

Silicon Sea Belt Fukuoka Project

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Silicon Sea Belt Fukuoka Project

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<http://www.slrc.kyushu-u.ac.jp/>



Universities

Industries



Silicon Sea Belt Fukuoka

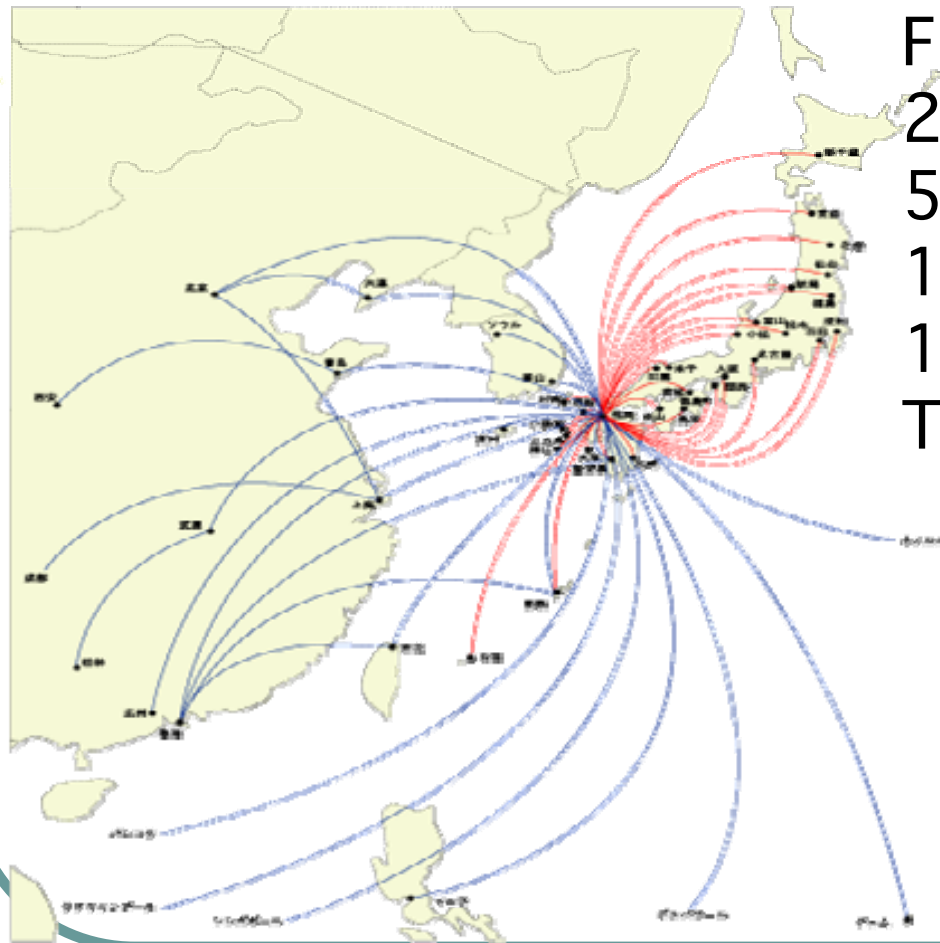
Fukuoka: World 20 Most Dynamic City

Newsweek International Edition

- July 3-10, 2006 issue
 - "The closest city to Asia": Fukuoka is the capital city of Japan's southernmost island, Kyushu. **Fukuoka is also the nearest big city in Japan to Shanghai or to Seoul.**
 - Many big brands in Japan like Toyota, Sony, Toshiba and Canon continue to pour money into manufacturing in and around Fukuoka. All these companies say geography and fast shipping still matter. So does staying close to Japanese suppliers.
 - The result: investment in manufacturing on Kyushu has grown as fast as 52 percent in recent years (though it slipped to 4 percent last year). **Locals now refer to Kyushu as Car Island, or Silicon Island.**

Location of Fukuoka

Convenient Fright Routes



From Fukuoka

200km: Pusan

500km: Osaka, Seoul

1000km: Tokyo, Shanghai

1500km: Sapporo, Beijing, Taipei

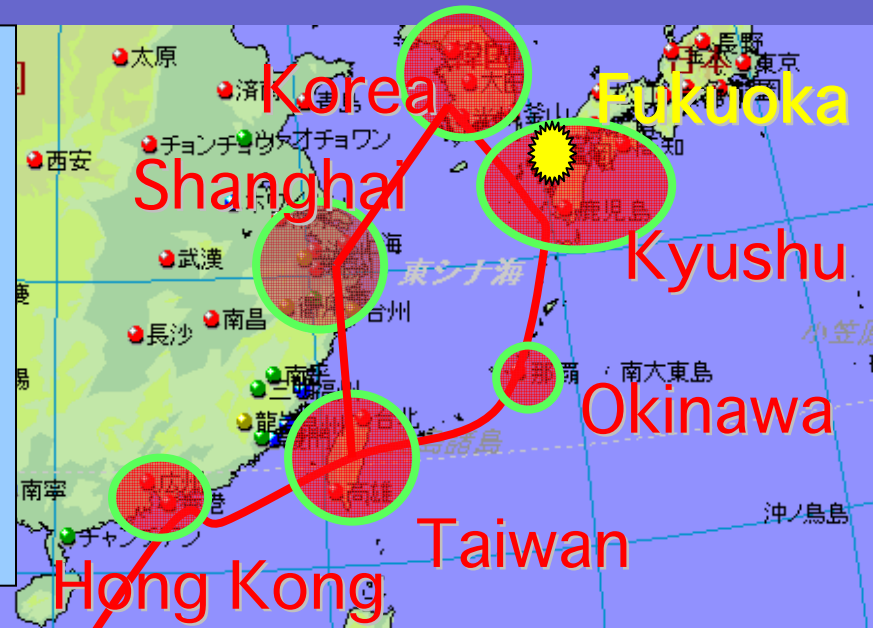
**Transport Hub of
Japan and the rest of
Asia**



What is Silicon Sea Belt?

Silicon Sea Belt

- Silicon Sea Belt is a center of semiconductor fabrication.
- This area is also the world largest market of IT industries.
- Fukuoka is addressing to establish a Center of Excellence for SoC design in this area.



- Collaboration in Silicon Sea Belt.
 - Integration of SoC Industries
 - > Marketing and system planning
 - > SoC Design (SW and HW)
 - > Fabrication (Silicon and board)
 - > Testing (from chips to systems)
 - IP exchange market
 - Human resource sharing

Silicon Sea Belt Fukuoka

- Started in 2000
- Motivation
 - Kyushu has played an important role in semiconductor industry and should change its role in the drastic growth of Silicon Sea Belt countries.
- Vision
 - Keep the leadership in SoC design and bridge between system design and fabrication technology.
- Strategy
 - COE of new SoC design technologies
 - Human resource for the SoC design industry
 - Integration of ventures and IDMs

Structure of SSB Fukuoka

Higher Peaks of R&D

- System Design
- SoC Design
- Fabrication
- Testing
- Applications

CLUSS Projects (2002-2007)

Low Power, RF, EDA, SiP,
Reconfigurable Systems,
Embedded Software

COE Program, CREST

Human Resource Development

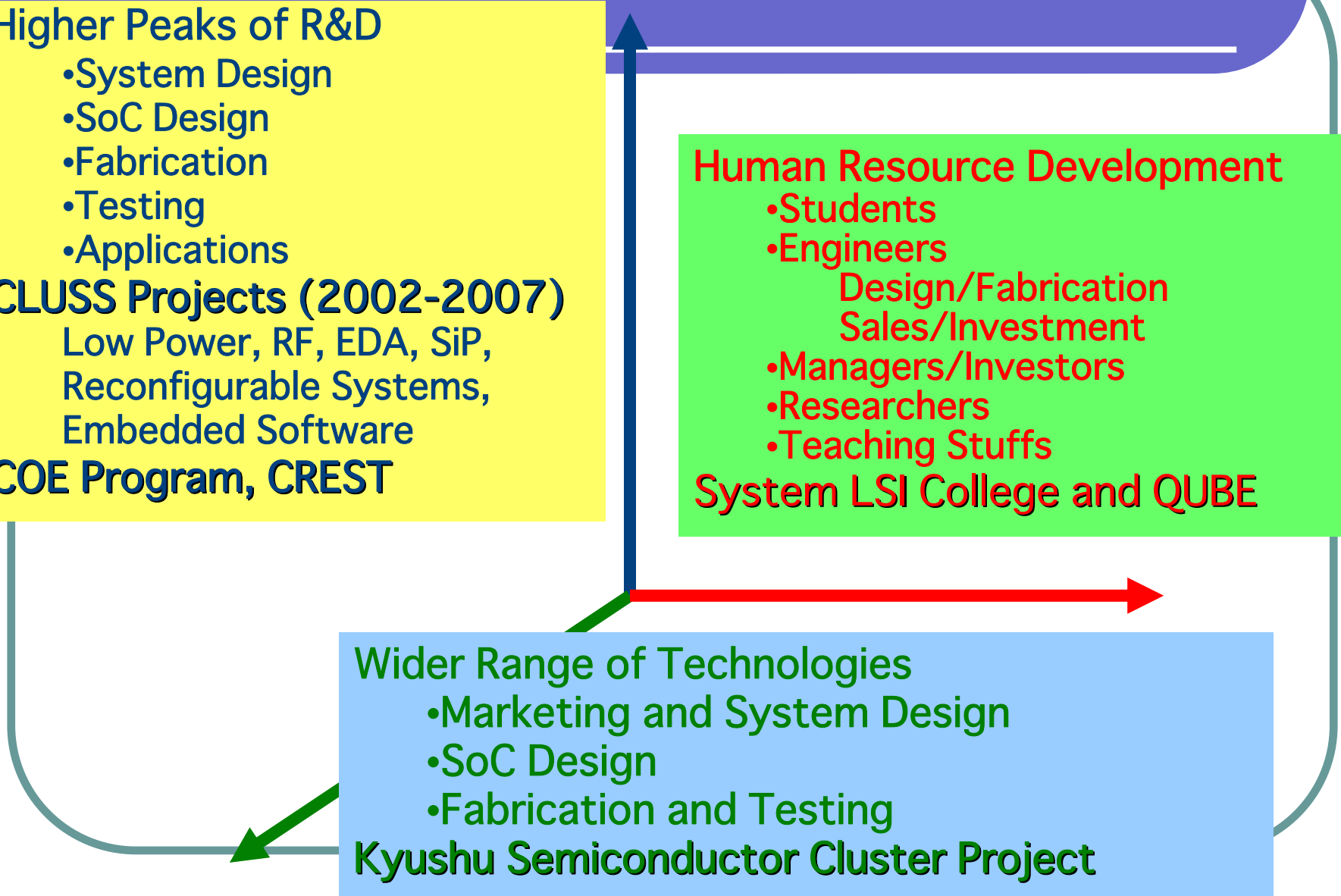
- Students
- Engineers
- Design/Fabrication
- Sales/Investment
- Managers/Investors
- Researchers
- Teaching Stuffs

System LSI College and QUBE

Wider Range of Technologies

- Marketing and System Design
- SoC Design
- Fabrication and Testing

Kyushu Semiconductor Cluster Project



Human Resource Development

College of System LSI Fukuoka
QUBE

System LSI College

●objective

—Under liaising of Academy, Industry and Government, the college foster well-qualified System LSI design person, and train them pragmatically.

●characteristic point

- lecturers as 31 faculties from 18 Universities, and 20 qualified technologists from various enterprises.
- pragmatically education consists of practical training (3 days - 4 weeks)
- High quality original teaching material.



Attendees companies

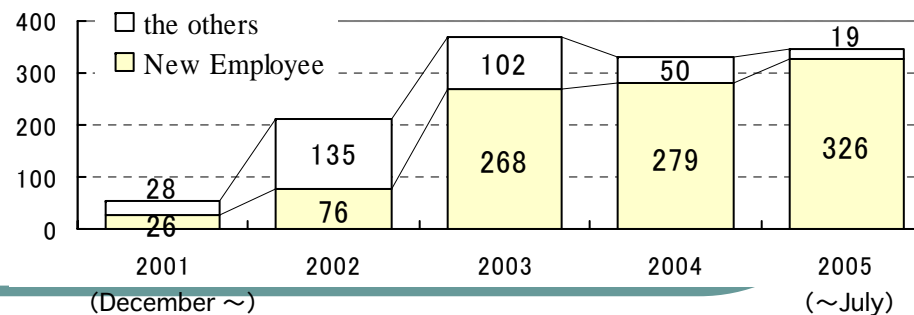
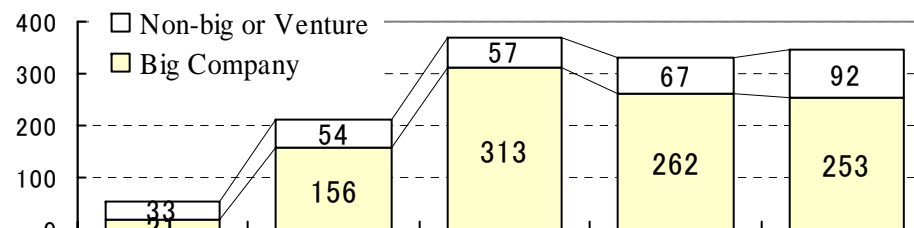
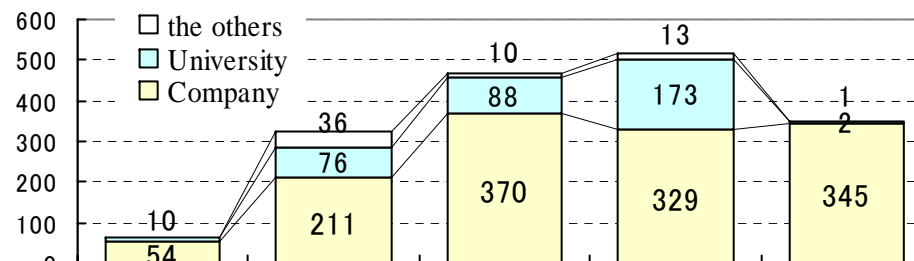
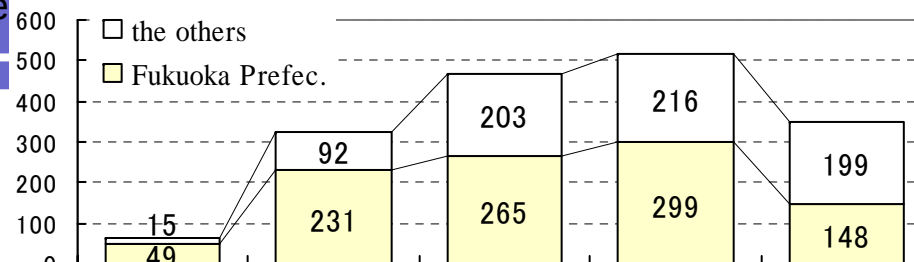
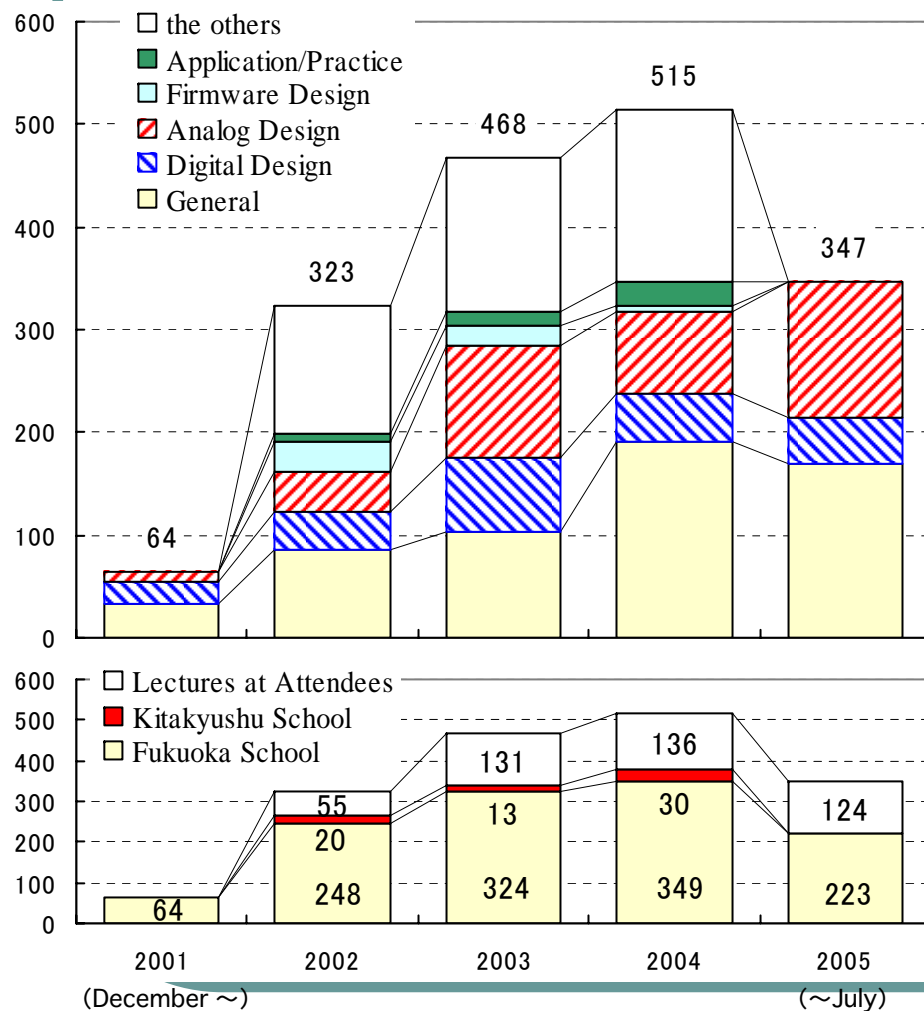
IP Square, Kyuki, Kyushu Electric, Kyushu Mitsumi, JMNet, Seiko Epson, Sony semiconductor Kyushu, TAM, Toppan Print, Toppan Technical Design Center, Hitachi ULSI systems, Logic Research etc.

1,000 design engineers (2001.12~2004.3)

Achievements

Accumulative Attendees Count

- 1,717 persons (Summation of attendees/lecture)
- Attendees of Analog Design Course
- Attendees of Digital Design Course × 2



New Education Program for Codesign

Q-shu University hardware/software Borderless system design Education program (QUBE)

【Purpose】 Educate highly qualified and skilled system LSI design engineers for VLSI design, embedded software design and HW/SW co-design

【Period】 2005.7~2010.3

【Goal】 Totally 360 engineers

Hardware
Design

HW/SW
Co-design

Embedded
Software
Design

System LSI Design Training Program

Advanced Design Technology Program

*Experienced
Super
Engineers*

Advanced level

About 10 years' job experience

Master level

About 3 years' job experience

Graduate level

New Employee, graduate student

Introduction level

University student

*Offer Educational Know-how
Backup by the Staff*

Cooperated Lecture : Real Embedded
Software Development Engineering

Fukuoka
Innovative CLUSTER

Design Method and Education Division
System LSI Research Center

21st Century Center of
Excellence Program

System LSI Research Center

*Graduate School of Information Science and Electrical Engineering
Kyushu University*

*Shift
Upper-level
Lectures*

Application/Practice Courses

Basic Courses

*College of System LSI,
FUKUOKA*

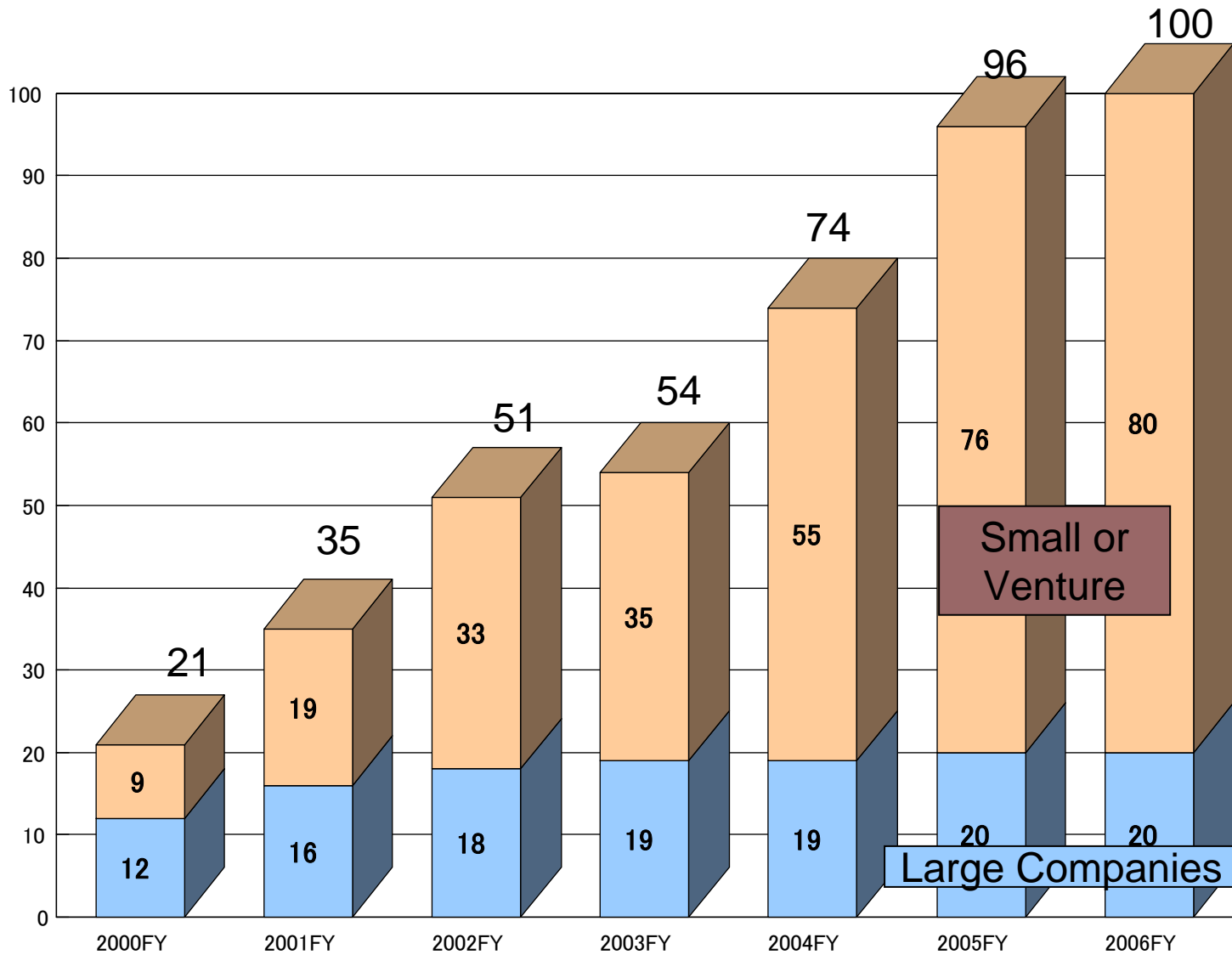
Integration of Industries

Fukuoka Soft-Research Park



NEC FUJITSU HITACHI Panasonic SONY IBM HOYA

**Small and medium ventures related to LSI design
and verification continue to gather (within Fukuoka)**

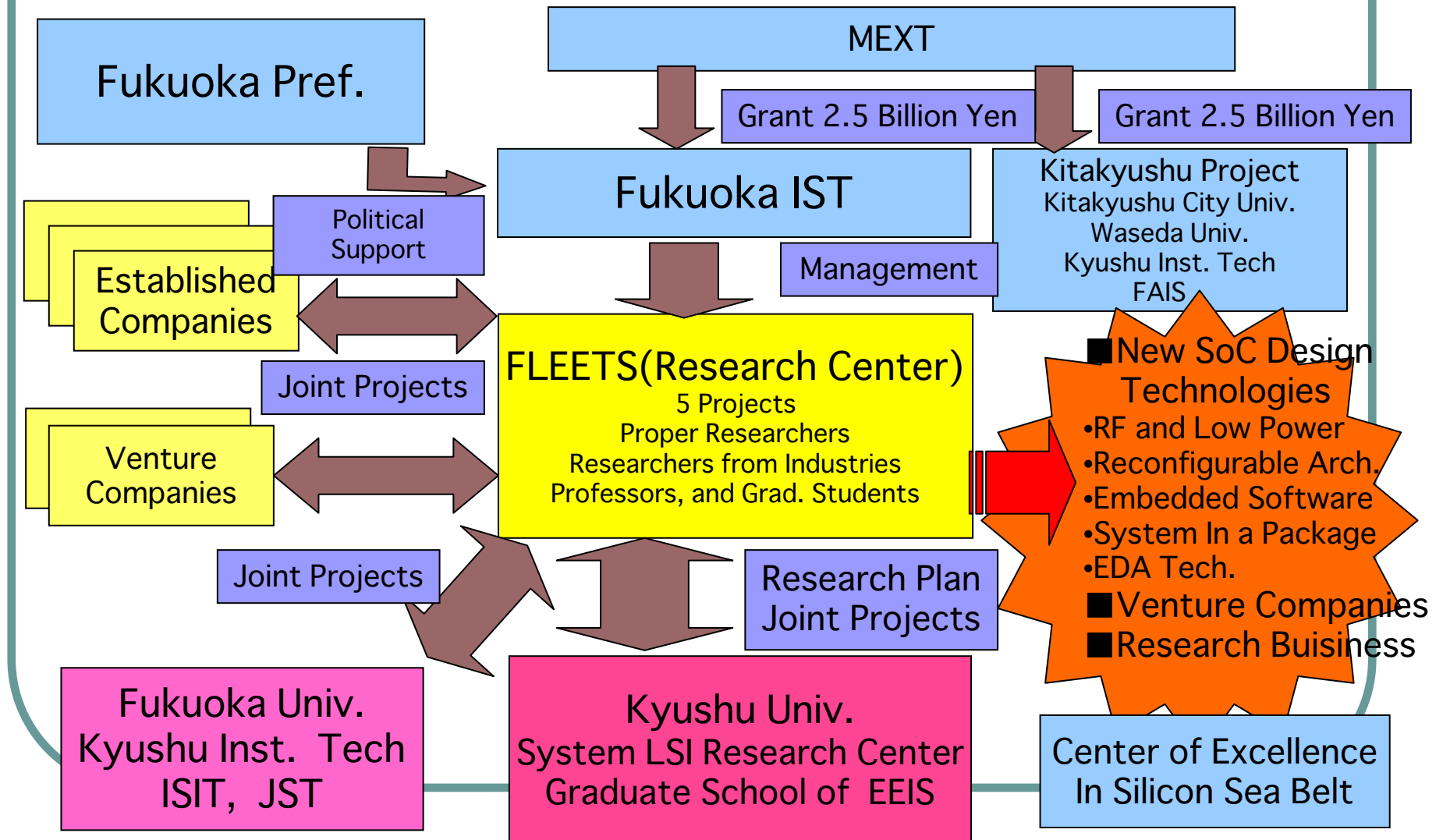


Research Activities

System LSI center of Kyushu Univ.
CLUSS Project
21st. Century COE Program
CREST

CLUSS: Innovative CLUster for Silicon Sea Belt

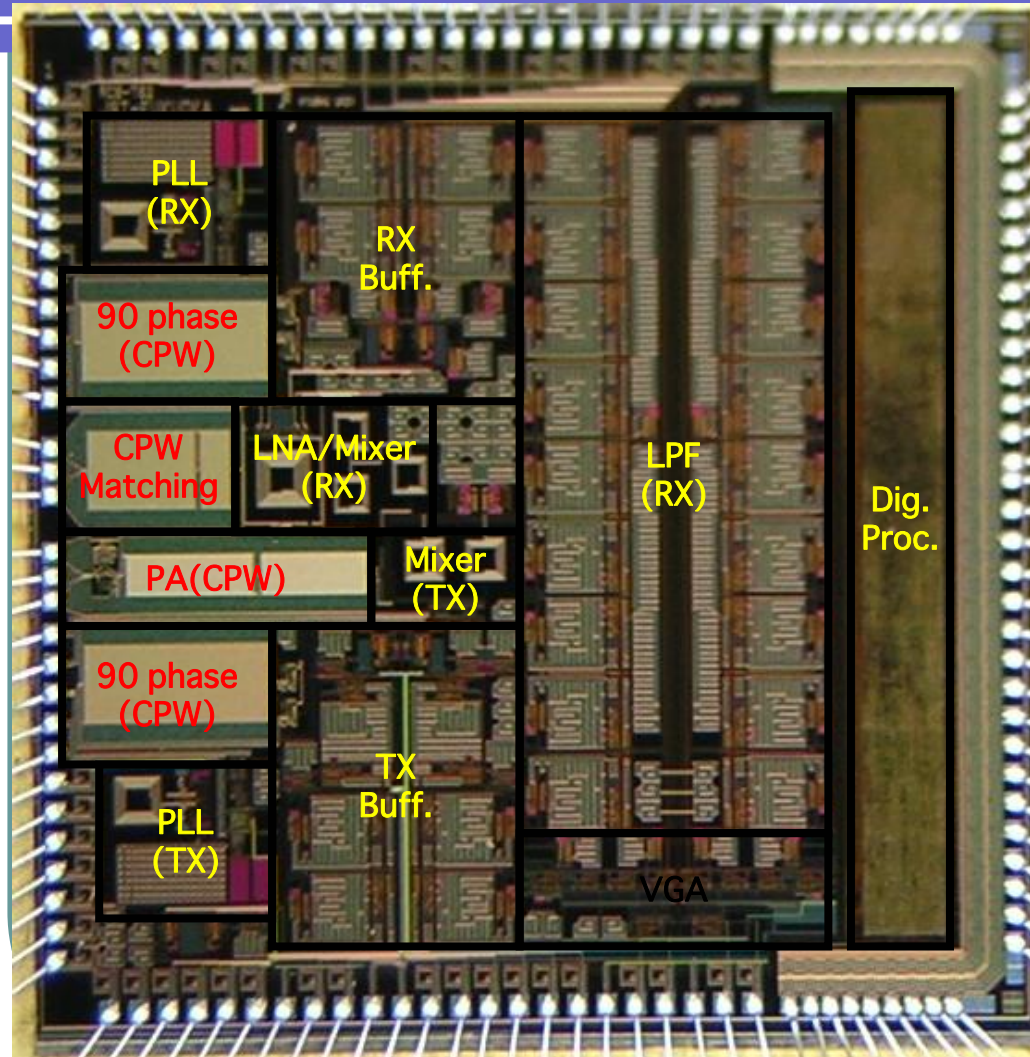
2001-2006



Research Projects in CLUSS

- Design Method for Low Energy Mobile System LSIs
(Haruich Kanaya, SLRC Kyushu Univ.)
- Next Generation System LSI Architecture
(Kazuaki Murakami, SLRC Kyushu Univ.)
- Design Methodology for SiP (System in a Package) Module
(Hajime Tomokage, Fukuoka Univ.)
- EDA Technology for The Next Generation
(Yusuke Matsunaga, SLRC Kyushu Univ.)
- Design Methodology for Embedded Software
(Akira Fukuda, Kyushu Univ.)
- Application Specific SoC Design
(Satoshi Goto, Waseda Univ. Joint Project with Kitakyushu)

Design of RF Communication Chip

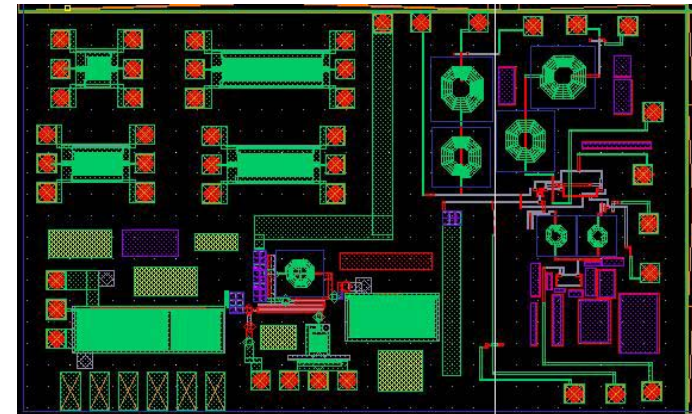


0.25 mm CMOS (TSMC)
5 mm X 5 mm

Wireless LAN(0.25 mm CMOS)

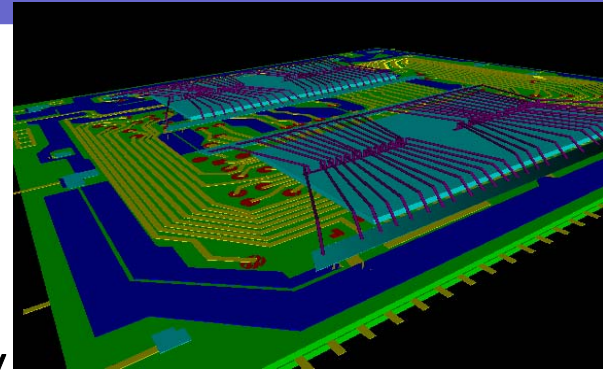
- ✓ IEEE802.11b
- ✓ 2.4 GHz
- ✓ Matching and Phase Shift by CPW
- ✓ Low Energy Digital Circuits

A New RF Front End Circuit

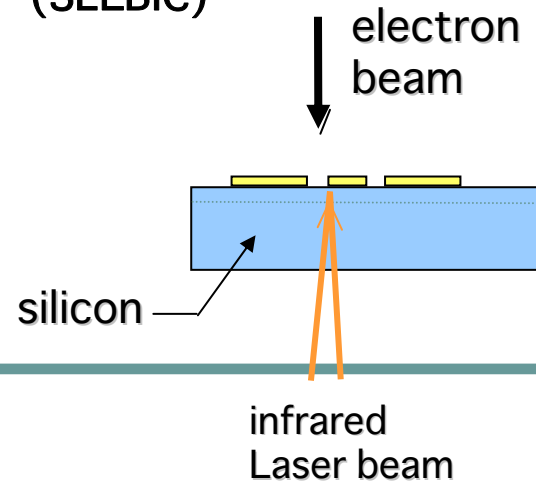


Establishment of SiP Module Design Technology

- EDA tools for high frequency SiP designs
Noise and stress analysis using 3-dimension models for heat and microwave effects
- SIPOS: System Integration Platform Standards
Standardization of SiP fabrication technology
- Establishment of test and verification technologies on SiPs
Development of measurement equipment:
Scaling Electron Laser Beam Induced Current (SELBIC)



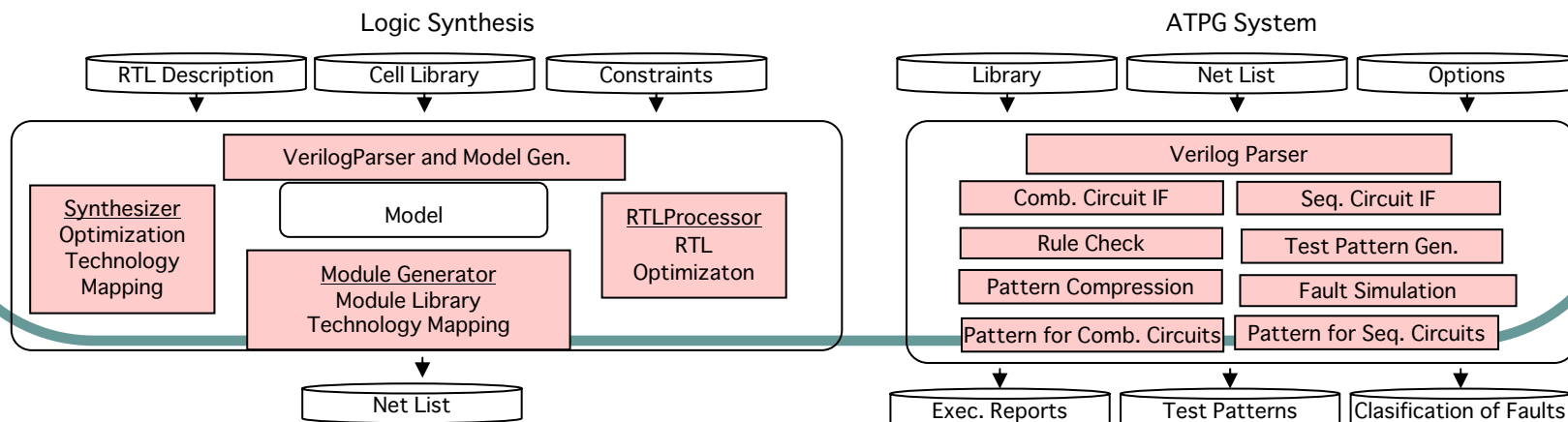
SiP 3-D Image by EDA Tools



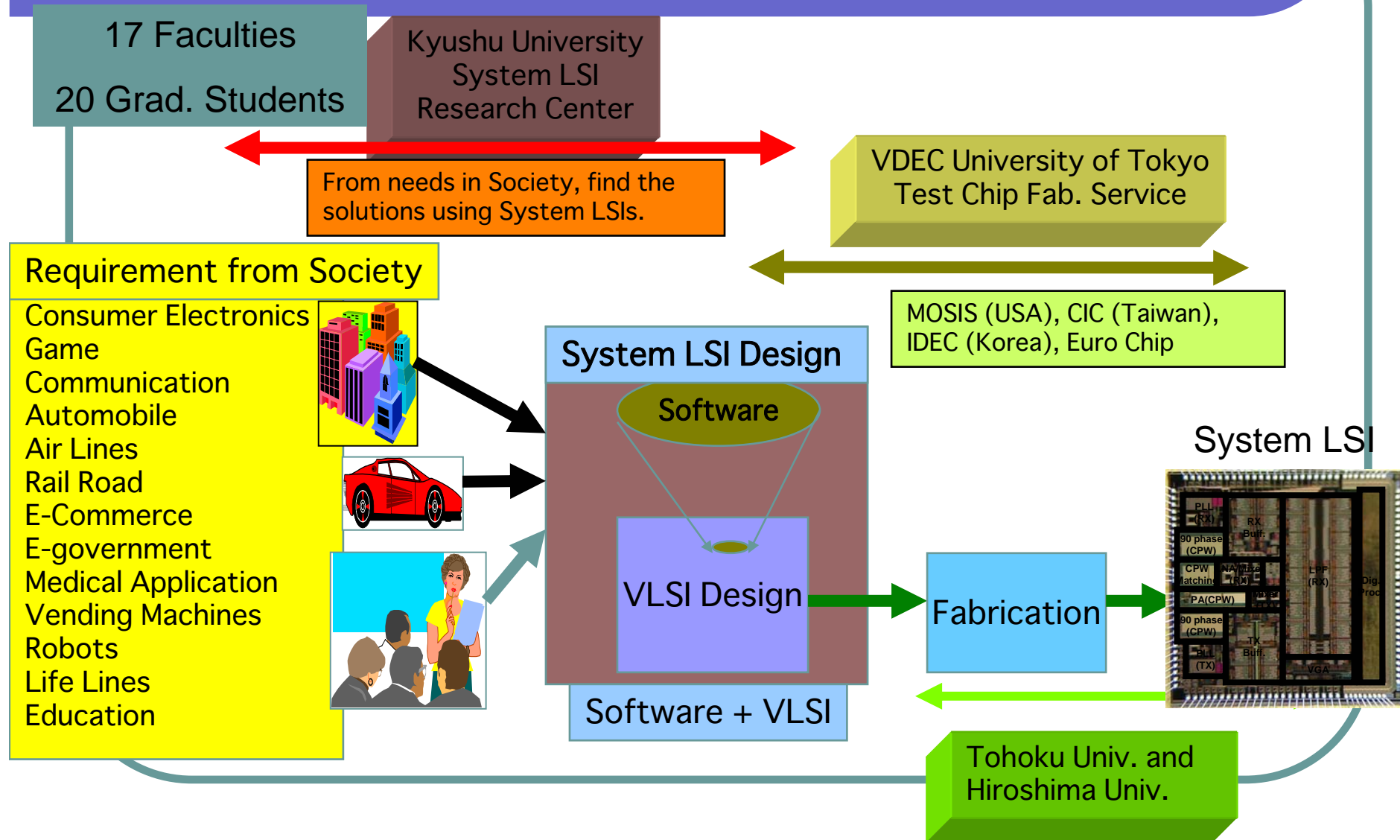
SELBIC

EDA and Test Generation Systems

- New Technology for Logic Synthesis and Test Generation
 - Prof. Matsunaga: Kyushu University
 - Prof. Kajihara: Kyushu Institute of Technology
 - FLEETS and ISIT
 - System JD and Logic Research
- ★ Logic Synthesis System
 - Special Function for Arithmetic Operation Module Generation
 - High Performance Technology Mapper
- ★ Automatic Test Pattern Generation System
 - High Speed Pattern Generation by a New Algorithm



System LSI Research Center, Kyushu Univ.



Fukuoka System LSI Design and Development Center

Incubation
Research and Development
Education and Training
Collaborations

From a 2-page Report

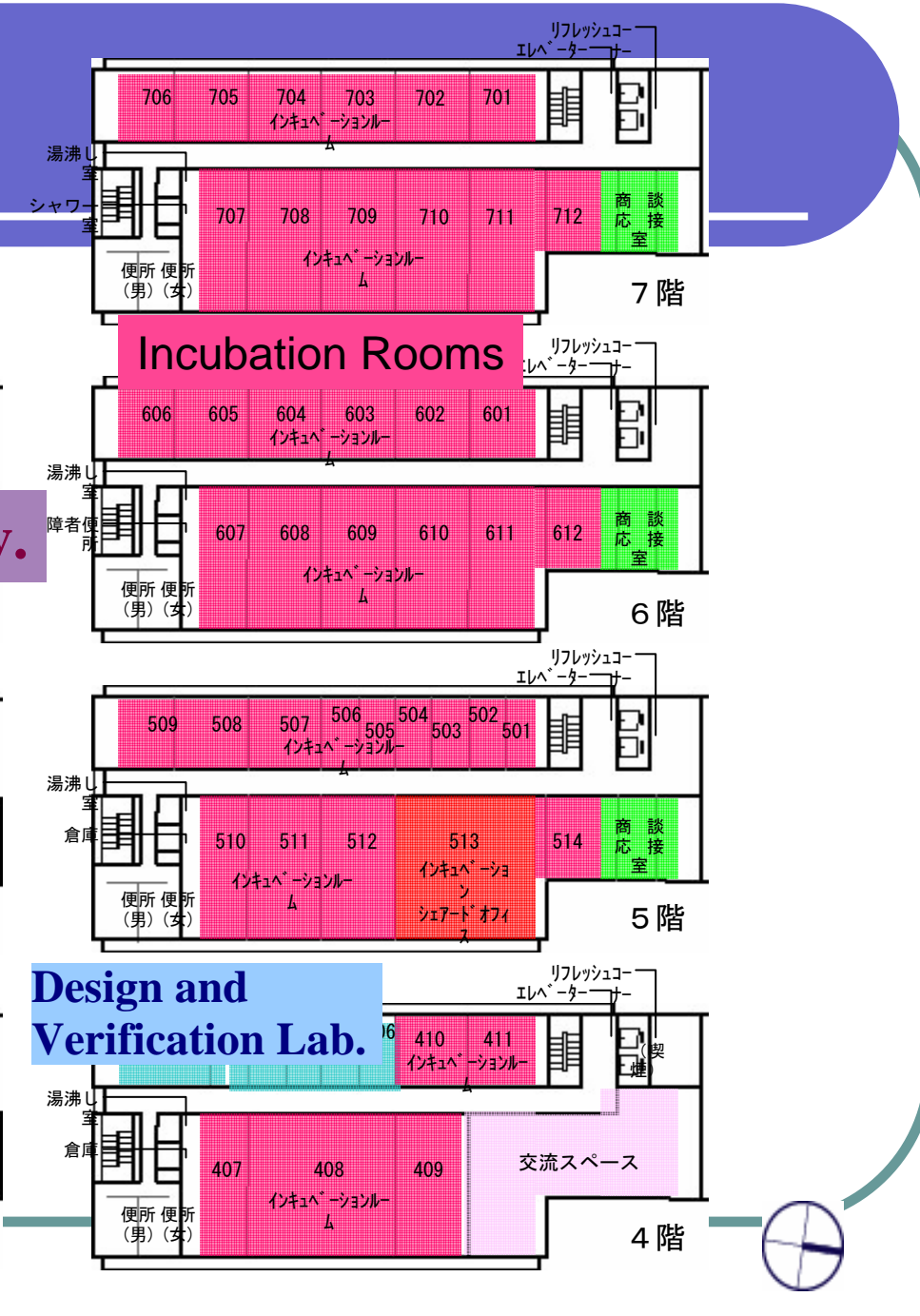
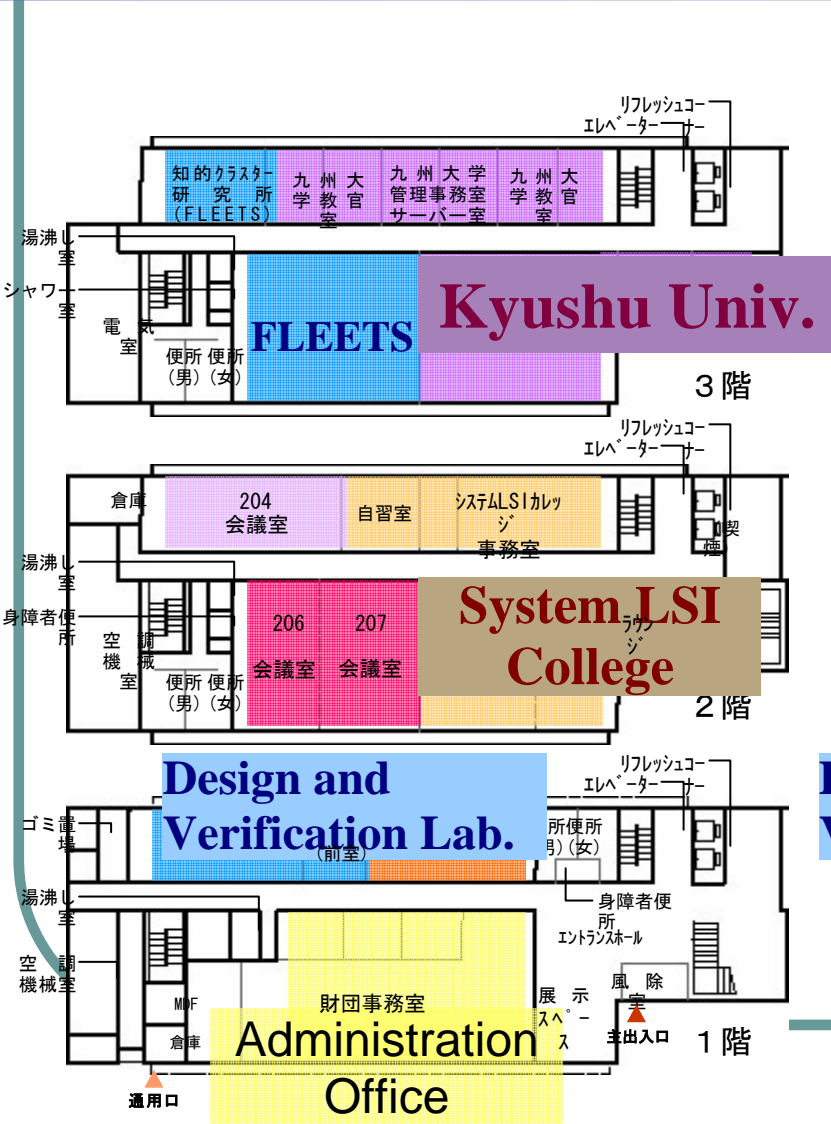
- Oct. 2002: Visit Taiwan and report on Silicon Soft Project
- Nov. 2002: Decision of the budget for the building (30 Million USD)
- Open on Nov. 4, 2004
- Budget from Central Government
- Operated by Fukuoka Prefecture

System LSI Design and Development Center



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TIFF (LZW) image data
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QuickTime® 7
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Conclusion

- Silicon Sea Belt is the world largest production and consumption region of semiconductor products. We should be a COE of SSB.
 - Collaboration among Governments, Academia and Industry
 - Collaboration with SSB area
- Integration of Industry - Automobile and LSI
- Roles of University
 - Education and Research
 - Create Dreams and Technologies of the future society - Experimental fields of Social Information Infrastructure