

Silicon Sea Belt Fukuoka Project

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Silicon Sea Belt Fukuoka Project

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Universities

Industries

Silicon Sea Belt Fukuoka

What is Silicon Sea Belt?

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**
 - **To be a Center of Excellence of new SoC design technologies**
 - **Develop human resource for the SoC design industry**
 - **Integrate of ventures and IDMs**

Structure of SSB Fukuoka

Higher Peaks of R&D

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

CLUSS Project I (2002-2007)

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

COE Program, CREST, CLUSS II

Human Resource Development

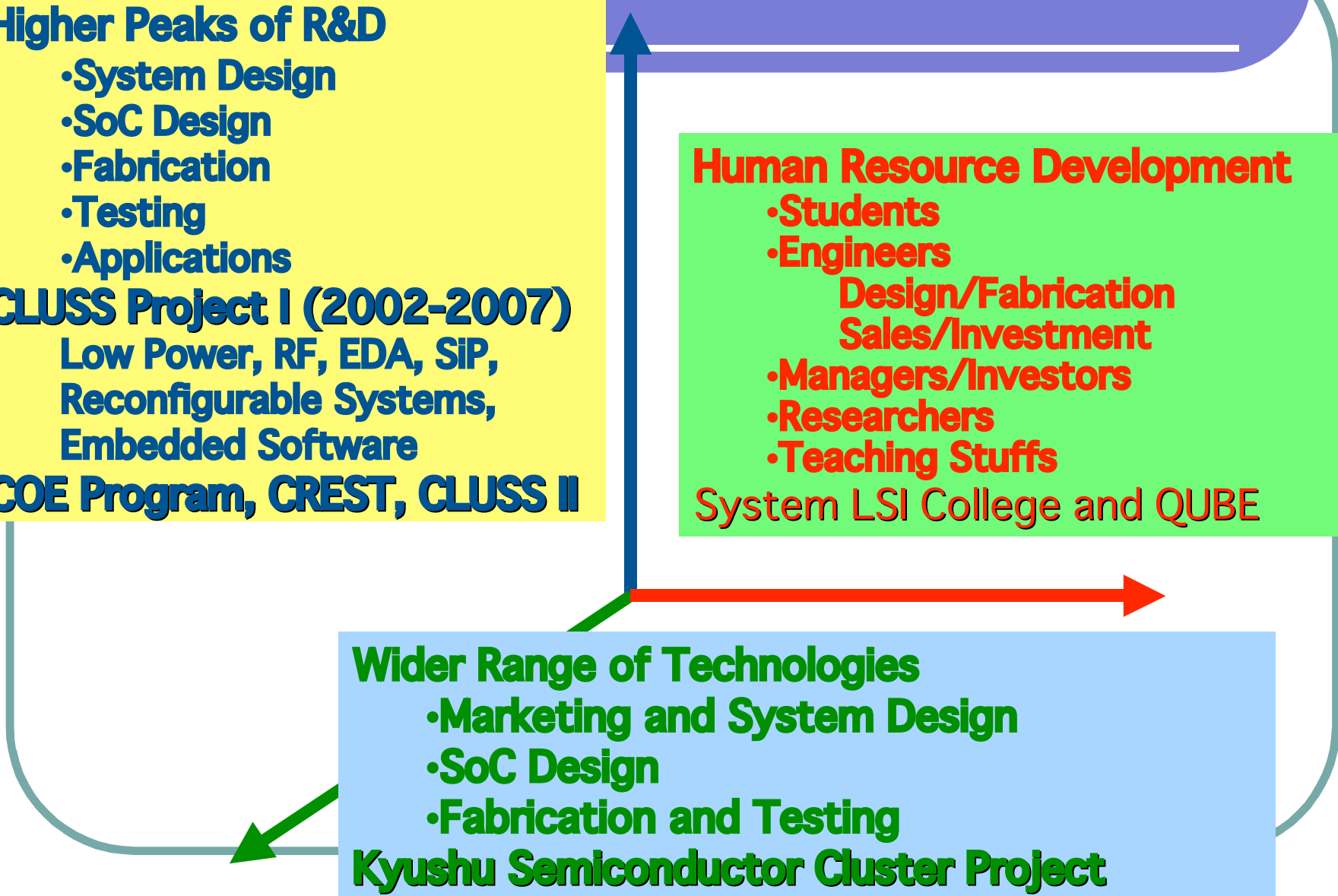
- Students
- Engineers
- Design/Fabrication
- Sales/Investment
- Managers/Investors
- Researchers
- Teaching Staffs

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

● Organization

- Collaboration of Local Governments (Fukuoka Pref., Fukuoka City and Kitakyushu City), Universities and Industries

● Curriculum and Operation

- Covering Digital, Analog and Embedded Software Design
- Practical courses for fresh engineers with experimental class and original teaching materials (Graduate and MC levels)
- More than 50 Lecturers from 18 Universities and 10 Companies
- Intensive courses for practical training (3 days - 4 weeks)



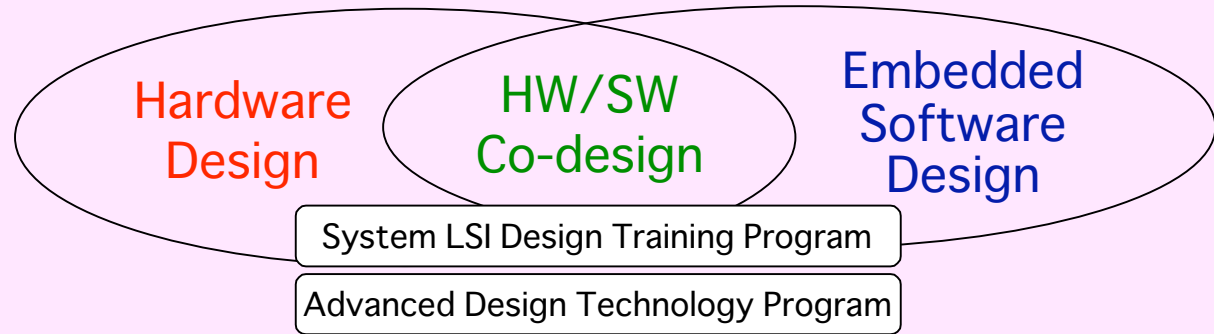
● Educated Engineers

- More than 500 engineers per year. Totally more than 2,000 engineers from Dec, 2001.
- Special courses for beginners of LSI design
- English courses for foreign engineers

Advanced 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



Experienced Super Engineers

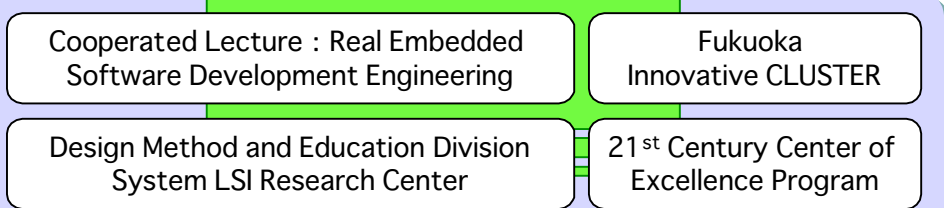
Advanced level
About 10 years' job experience

Master level
About 3 years' job experience

Graduate level
New Employee, graduate student

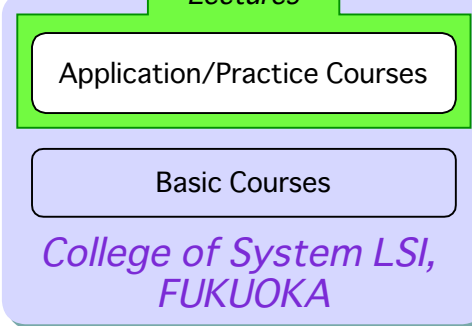
Introduction level
University student

Offer Educational Know-how Backup by the Staff



System LSI Research Center
Graduate School of Information Science and Electrical Engineering
Kyushu University

Shift Upper-level Lectures



Integration of Industries

Fukuoka Soft-Research Park



Fukuoka Airport

Fukuoka Software Research Park

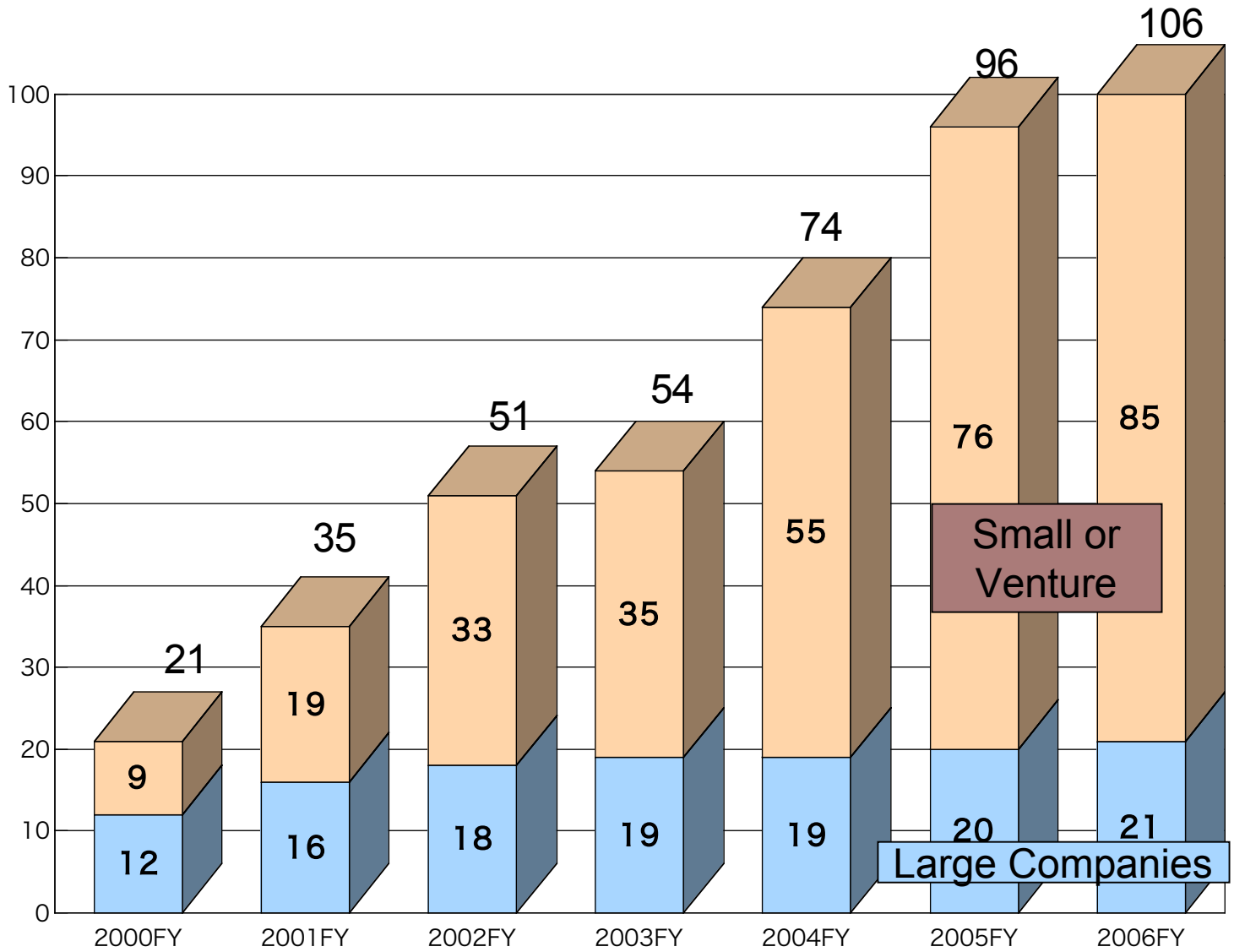
System LSI Design and Development Center

TNC 競速会館
パワエリア

福岡でビジネスの夢を拡げる。
企業のパフォーマンスを上げる。
新設された施設で活躍しています。
未来へビジネスの夢を拡げる。
福岡の発展として注目される。
海に開かれた国際都市の
首都圏から海外への充実した
豊かな自然環境と利便性の
都市は、



The Number of Small and Medium Ventures Related to LSI design and Verification in Fukuoka Area



Research Activities

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

System LSI Research Center, Kyushu Univ.

17 Faculties
7 Staffs
20 Grad. Students

Kyushu University
System LSI
Research Center

From needs in Society, find the solutions using System LSIs.

VDEC University of Tokyo
Test Chip Fab. Service

Requirement from Society

Consumer Electronics
Game
Communication
Automobile
Air Lines
Rail Road
E-Commerce
E-government
Medical Application
Vending Machines
Robots
Life Lines
Education



System LSI Design

Software

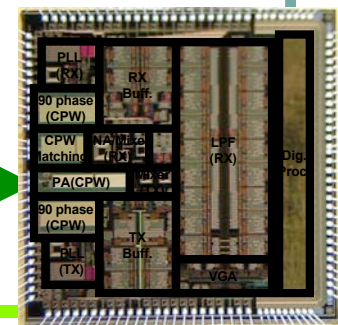
VLSI Design

Software + VLSI

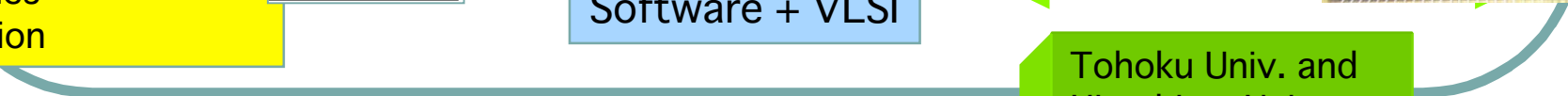
MOSIS (USA), CIC (Taiwan),
IDEC (Korea), Euro Chip

Fabrication

System LSI

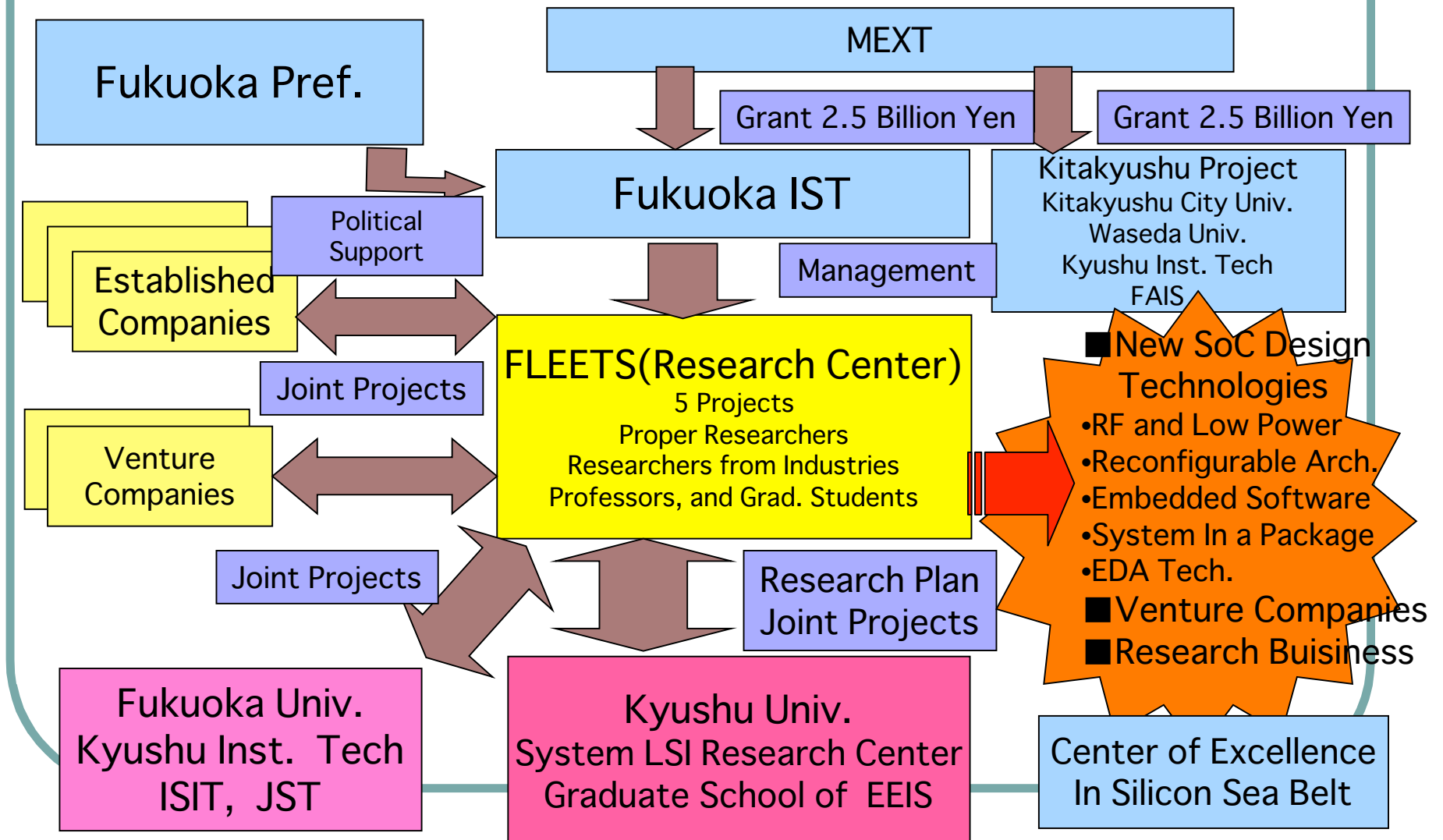


Tohoku Univ. and
Hiroshima Univ.



CLUSS : Innovative CLUster for Silicon Sea Belt

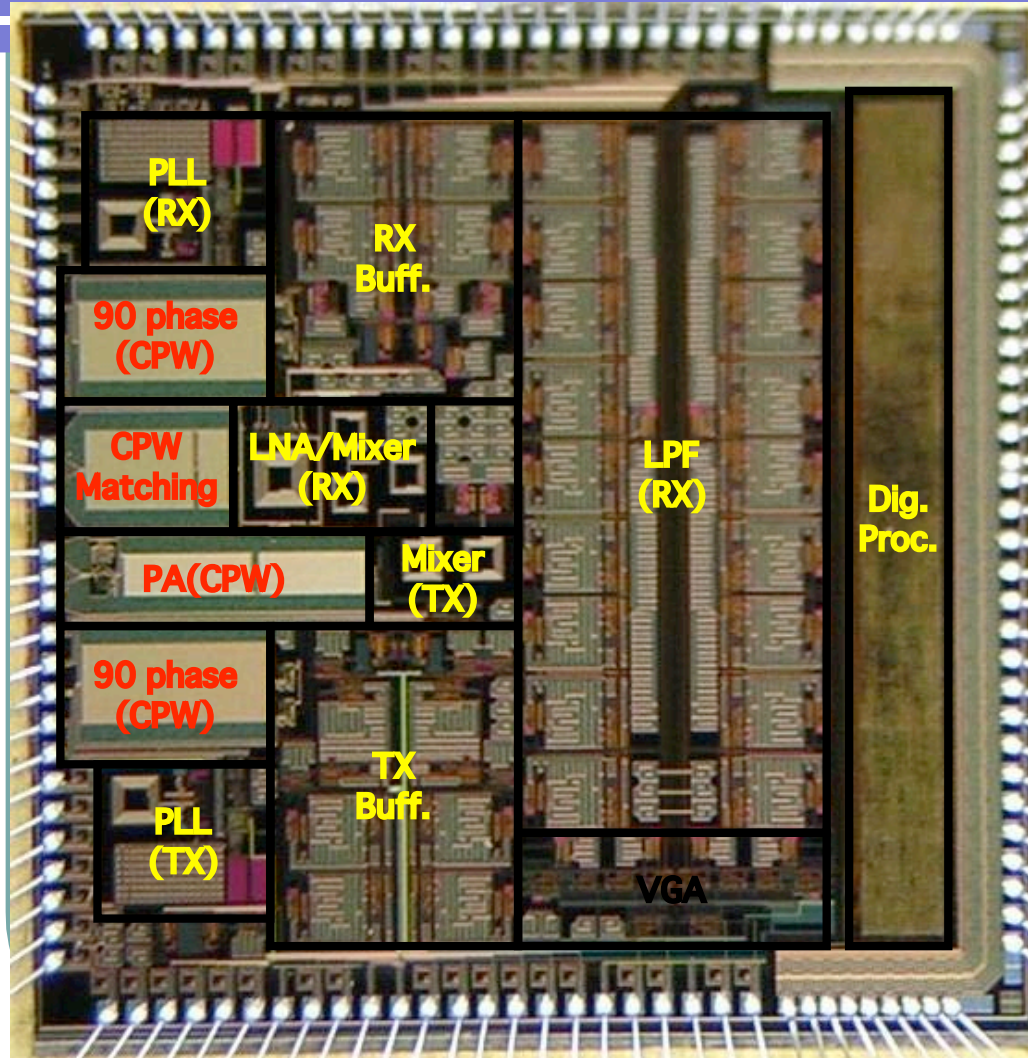
2001-2007



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

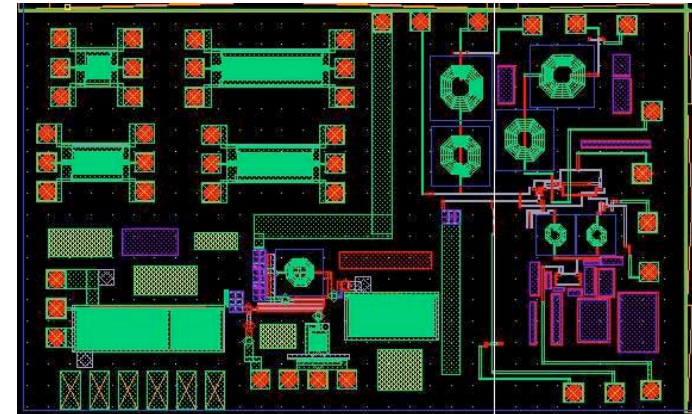


0.25 mm CMOS (TSMC)
5 mm X 5 mm

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

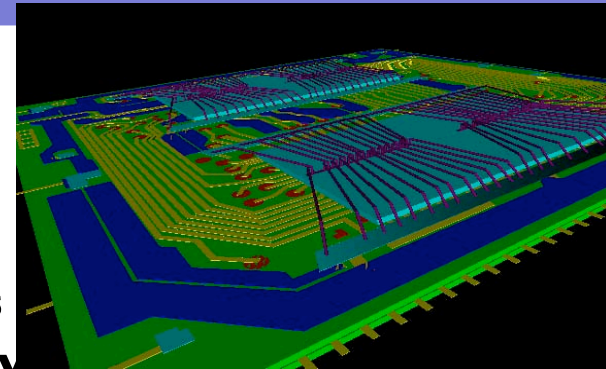
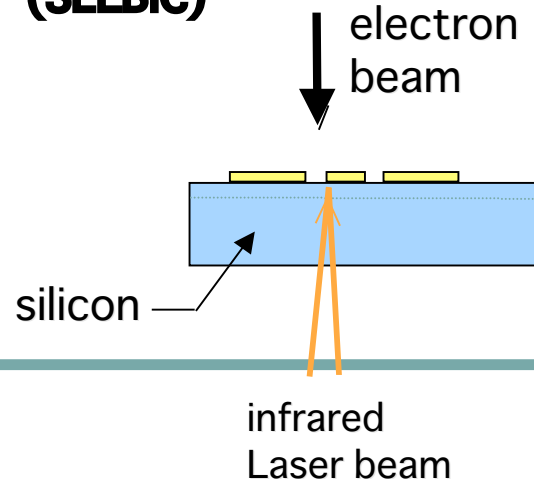
- EDA tools for high frequency SiP designs

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

Fukuoka System LSI Design and Development Center

**Incubation
Research and Development
Education and Training
Collaborations**

From a 2-page Report

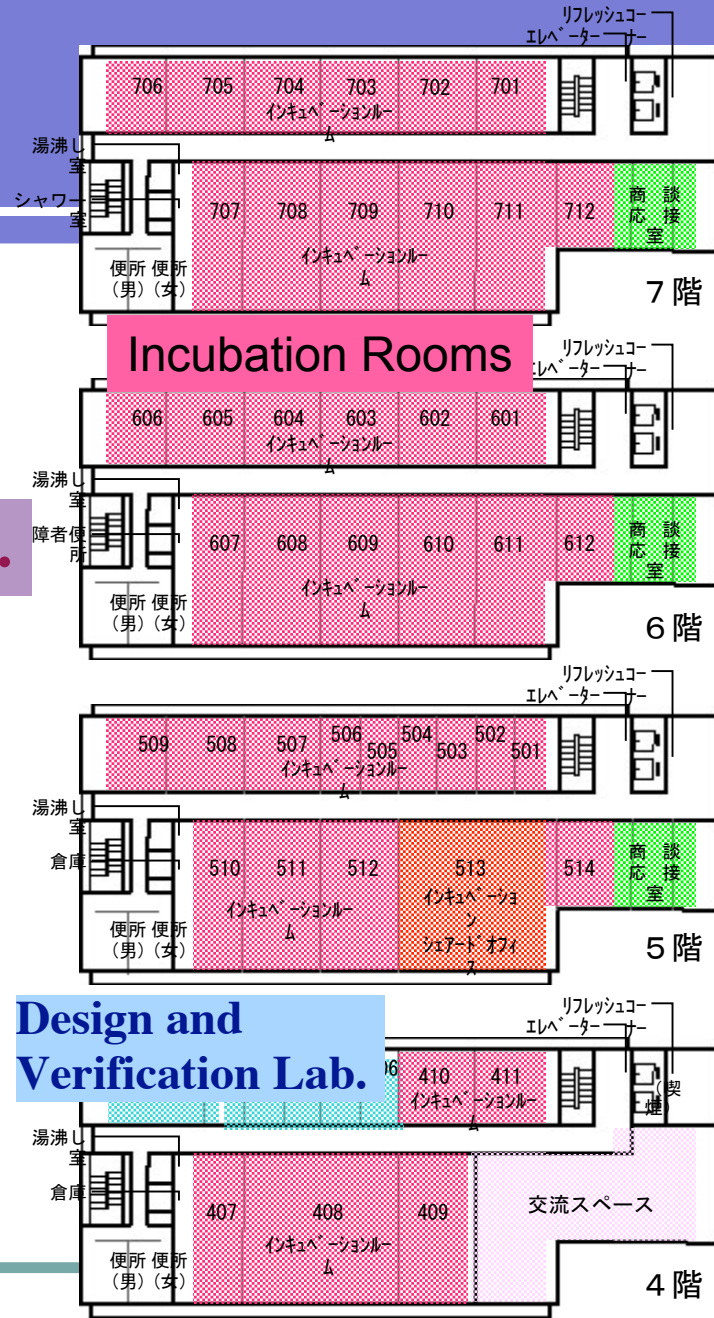
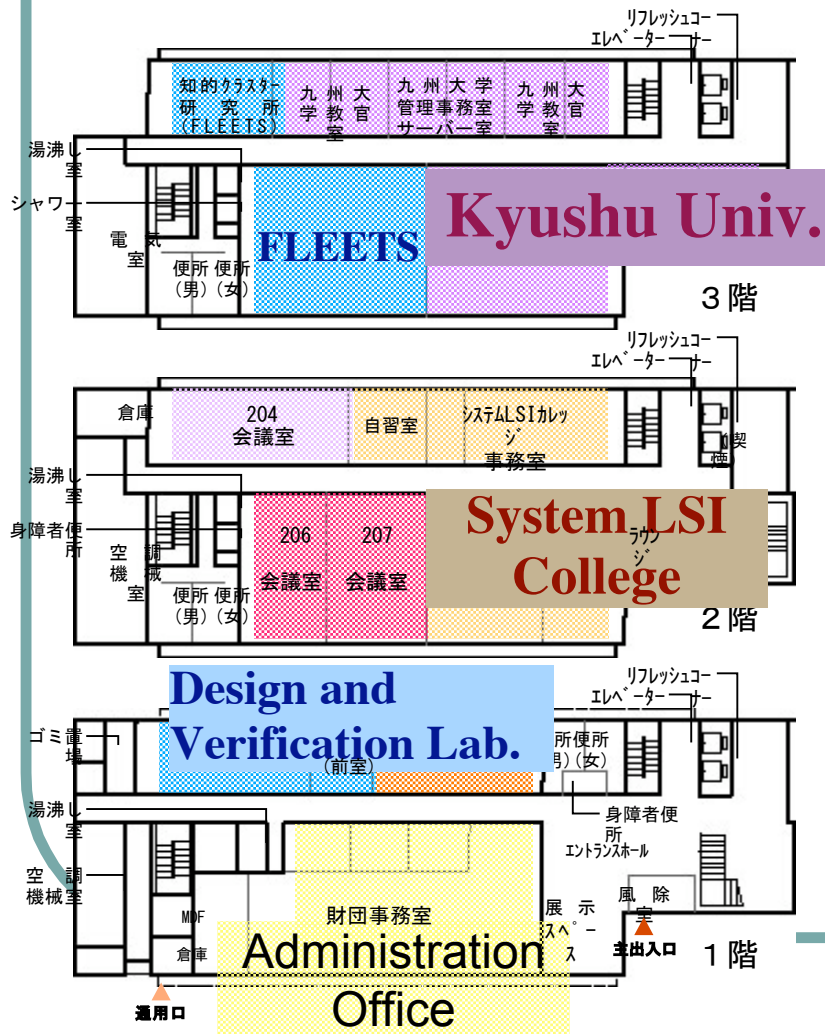
- **Oct. 2002: Visit Taiwan and report on Silicon Soft Project**
- **Nov. 2002: Decision of the budget for the building (30 Million USD)**
- **Open on Nov. 4, 2004**
- **Budget from Central Government**
- **Operated by Fukuoka Prefecture**

System LSI Design and Development Center

- A 7 storied building in Momochiham Area
- 7,700 m² for Incubation, education, research and development activities.



System LSI Design and Development Center



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