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CDIO Members at-large

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Chengdu, P.R. China

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Systematical View of CDIO in CUIT

2017 CDIO Asian Regional Conference

School Development

2015 School promoted from college to university in name

2000 Chengdu University of Information Technology

1978 Chengdu Institute of Meteorology

1956 Chengdu School of Meteorology

1951 School Founding

- **Undergraduates : 19,000**
- **Graduates : 2,000**
- **Undergraduate Disciplines : 53**
- **MOE "Plan for Educating and Training Outstanding Engineers" : 8 disciplines**

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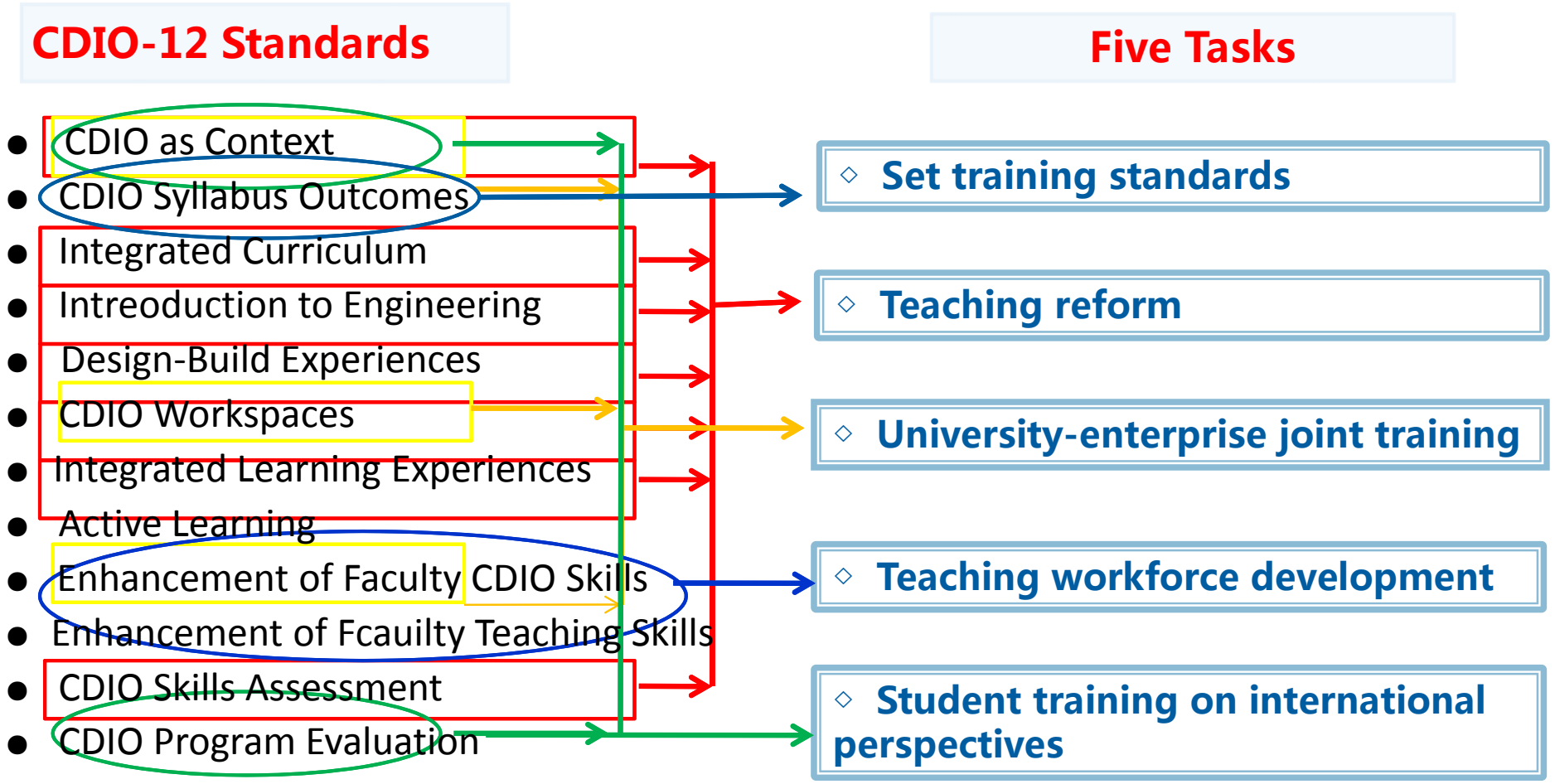
I. System View

Reference Source: Ideas of CDIO Engineering Education

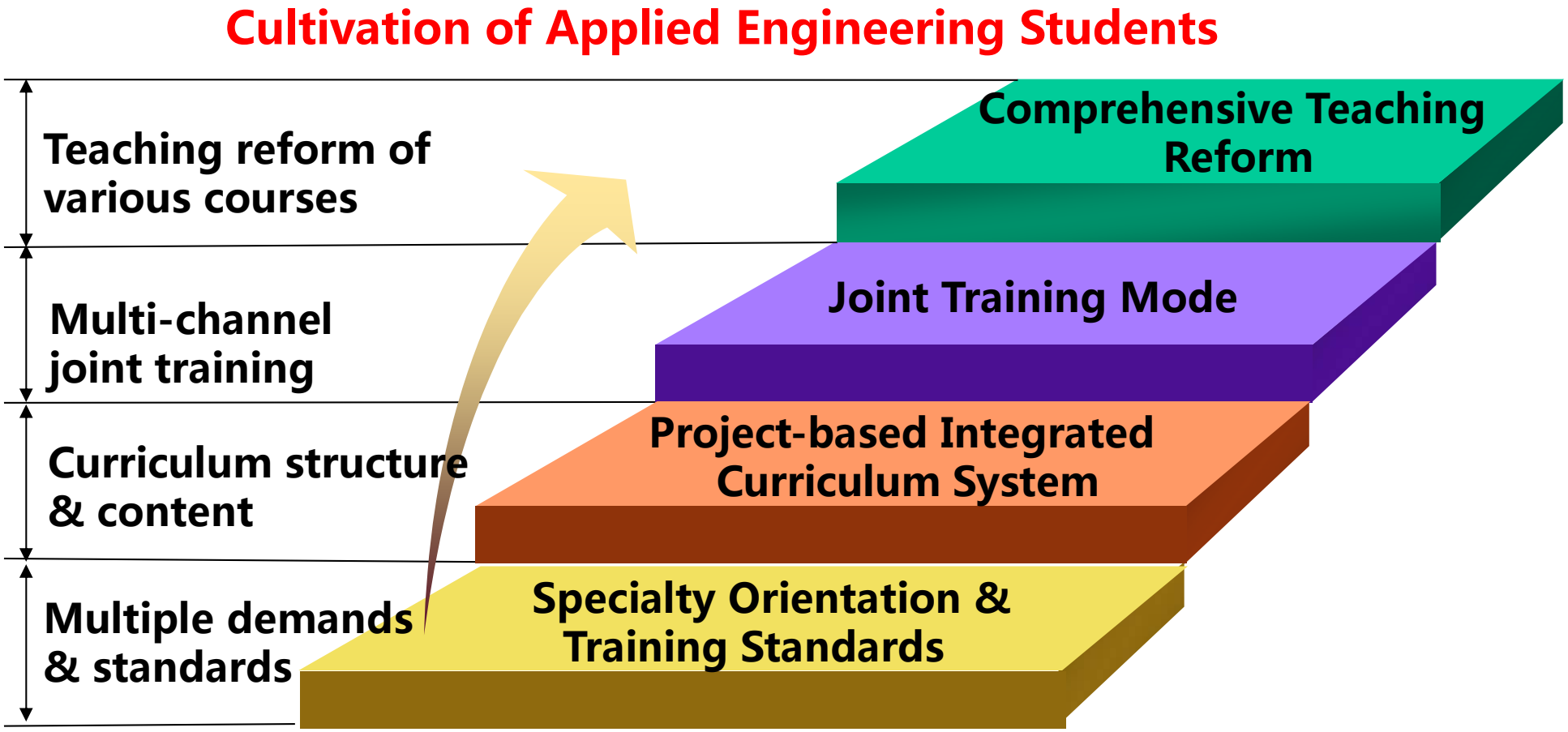
Integration Source: CDIO Syllabus & 12 Standards

Fulfill the five tasks of MOE "Plan for Educating and Training Outstanding Engineers"



I. System View

Promotion of integrated reform for engineering education, focusing on the design of academic specializations.



II. Method

1. Set demand-oriented training standards
2. Reconstruct a project-based curriculum system
3. Promote leveled curriculum reform
4. Implement university to enterprise joint training
5. Establish quality assurance for continuous improvement

II. Method

1. Set demand-oriented training standards

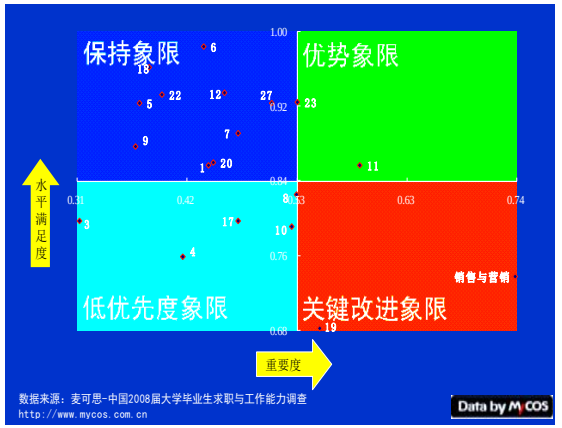
Survey on Demands — To define the basis for training standards

Third Party Evaluation — To know graduates' primary ability

Argumentation on Disciplines — To determine the purpose and features of each discipline

Integration of CDIO Syllabus — Use CDIO syllabus for reference and set training standards for outstanding professional students

Training Standards for Professional Students



- **Framework-** "Knowledge-Ability-Attributes" Integrative Training

Standards

First-level Index	Second-level Index	Third-level Index	Specific descriptions
1. Technology knowledge	1.1 Basic knowledge of the discipline	1.1.1 Basic knowledge of Advanced Mathematics and Physics	Students acquire the basic knowledge of calculus, linear algebra, etc. of advanced mathematics and basic knowledge of mechanics, electromagnetism, thermology, etc. Students have the application ability of scientific methods.
		1.1.2 Basic experimental methods and skills of Physics	Students know how to use experiment instruments, how to design physical experiments, and how to collect and analyze data.

- **Training Standards – Guide for curriculum system reconstruction**

2. Reconstruct project-based curriculum system

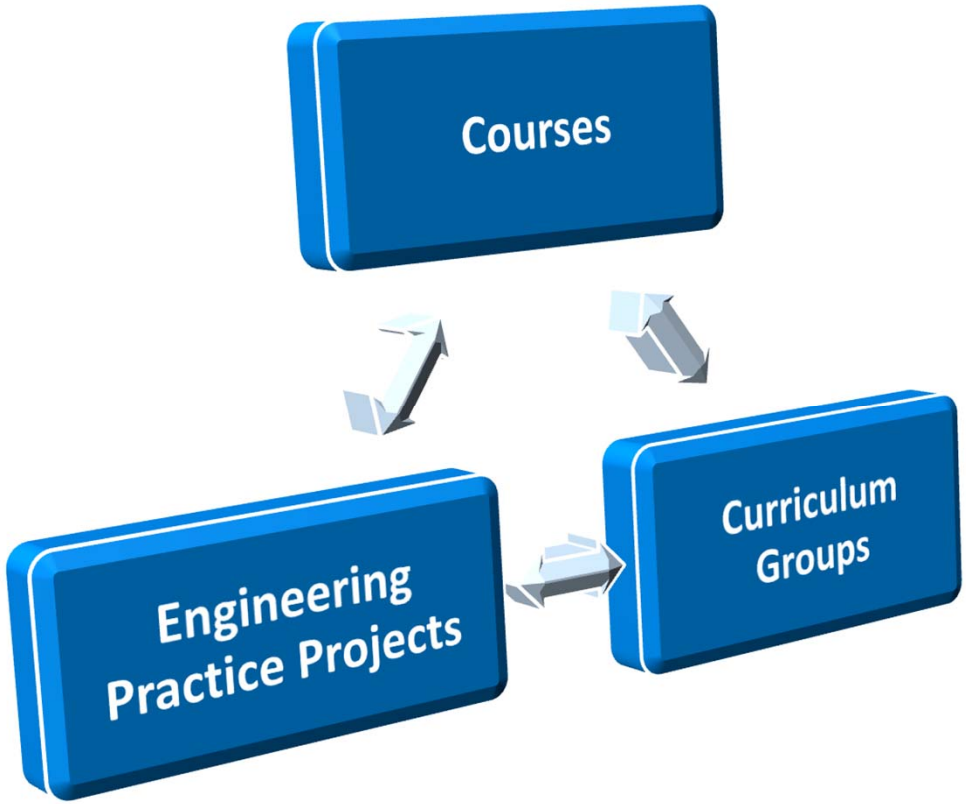
- **Project-based training-** **Three-levels of engineering practice projects that link course areas**

  - **Level I Project: Practice projects across multiple semesters**
  - **Level II Project: Projects corresponding to specialized course group**
  - **Level III Project: Practice projects for specific courses**

Objectives: **To use professional knowledge and exercise practice ability**

- **Integrated Design-**

Explore the relationship of courses, curriculum groups, and engineering practice projects.



- **Ability Progression-** Implement standards to set goals and improve student ability

First Grade	Introduction to Engineering	Engineering Practice	College English	
	Calculus	College Physics	Circuit Analysis	.....
Second Grade	Analog Electronics	Engineering Practice	Atmospheric Sciences	
	Digital Electronics	Programming	Signals and Systems	.....
Third Grade	Digital Signal Processing	Meteorological Observation	Meteorological Remote Sensing	Satellite Meteorology
	TEAMWORK	INNOVATION	COMMUNICATION	

Matrix of "Training Standards - Curriculum System"

表1:本科工程型_实现矩阵（工程方向）

	思想道德修养与法律基础	中国近现代史纲要	马克思主义基本原理	毛泽东思想和中国特色社会…	毛泽东思想和中国特色社会…	形势与政策	大学英语	体育	微积分I	微积分II	空间解析几何与线性代数	离散数学	概率论与数理统计	大学物理B	工程导论	工程制图	C语言程序设计1	C语言程序设计2	面向对象程序设计	数据结构	经典算法的设计与实现	计算机组成原理	操作系统原理	计算机网络
1 技术知识和推理能力																								
1.1基础科学知识																								
1.1.1数学知识									TU	TU	TU	TU	TU	U			U	U			U	U		
1.1.2物理学知识														TU								U		
1.2核心工程基础知识																								
1.2.1核心工程基础知															I	U	I	IU			TU			
1.3 高级工程基础知识																								
1.3.1 高级工程基础									I	I	I	I	I						TU	U		I	IT	I
2 个人职业技能和职业																								
2.1专业基本能力																								
2.1.1计算机思维																	TU	TU	TU	TU	IU	U	ITU	
2.1.2算法设计与分析																	TU	TU	TU	TU	IU		ITU	
2.1.3程序设计与实现（包括硬件与软件实现）																	TU	TU	TU	ITU	IU		I	
2.1.4系统能力																		U	U	U	IU	IU	I	
2.2工程推理和解决问题																								
2.2.1认识和系统表述																	I	I	I				I	
2.2.2建立模型																				TU	ITU		I	
2.2.3判断和定性分析																	I	I	I					
2.2.4带不确定性因素																	I	I	I					
2.2.5解决方法和建议																	U	U	U			U		U
2.3实验中探寻知识																								
2.3.1 建立假设									I	I	I	I	I											
2.3.2 查询相关书刊或者电子文献														U							U	U		
2.3.3 实验探索														I							U			
2.3.4 假设检验和论									U	U	U	U	U	U							U			
2.4 系统思维																								
2.4.1 整体思维	I		I						U	U	U	U	U	U			U	U	U	U	U	IU	IT	I
2.4.2 系统内的紧急性和互交性																						I	ITU	I
2.4.3 确定优先级和																						IU	ITU	I
2.4.4 决议时权衡、判断和平衡																						ITU	I	I
2.5 个人技能和态度																								
2.5.1 主动和愿意冒								U							IU									
2.5.2 执着与变通								U							IU									
2.5.3创造性思维															IU		U	U	U		U	U	I	
2.5.4批评性思维	I		I	I	I	I									IU							U		I
2.5.5 自省个人的知识、技能、态度															IU									

	计算机导论(含单片机)	电路与电子学	数字电路与逻辑设计	汇编语言程序设计	操作系统实验(Linux内核)	电子系统综合设计	嵌入式技术	设备驱动程序设计	计算机体系结构	嵌入式应用系统与设备驱动…	软件工程	软件测试技术	数据库原理	JAVA程序设计	WEB编程技术	数据库应用技术(Oracle)	WEB数据库访问技术(J2EE)	J2EE与oracle综合开发	面向对象分析与设计（UML…	XML设计及应用	VC++程序设计	net与SQL Server综合开发	.net架构及应用
1 技术知识和推理能力																							
1.1基础科学知识																							
1.1.1数学知识																							
1.1.2物理学知识		U																					
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1.3 高级工程基础知识																							
1.3.1 高级工程基础	I	I	I	I	TU		TU	TU	I		ITU		TU										
2 个人职业技能和职业																							
2.1专业基本能力																							
2.1.1计算机思维	I				TU	IU				IU	U	U	U	TU	TU		TU	IU		TU	TU	IU	TU
2.1.2算法设计与分析					TU					IU				TU	TU			IU			TU	IU	TU
2.1.3程序设计与实现（包括硬件与软件实现）					TU					IU				TU	TU	TU	TU	IU	TU		TU	IU	TU
2.1.4系统能力											IU	U		TU	TU	TU		U	TU		TU	IU	TU
2.2工程推理和解决问题																							
2.2.1认识和系统表述						IU				IU			TU			TU		IU		TU		IU	
2.2.2建立模型	IU				TU	IU				IU	I		TU			TU	TU	IU	TU	TU	U	IU	
2.2.3判断和定性分析	IU					IU				IU		IU						IU	U	TU		IU	
2.2.4带不确定性因素	IU					IU				IU	U	IU						IU	U	TU		IU	
2.2.5解决方法和建议	IU					U				U	U	IU	U					U	U	U		U	
2.3实验中探寻知识																							
2.3.1 建立假设																							
2.3.2 查询相关书刊或者电子文献					U	IU				IU			U			U	U	IU	U	U		IU	
2.3.3 实验探索					U	IU				IU								IU				IU	
2.3.4 假设检验和论						IU																	
2.4 系统思维																							
2.4.1 整体思维					U	IU			IU	IU	TU	IU	U	U	U		U	IU	U	TU	U	IU	
2.4.2 系统内的紧急性和互交性	I				U		U			IU		IU	U					IU				IU	
2.4.3 确定优先级和				I				I	TU		U	IU											
2.4.4 决议时权衡、判断和平衡	I	I	I																				
2.5 个人技能和态度																							
2.5.1 主动和愿意冒						U				U								U				U	
2.5.2 执着与变通																							
2.5.3创造性思维					U	IU				IU	I							IU		U		IU	
2.5.4批评性思维																							
2.5.5 自省个人的知识、技能、态度						U				U								U				U	

	计算机控制技术	微机接口及应用	HDL与可编程器件	人工智能	网络信息安全	TCP/IP及应用	网络设备配置与管理	实用网络技术	计算机专业英语	多媒体应用技术	编译原理	现代气象业务体制	学科前沿讲座	军事理论及训练	创新实践	单片机嵌入式系统设计与集成	ARM嵌入式系统设计与集成	企业实习	毕业论文（设计）	企业培养环：轮岗	企业培养环：定岗	企业培养环：毕业设计
1 技术知识和推理能力																						
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2.1专业基本能力																						
2.1.1计算机思维				U	U	U	U	U			IU					IU	IU	IU	IU			IU
2.1.2算法设计与分析				U												IU	IU	IU	IU			IU
2.1.3程序设计与实现（包括硬件与软件实现）				U												IU	IU	IU	IU			IU
2.1.4系统能力																						
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2.2.3判断和定性分析																IU	IU	IU	IU			IU
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2.2.5解决方法和建议				TU												U	U	U	IU			U
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2.4 系统思维																						
2.4.1 整体思维	I		I		IU	IU	IU				U	I			IU	IU	IU	IU	IU			IU
2.4.2 系统内的紧急性和互交性								IU		I	U				IU	IU	IU	IU	IU			IU
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2.4.4 决议时权衡、判断和平衡	U										U		I									
2.5 个人技能和态度																						
2.5.1 主动和愿意冒															U	U	U	U				U
2.5.2 执着与变通														IU	IU							
2.5.3创造性思维					U								IU		IU	IU	IU	IU	U			IU
2.5.4批评性思维					U								IU		IU							
2.5.5 自省个人的知识、技能、态度															U	U	U	U	U			U

Reform of common foundation courses & specialized course

- Define course standards
- Optimize teaching contents
- Student-centered teaching mode
- Cultivation of general ability, practical ability, and engineering competence
- Assessment of knowledge and ability

- **Reform of general foundation courses**

Ability-oriented teaching reform of general foundation courses, such as *College Physics, College English, Computer Science, Mathematics*, etc.

- **Reform of engineering foundation courses**

Two new courses added:

Introduction to Engineering* & *Engineering Practice

- **Reform of specialized courses**

Teaching contents, teaching methods, and assessment methods

- **Process-based Evaluation Platform:** **Assessment of Knowledge and Ability**

Process-based evaluation platform for Computer Science course

4. Implement university to enterprise joint training

- **Details of Joint Training:**

  - Set up joint training plan
  - Construct practice spaces
  - Cooperate in student training
  - Co-organize academic competitions
  - Cooperate in developing teaching workforce

4. Implement university to enterprise joint training

- **University- enterprise cooperation**
  - Customized class for enterprise
  - 3+1” University-enterprise joint training
  - Intensive practice in enterprise
  - Enterprise project-driven training

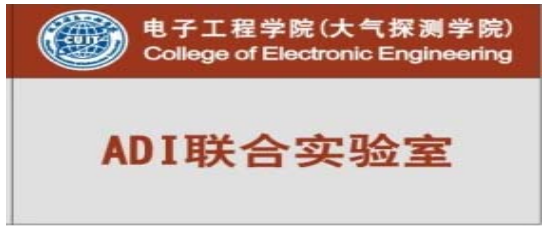
Signing Ceremony

- **Practice Space, jointly constructed by the university and enterprises**

Joint Laboratory

More than 20 joint labs constructed by the university and world-renowned enterprises



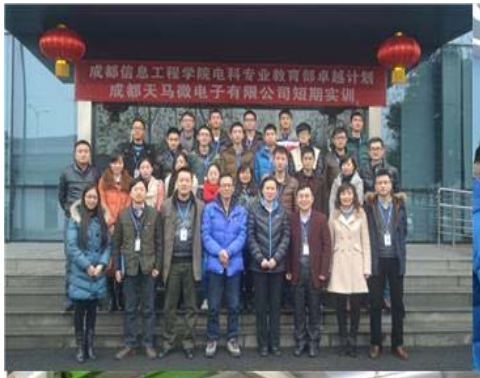



Joint Practice Fields

More than 190 practice fields, including 8 national engineering education and practice centers

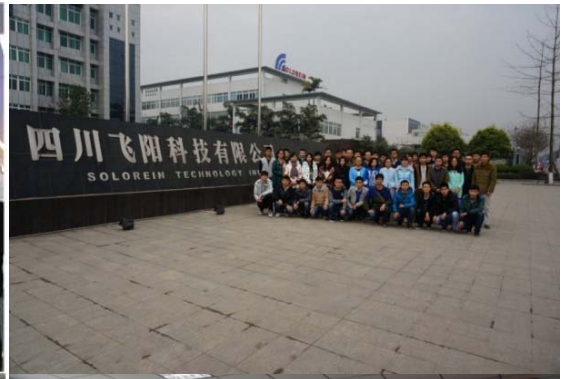
ANALOG DEVICES
TEXAS INSTRUMENTS
DELL
SAMSUNG
Marriott
中国气象局 CHINA METEOROLOGICAL ADMINISTRATION
国家统计局 National Bureau of Statistics of China

Practice Space in Enterprises





Tianma Microelectronics Co., Ltd.



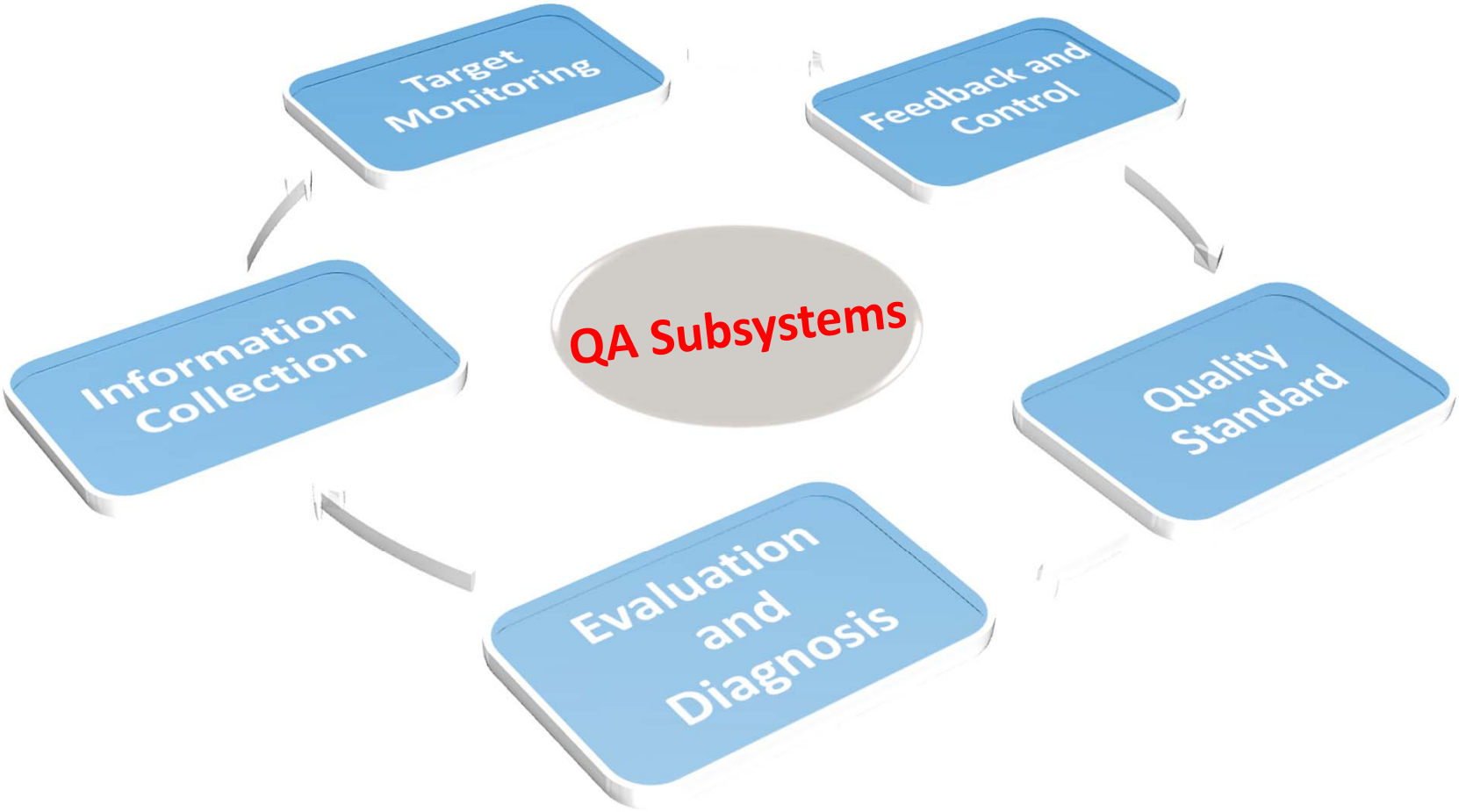
Solorein Technology Inc.

Compal Electronics, Inc.

II. Method 5. Establish quality assurance for continuous improvement

- **Quality Assurance:**

Two-level (University & College) Evaluation + Third Party Quality Evaluation



II. Method 5. Establish quality assurance for continuous improvement

- **Regular data monitoring of teaching with focus on effects**

CUIT Data Analysis Report of Class Teaching

CUIT Study Investigation Report

II. Method 5. Establish quality assurance for continuous improvement

- **Internal evaluation system with emphasis on quality**

Program Evaluation

- Program Orientation
- Plan Design of Student Training
- Teaching Management
- Curriculum Construction
- Faculty Development
- Teaching Facilities Construction
- Cultural Construction

Evaluation meeting

II. Method 5. Establish quality assurance for continuous improvement

- **Regular external feedback and evaluation for continuous improvement**

CUIT Annual Report on Social Demands and Education Quality (by MyCOS)

III. Output

1. Improved teaching quality

2. Improved innovation and entrepreneurship of engineering students

3. Enhanced quality and employability of graduates

4. Promoted CDIO engineering education reform through academic exchange

Recent Achievements:

- 2014 National teaching achievement prizes (2 second prizes)
- 2014 Provincial teaching achievement prizes (9 first prizes)
- 8 Experimental programs of MOE Plan for Educating and Training Outstanding
- Two programs of national pilot reform
- One national level teaching team
- One national experimental teaching demonstration center
- 8 national engineering education and practice center

III. Output

2、Improved innovation and entrepreneurship of engineering students

- Top Prize (“IT” Cup) in 2012 Electronic Design Competition for College Students in Sichuan Province;
- Silver Award in CDIO Student Academy;
- Excellence awards in National Electronic Design Competition.

3. Enhanced quality and employability of graduates

Students' employability and employment quality rank top among provincial colleges and universities three years in a row.

Since CDIO Engineering Education Reform :

- **Graduates' overall satisfaction with CUIT: 3 percentage points higher ;**
- **Graduates' job satisfaction: 5 percentage points higher;**
- **Connection between job and major: 4 percentage points higher for engineering and science graduates;**
- **Satisfaction with graduates' overall capacity: 3 percentage points higher.**

4. Promoted CDIO engineering education reform through academic exchange

- More than 30 presentations on engineering education at conferences at home and abroad;
- Dozens of universities visited CUIT to exchange experiences.

President Zhou Jiliu delivered a keynote speech at the 10th CDIO International Conference in Spain

Prof. Xie Mingyuan delivered a speech at a MOE Conference

III. Output

4. Promoted CDIO engineering education reform through academic exchange

- **Promote 8 program to join the engineering education accreditation ;**
- **CUIT hosted the 11th International CDIO Conference in June, 2015.**

More than 300 scholars from 32 countries attended.

THANKS !

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