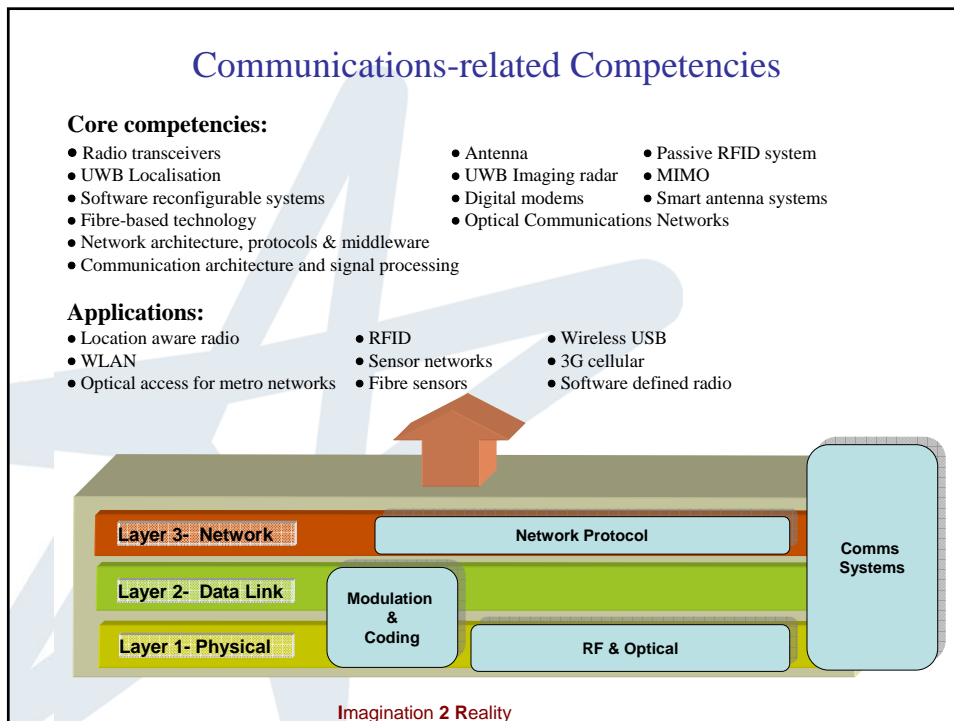
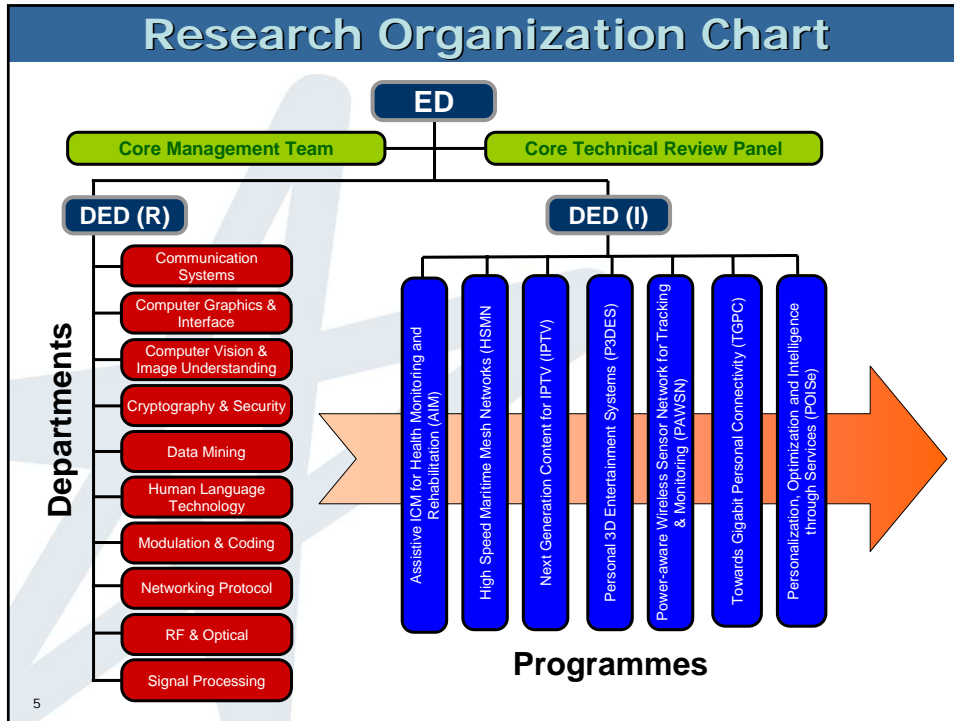
1. Research Collaboration
2. Technology Incubation
3. Business Incubation
4. Technology Licensing
5. Technology Road-mapping
6. Secondment of Technology Experts
7. Technical Advisor



Research Collaboration (Research Institutes “RI”)



- **Joint Development & Partnership** – achieve common milestones and deliverables
- **Contributions** – funding cash/in-kind (manpower, consumables or equipment)
- **Benefits** – Access to RI expertise & capabilities
 - Company gains research expertise & experience



Media-related Competencies

Core competencies:

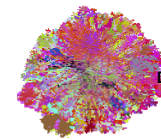
- Automatic Image Annotation & Recognition
- Brain-Machine Interface
- H.264 / AVC / MPEG 4 Part 10 Video Codec
- Interactive Computing
- MPEG-4 Audio Scalable to Lossless Coding
- Multi-modal Biometric & Context Awareness
- Multilingual Information Extraction, Retrieval & Modeling
- Multimedia Assurance
- Scene Analysis & Understanding
- Speech, Speaker & Language Recognition
- Sound Synthesis
- Data Mining
- Bioinformatics

Applications:

- Homeland security
- Surveillance
- Proactive Healthcare (PSP)
- Decision Systems
- Media search & indexing
- MPEG-x, JVT, H.26y, JPEG
- Biometrics
- Multimedia Communications & Transmission System
- Immuno-informatics
- Media Forensics



Computer Vision



Data Mining

Computer Graphics

Signal Processing

Human Language Technology

Computing-related Competencies

Core Competencies

- Cryptography - design and analysis of cryptosystems

Applications

- Sensor network security - key distribution and detection of node compromise
- Privacy protection - security and privacy in e-commerce and data mining
- RFID security - fighting physical counterfeits by secure RFID data chaining and management
- Security protocols - authentication, fair exchange, e-payment, key agreement
- Defending against malware - protect mobile devices from virus and worms
- Digital rights management - digital copyright protection by software obfuscation

A*STAR Technologies

1. Scalable to Lossless Coding (SLS)
2. Mobile Image Recognition & Annotation (Snap2X)
3. Gender Recognition/Age Classification
4. DRM for Personal Content (SuSie)
5. Human Language Technologies
6. Scalable Video Coding (SVC)

Scalable to Lossless Coding (SLS)

- 1. Scalability Media Technologies to allow users to Truly Enjoy the Best Media Quality Everywhere and Every time via Today's Pervasive Wireless/Mobile/Wired Broadband Access**
- 2. MPEG-4 SLS as the standard format for adaptive online audio streaming**
- 3. Providing incomparable streaming music listening experience**

Extensions for IP Streaming

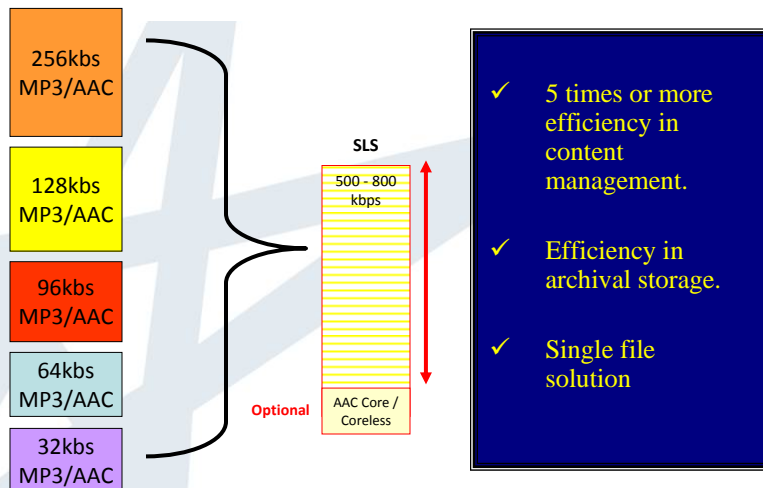
The dynamic, real-time scalability of the MPEG4-SLS makes it ideal for addressing the issues of IP Streaming

- Dynamic, real-time, fine-grained scalability of output bit-stream that adapts to live network conditions.
- One file per title for simplified content management and content distribution.
- Provides handle for real-time throttling of streamed bit-rate giving service provider the ability to adjust service according to network conditions and to implement QoS strategies.

14/10/2009

Slide 11

Optimized Efficiency (Cost Saving)



14/10/2009

Slide 12

Snap2X

Interactive Mobile Image
Recognition System together with
Location Based Service
to add value to
users' experience of acquiring
information and products

What is Snap2Tell

- Mobile Image Recognition Engine
- Image Recognition Engine developed at A*STAR's I²R
- Associates Point of Interest (POI) with relevant information



What is Snap2Play

- Interactive Mixed-Reality mobile application
- Employs Snap2Tell's Image Recognition Engine as well as multi-input modalities (i.e. GPS and accelerometer sensors)



Quest

Potential Business Opportunities

- Mobile Learning Experience - Education (e.g. Snap2Play @ Zoo)
- Mobile Interactive Tourist Guide
- Digital Out-of-Home Advertisement
- Mixed-reality Mobile Gaming (Team Building, Social network virtual reality game, etc)

Gender Recognition/Age Classification - Overview

- A subset of the video analytics technology
- From a video stream,
 - Extract the relevant frames
 - Locate human & faces
 - Extract the facial features
 - Compute, filter over several frames and make decision
 - Return the gender of the subject
- Current Intellectual Property
 - Gender Recognition Prototype (Software)
 - Fast Adaboost Training (TD)
 - Shorten training process

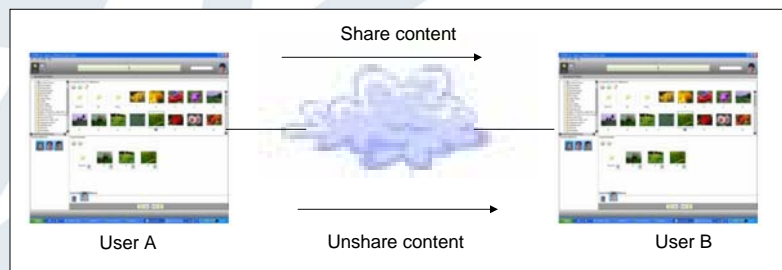


Potential Applications

- Information Kiosks (Private Viewing)
 - Camera to capture, process and record the users of the kiosk.
- Check-out Counter
 - Camera to capture, process and record the buyer
- Digital Signages (Public Viewing)
 - Audience Profiling

Overview of SuSie (*Share and Unshare, It's Easy*)

- **Simple-to-Use Digital Rights Mgt (DRM) Software** For **Controlled Sharing** of User's **Media Content** (e.g. pictures, video, audio)
- Allows users to **easily share, read and store media content** (encrypted) over the web
- User able to **selectively unshare** or revoke sharing of media files

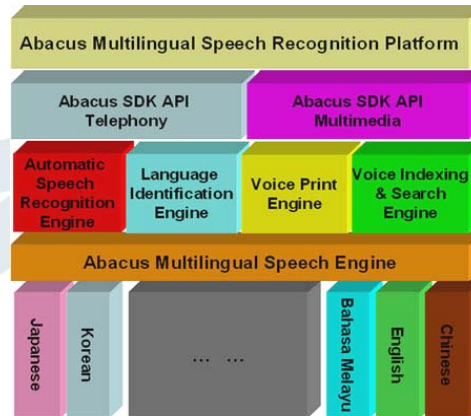


Key Benefits

- Simple-to-use DRM for user content
 - Including photos, videos, audio, user generated content
- No password and user identity required
 - Digital identity supported
- Easy to share and unshare content
 - Ease of use
- Secure sharing
 - Encryption while transmitting, storing and reading
- Efficient and tamper resistant
 - Secure and efficient key and digital certificate management techniques

Human Language Technologies

- Asian language computing platform
- Phone-based multilingual large vocabulary ASR systems (support mixed-lingual ASR)
- Multi-level (phone-word-phrase-document) spoken document indexing and retrieval (voice mining)



Speech Applications

- Audio keyword search
- Computer-aided Language Learning
- Speaker Verification
- Language Identification
- Automatic Meeting/Lecture Transcription
- Human-Robot Communication
- Automatic Call Centre

Breakthrough Technologies

Bag-of-sounds

- State-of-the-art speaker and language recognition performance (NIST)
- Patented novel industrial process that transform the way to speaker/language recognition
- Haizhou Li and Bin Ma, "[A Vector Space Modeling Approach to Spoken Language Identification](#)", in *IEEE Transactions on Audio, Speech and Language Processing*, Vol 15, No. 1, 2007
- Bin Ma, Haizhou Li, and Rong Tong, "[Spoken Language Recognition with Ensemble Classifiers](#)", in *IEEE Transactions on Audio, Speech and Language Processing*, Vol 15, No. 7, 2007

International Benchmarking (NIST)

2009 Rich Transcription

1st place in Speaker Diarization task (6 teams)

2008 Speaker Recognition Evaluation (SRE)

1st place in Core Test Condition (46 teams)

2007 Language Recognition Evaluation (LRE)

1st place in 17 categories, 2nd place in 12 categories, top-3 in 31 out of all 36 categories (23 teams)

2007 Rich Transcription

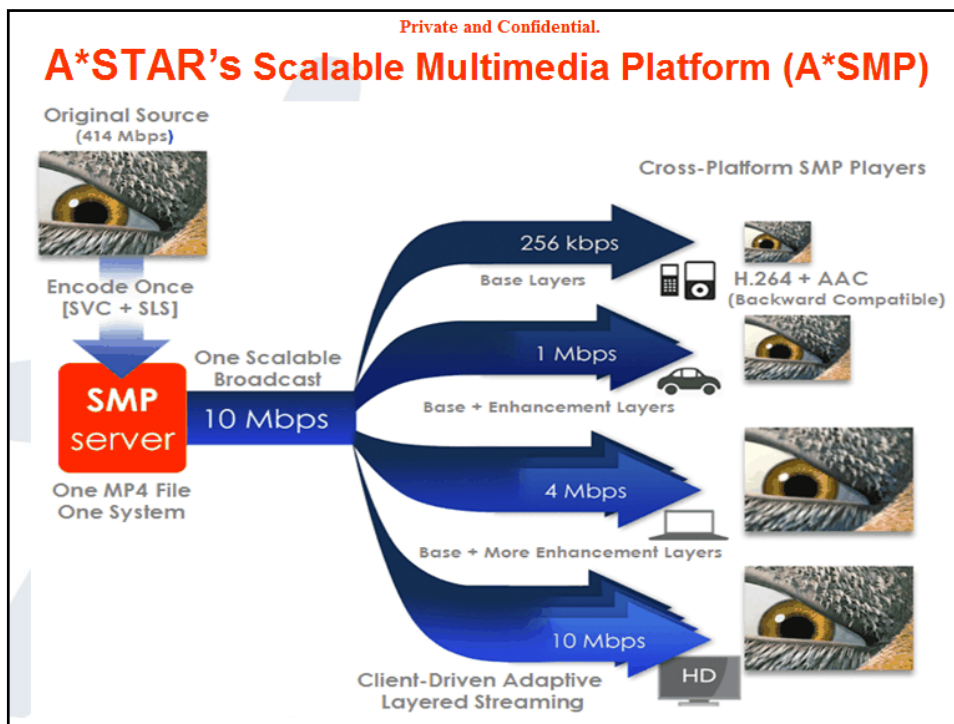
2nd place in Speaker Diarization task (8 teams)

2006 Speaker Recognition Evaluation (SRE)

2nd position in 4 categories & 3rd position in 1 category out of 7 categories (38 teams)

2005 Language Recognition Evaluation (LRE)

1st place in Korean, 2nd place in English & 3rd place in both the "All Language Trials" and "Primary Language Condition" categories



Applications

- Video Broadcast & Mobile TV
- IPTV & In-Home Narrowcast
- Multiparty Video Conference
- Scalable Video Surveillance
- Live Multi-stream Video
- Tele-health Consultation

Technology Demos

1. Demos during Networking Session
2. TechFest 2009 @ Fusionopolis, Level 1
3. STARHome Tours (4.30, 5.00, 5.30 pm)
4. A*STAR Lab Tours (Sign-up at TechFest Reception Counter)
 - Virtual Reality Dance
 - OwnComm (4G)
 - Anechoic Chamber
 - UWB In-door Localisation

Thank You

Teo Poh Heng
Assistant Vice-President, Science & Engineering Commercialisation
Exploit Technologies Pte Ltd
pohheng@exploit-tech.com

Wilson Lau
Senior Manager – Industry Development
Institute for Infocomm Research
whlau@i2r.a-star.edu.sg