The Embedded Software Consortium of Taiwan
A Progress Report of Educational Activities

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National Taiwan University

VLSI CSE Program

❖ **The VLSI Circuits and Systems Education (CSE) program since 1996**
- ➢ By Ministry of Education (MOE), Taiwan
- ➢ Purpose: to provide high-quality engineers to local semiconductor industry

❖ **Phase-I: 1996 – 2000**
- ➢ Goal: to establish fundamental IC design labs at ~20 universities
- ➢ Total funding by MOE: US$3M

❖ **Phase-II: 2001 – 2005**
- ➢ Goal: adopting a top-down design by forming 6 consortia
- ➢ Total funding by MOE: US$15M

VLSE CSE Program: Phase-III

❖ **Period: 2006 – 2010**
  ➢ Goal-1: to continue enhancing our curricula
 ➢ Goal-2: to contribute our results to international communities

❖ **8-consortia architecture**
  ➢ SOC supervises all activities and programs
  ➢ Total funding: ~US$20M

❖ **4 national student programming contests**
  ➢ IC Design Contest, Silicon IP Authoring Contest, EDA Programming Contest, ESW Design Contest
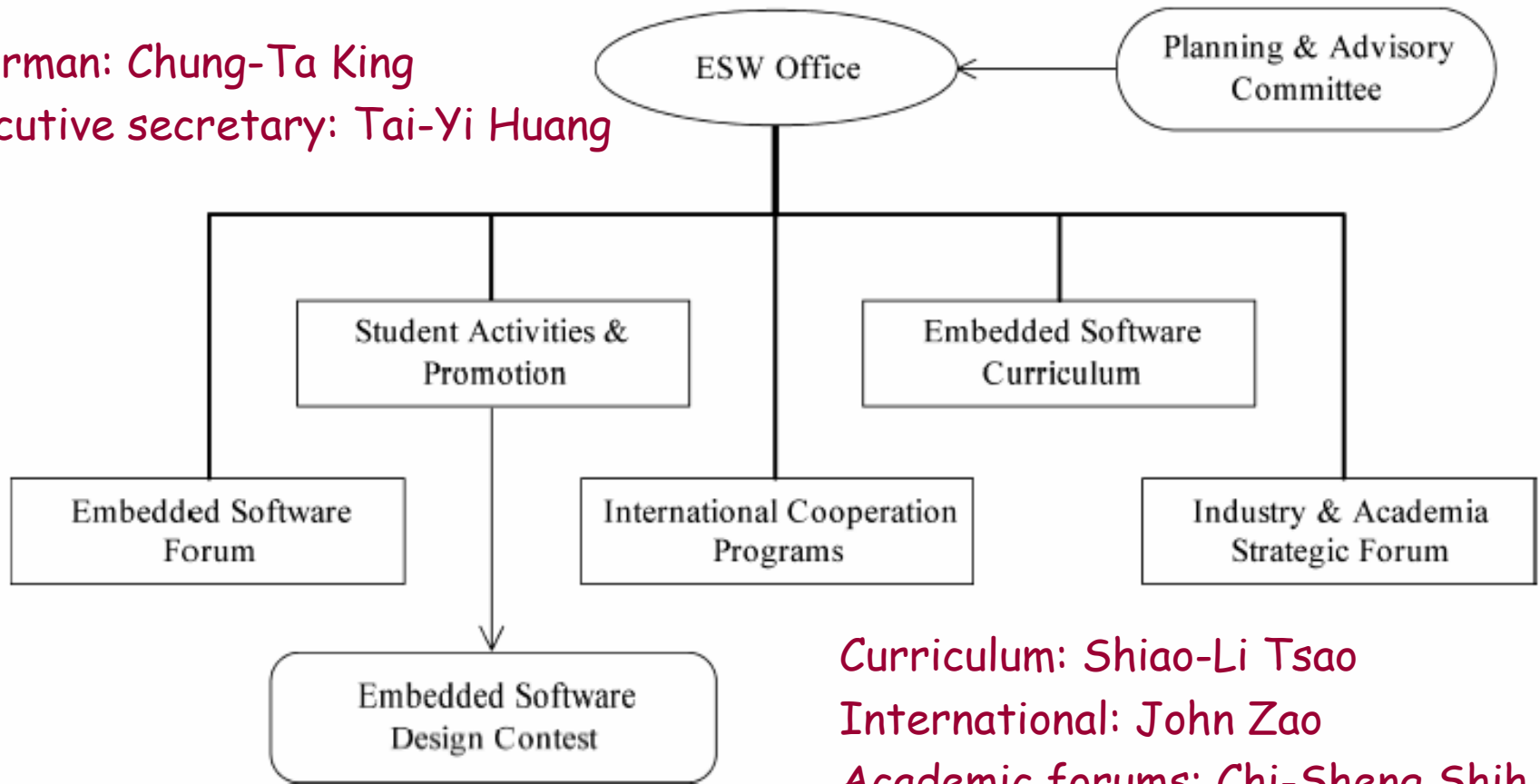
The 8-consortia Architecture

Embedded Software Consortium
http://esw.cs.nthu.edu.tw
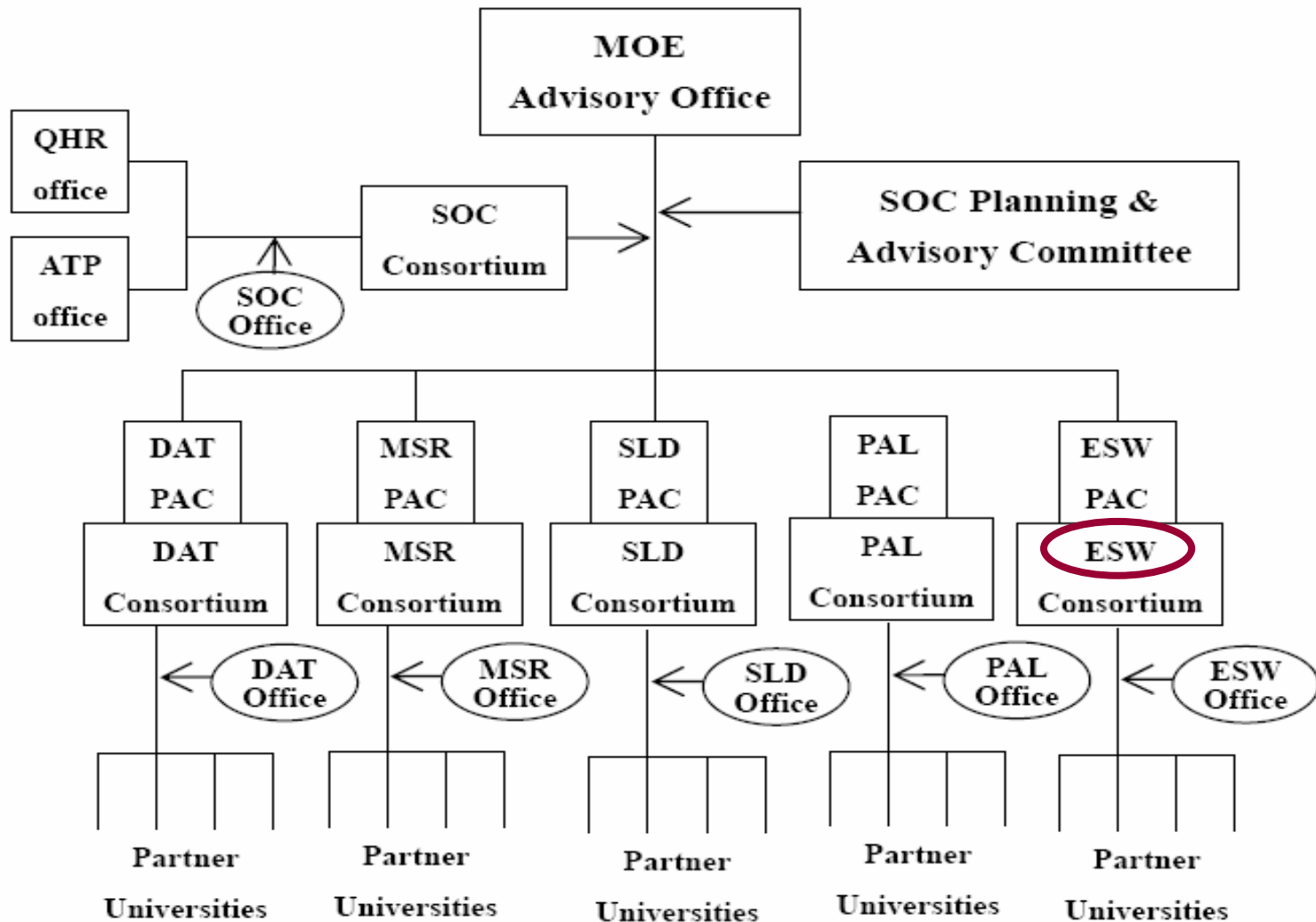
- ❖ **ESW was established in 02/2004**
  - ➢ Goal: to focus on software development for SoC systems
- ❖ **ESW programs**
  - ➢ Academic forums
  - ➢ Industrial strategic forums
  - ➢ International collaborations
  - ➢ Student activities and promotions
  - ➢ ESW curriculum development
- ❖ **"The Embedded Software Consortium of Taiwan"**
  - ➢ ACM Transactions on Embedded Computing Systems, 4(3):612-632, August 2005.

ESW Program Architecture

Chairman: Chung-Ta King
Executive secretary: Tai-Yi Huang

ESW Office

Planning & Advisory Committee

Student Activities & Promotion

Embedded Software Curriculum

Embedded Software Forum

International Cooperation Programs

Industry & Academia Strategic Forum

Embedded Software Design Contest

Curriculum: Shiao-Li Tsao
International: John Zao
Academic forums: Chi-Sheng Shih

partner universities: 22, professors: 46

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Embedded Software Consortium
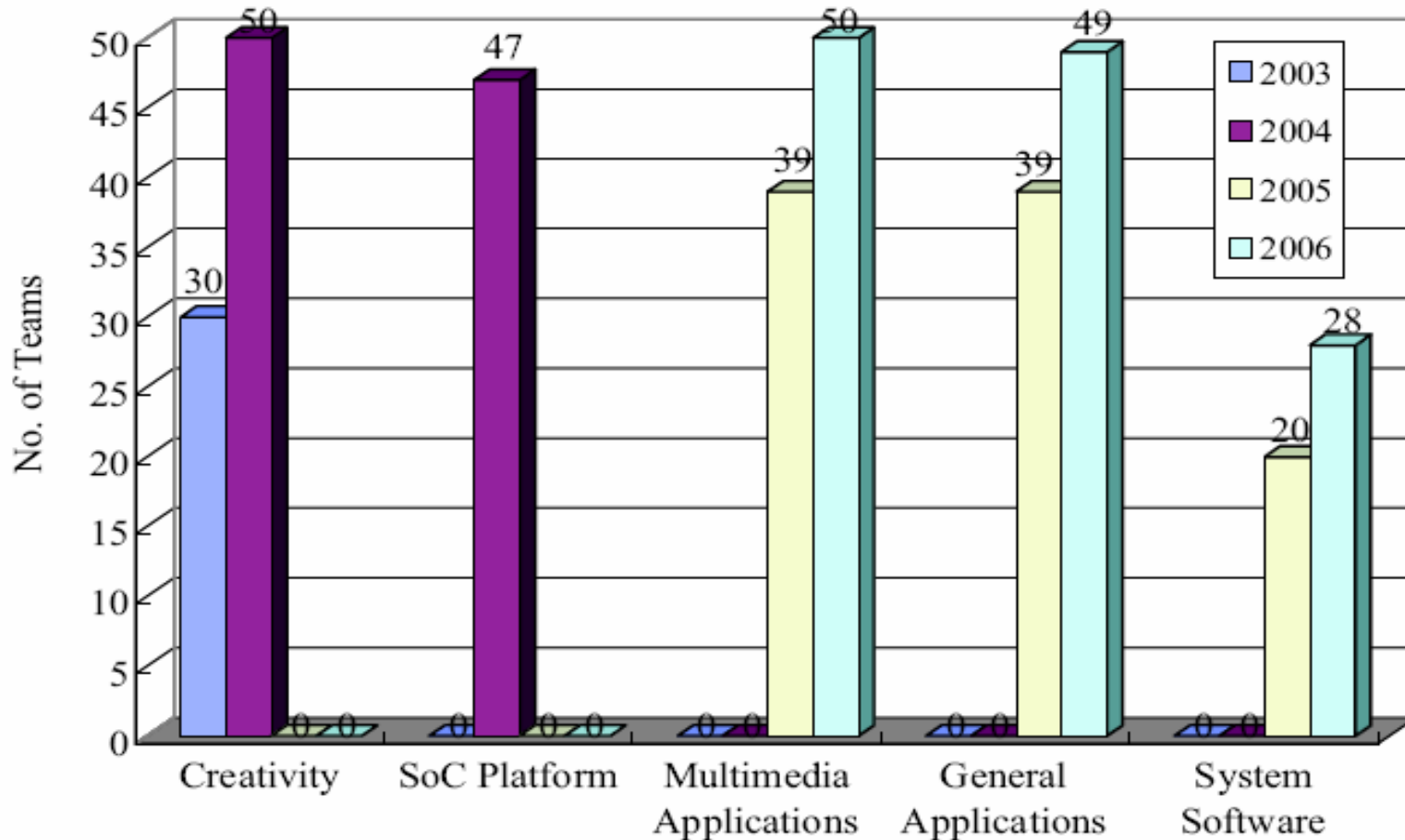
ESW Design Contest

❖ **The first ESDC was hold in 2003**

  ➢ It is the largest platform for students to demonstrate their embedded systems

❖ **ESDC overview**

  ➢ Period: 4 months

  ➢ Team-up: no more than 3 students

  ➢ Phases: proposal-review & final demo

  ➢ Grading: report (30%), presentation (20%), system demo (50%)

  ➢ Award: top 3% are financed to attend an international conference (~US$6,000)

嵌入式軟體聯盟
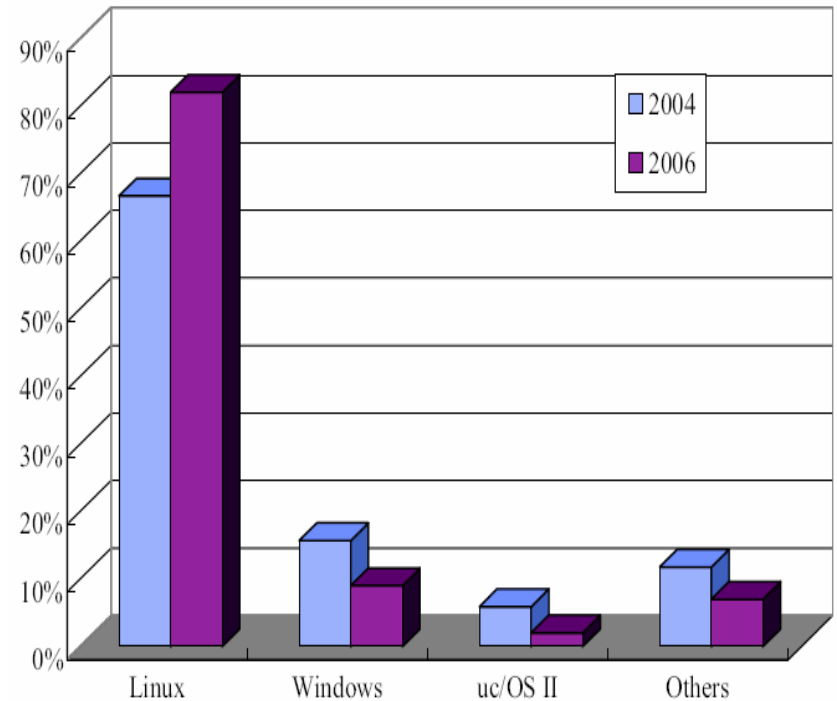**Embedded Software Consortium**

ESDC Attendance

Number of Registered Teams

Year	2003	2004	2005	2006
Year	30	97	98	127

Year

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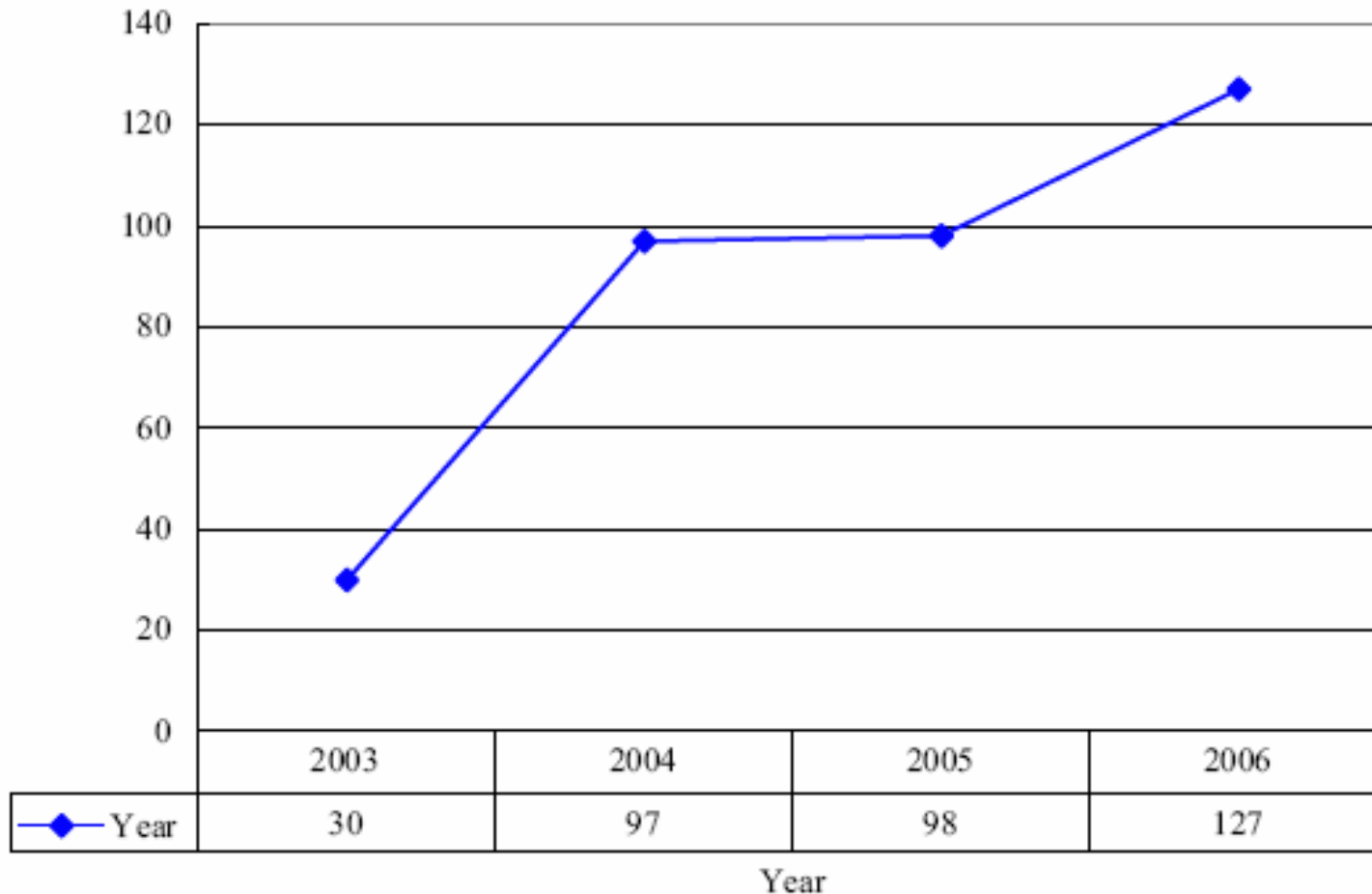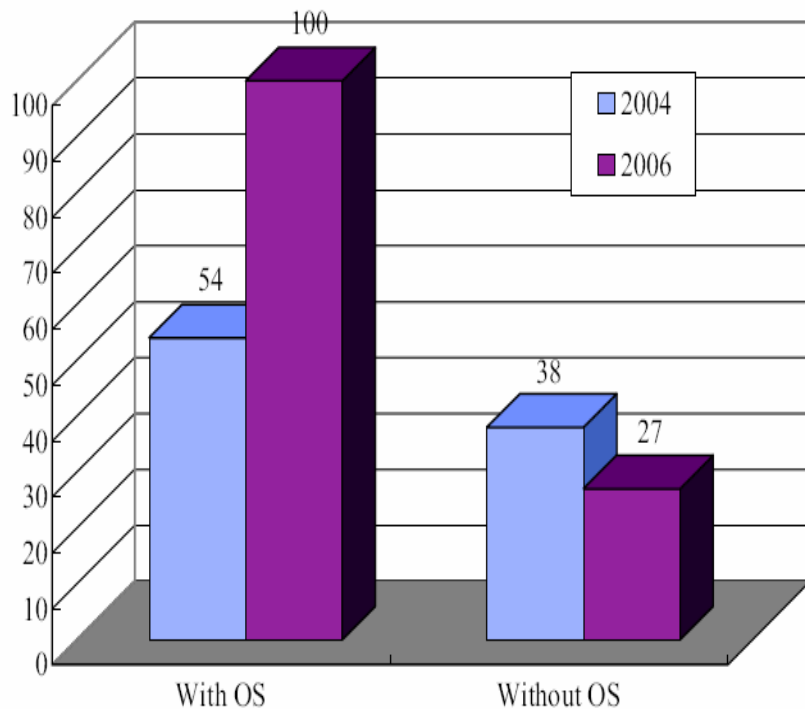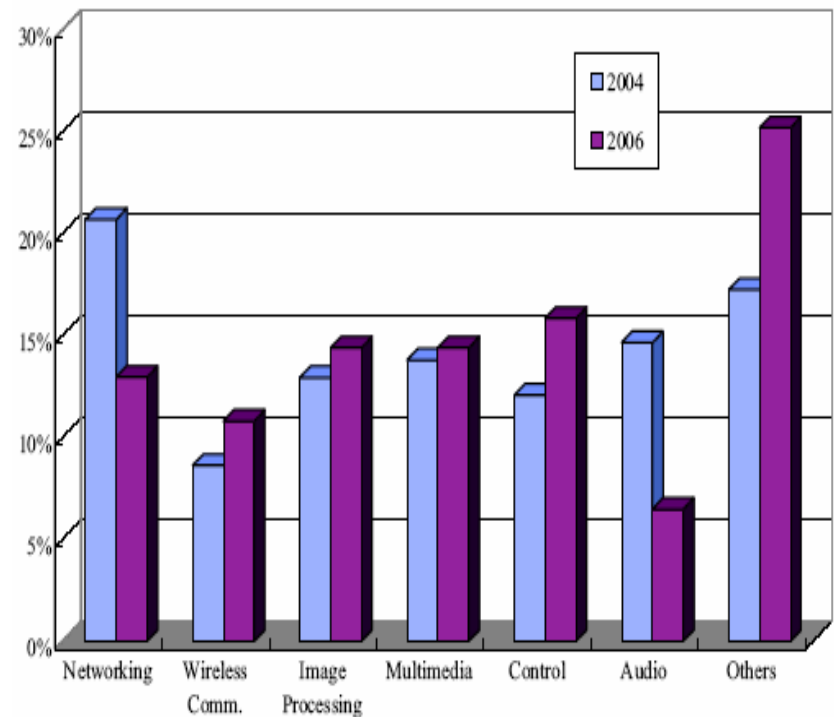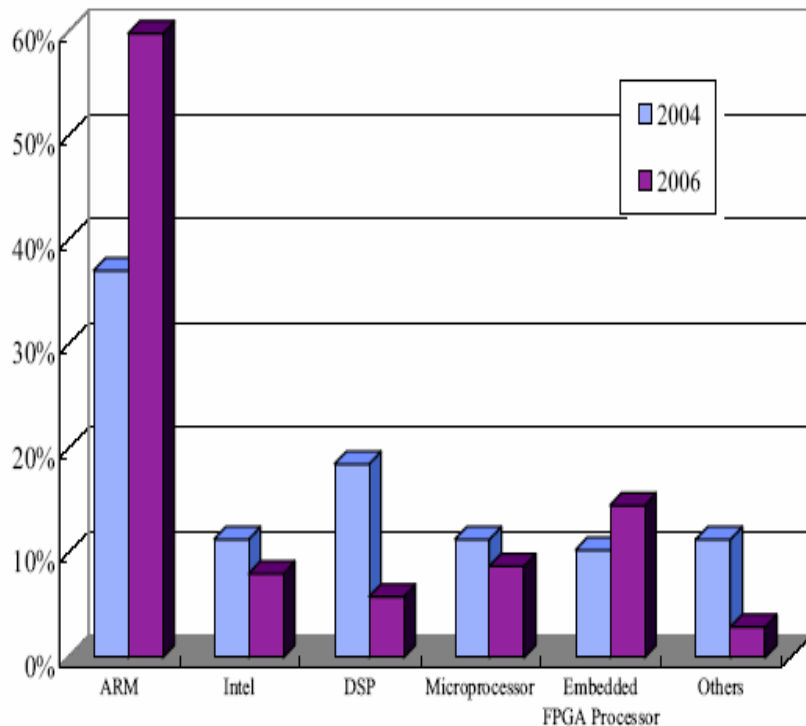
ESDC Attendance by Category

ESDC Attendance by OS

By Processors and By Topics

ESW Lab Map

❖ ESW curriculum develops many hands-on labs (over 140 labs by now)

  ➢ Each course requires to turn in 4 labs

❖ Lab Map: to construct a map of labs that serves as a guide and as a database

❖ Each lab module includes:

  ➢ Step-by-step procedure to reproduce

  ➢ HW/SW requirement, vendors, price, etc

❖ Peer-review process

  ➢ Reviewed by another group of professor and students

  ➢ Being able to reproduce is the key

❖ http://esw.cs.nthu.edu.tw/labmap/allmodules.htm

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Map browsed by All Modules

Lab Module List

[001-02][薛智文]　[001-03][林寬仁]　[001-04][胡竹生]　[001-05][黃文增]　[001-07][楊正仁]　[001-08][張軒彬]

[001-09][吳曉光]　[001-10][楊中平]　[002-01][張榮貴]　[003-01][王勝德]　[004-01][鍾葉青]　[005-01][施吉昇]

[006-01][李政崑]　[007-01][侯廷偉]　[008-01][鍾明政]　[009-01][許孟超]

Browse all lab modules by classification of [**All Modules**] [**OS**] [**Platform**] [**Tool Chain**]

Table: Lab Modules

001-02	開發教師：薛智文 課程名稱：系統晶片之嵌入式即時作業系統 學校系所：中正大學資工系 主審委員：金仲達	電話：05-2720411 ext. 23125 地址：嘉義縣民雄鄉大學路168號 資工所即時系統實驗室 繳交日期：2005/9/10
Content: 4 Lab modules	Platform: Creator S3C2410 Lab1: Download program (LCD application) to Creator S3C2410 The objective of this lab is to train students to setup development environment of an embedded system and manipulate an ARM embedded platform. Students should be first familiar with the hardware specification of the hardware platform in order to control the hardware. A student will learn to install and configure the tool chain of the embedded platform. In addition, students will learn how to cross compile and download program from a host PC and execute the downloaded program on the embedded platform. Lab2: Porting Linux on Creator S3C2410 The objective of this lab is to train students with the process of porting the Linux operating system onto an ARM	

Map browsed by OS

Table: OS

OS	Platform	Description
Linux	Creator S3C2410	Porting Linux2.4 [001-02-02]
		MP3 player [001-02-03]
		RT-OS module FireLinux [001-02-04]
	TI OMAP 5910	Porting Linux2.4
		IPC (Share memory)
		IPC (semaphore)
		Pthreads Programming
		Programming of Embedded GUI
		Network Digital Camera Example [001-04-01]
	PCM7230	PPRK [001-04-00 ~ 10]
	VIA EPIA MII	Porting Linux 2.6 [001-10-01]
	X86	Create Boot disk of linux [003-01-02]
uClinux	NET-Start!W3001 ARM S3C4510B	Porting uClinux2.0 [001-03-04]
		Boot loader [001-03-03]
		Switch and 7 segments [001-03-05]
		Interrupt Handle and TimeDelay [001-03-06]
		DMA [001-03-07]
	Net-Start evaluation ARM S3C4510B	Helloworld, Switch, 7 segments [003-01-01]
		Barbcode scanner, LCD module [003-01-05]
		Network packet Filter [003-01-08]
		uBoot and NFS [009-01-01]
	Creator S3C4510B	Porting uClinux [001-09-04]
		Setup Network [001-09-03]
		Using Debugger of dommingo [003-01-04]

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Map browsed by Platforms

Table: Hardware Platform

Hardware Platform	Porting OS	Applications/drivers or others
Creator S3C2410		LCD Display [001-02-01]
	Linux2.4 [001-02-02]	MP3 player [001-02-03]
		RT-OS module FireLinux [001-02-04]
NET-Start!W3001 ARM S3C4510B	uClinux2.0 [001-03-04]	Boot loader [001-03-03]
		Switch and 7 segments [001-03-05]
		Interrupt Handle and TimeDelay [001-03-06]
		DMA [001-03-07]
	uC/OS [001-03-08]	Modify Scheduler: Priority inversion[001-03-09]
NET-Start evaluation ARM S3C4510B		DIP switch and 7 segments [001-08-01]
		SWI and ISR [001-08-02]
	uC/OS II	Modify Message Queue [001-08-03]
		Modify semaphores: API Flush() [001-08-02]
		Modify scheduler: Readylist [001-08-03]
		Modify scheduler: Round robin [001-08-04]
		Modify scheduler: Multi-level Queue [001-08-05]
	uClinux	Helloworld, Switch, 7 segments [003-01-01]
		Barbcode scanner, LCD module [003-01-05]
		Network packet Filter [003-01-08]
		uBoot and NFS [009-01-01]
		Debugger rm-elf-gdb [003-01-03]
TI OMAP 5910	Linux2.4 [001-04-01]	IPC (Share memory)
		IPC (semaphore)
		Pthreads Programming

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Map browsed by Toolchains

Table: Tool Chain

Compiler and Debugger	Lab Modules number
ARM Development Suite	[001-03-01] [001-03-02] [001-07][001-08]
ARM SDT	[001-05]
Hitool	[001-10-02] [003-01-01]
Build ARM GCC cross compilder	[002-01-01] [003-01-01]
Porting GCC to ARM	[002-01-02]
Setup GDB/insight 6.1	[002-01-03]
Porting GCC to TI C6X	[002-01-04]
Add new instruction	[002-01-05]
Debugger arm-elf-gdb	[003-01-03]
Debugger domingo	[003-01-04]
CCStudio	[006-01-01]

Summary

- ❖ **ESW is at its 3rd year, maturing**
  - ➢ ESDC is the largest embedded SW event
  - ➢ Lap map and its review process is working
  - ➢ Making our efforts visible internationally
- ❖ **Next step on ESW education?**
  - ➢ New courses on multi-core and HW/SW?
  - ➢ Education → research?
  - ➢ Pacific-rim ESW consortium?

Thank You

ESW Activity Summary
(2006/08/31)