

Shanghai, China

# **Interdisciplinary Trends in Design Education: the Analysis of Master Dissertation of College of Design and Innovation , Tongji University**

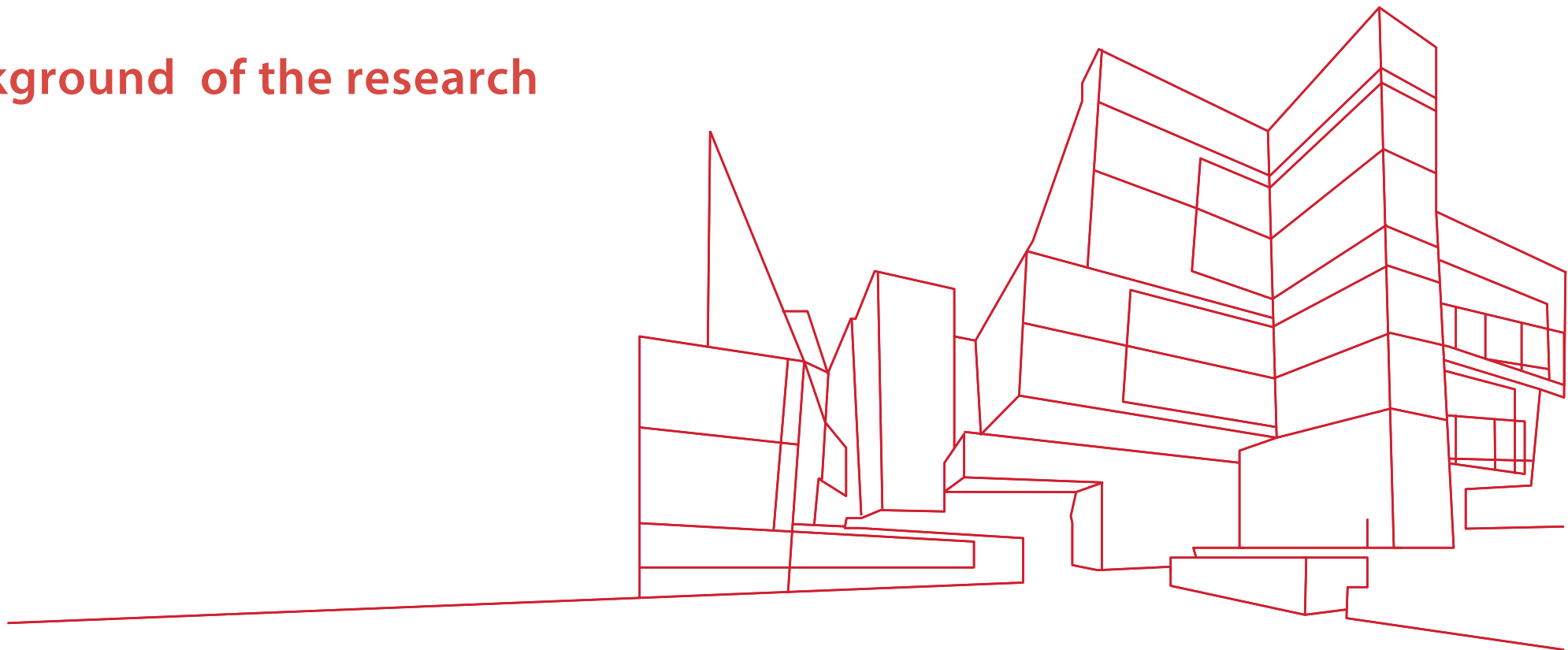
Lisha Ren , Yan Wang

College of Design and Innovation, Tongji University



# 1 Introduction

— The background of the research



# ■ Introduction

## The specialized subject classification in education

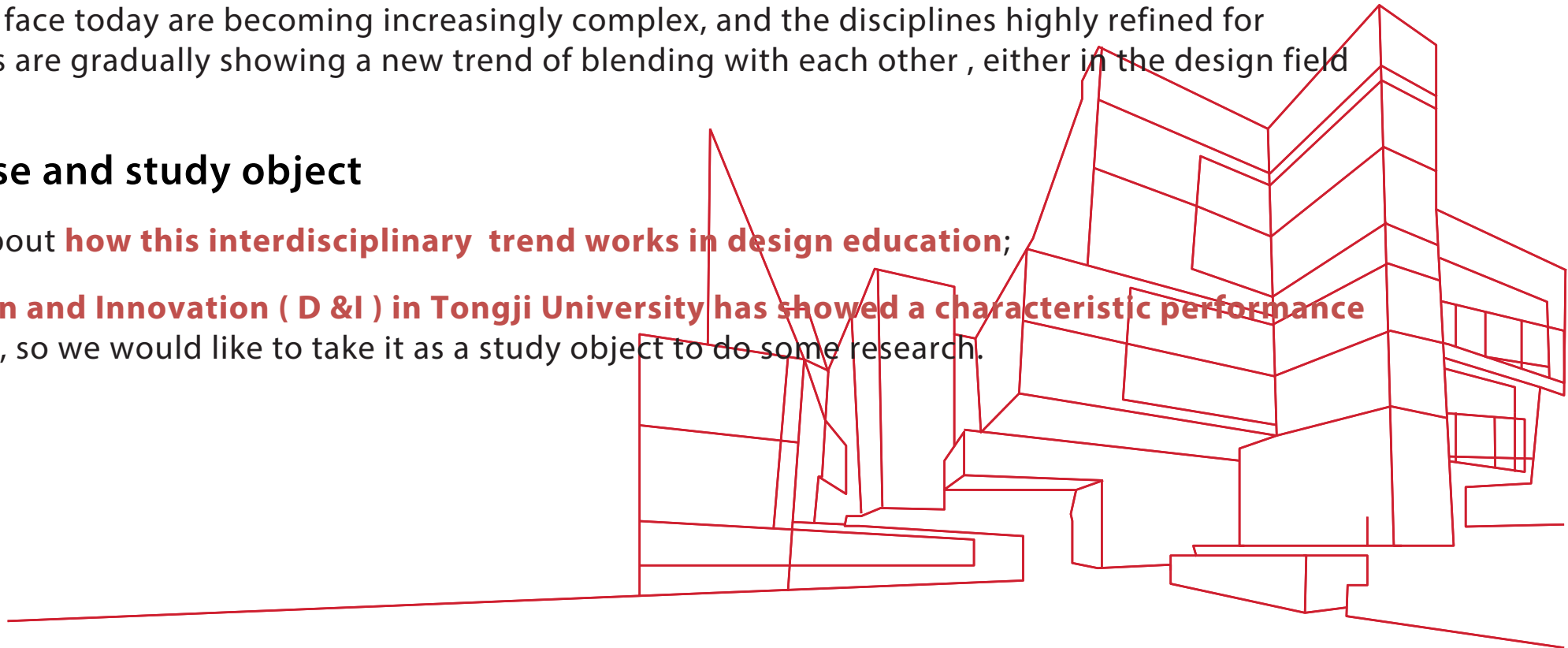
- In the past few centuries, social development has brought a highly refined social division of labor and occupations , thus promoting the establishment of specialized subject classification in education sector.

## A interdisciplinary trend

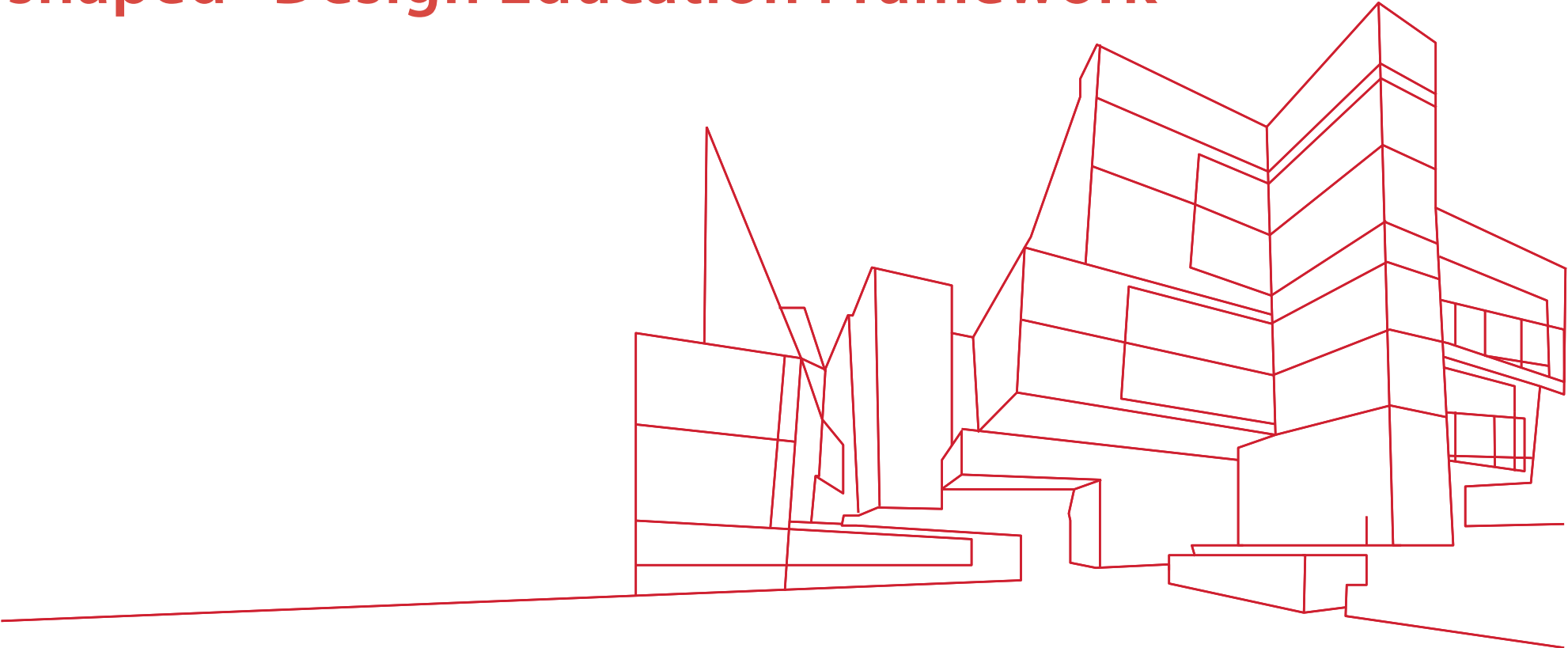
- The problems we face today are becoming increasingly complex, and the disciplines highly refined for hundreds of years are gradually showing a new trend of blending with each other , either in the design field or in other areas.

## Research purpose and study object

- We are curious about **how this interdisciplinary trend works in design education;**
- **College of Design and Innovation ( D & I ) in Tongji University has showed a characteristic performance** in this new trend , so we would like to take it as a study object to do some research.



# 2 A 3D “T-shaped” Design Education Framework



# ■ A 3D “T-shaped” Design Education Framework

## 2.1 Design education in D&I

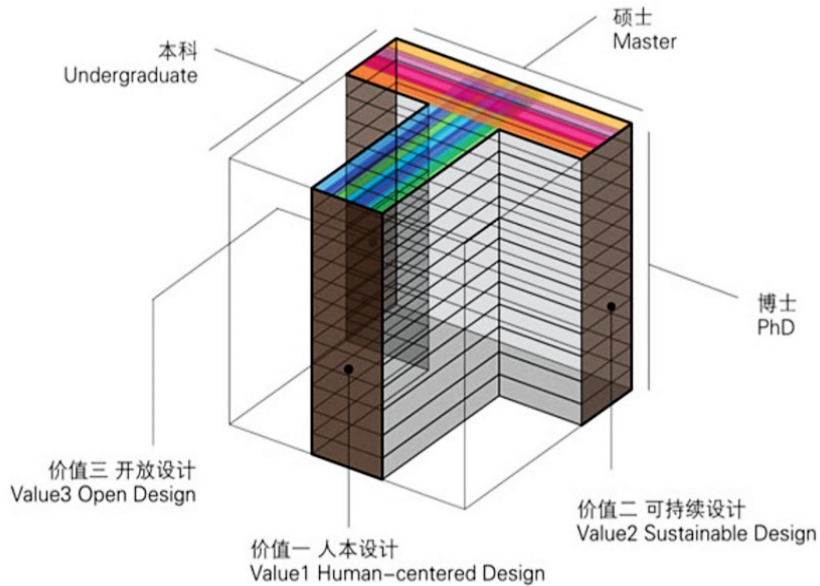


Figure 1: A 3D “T-shaped” innovative design education framework (Lou & Ma, 2015)

### The establishment of D&I

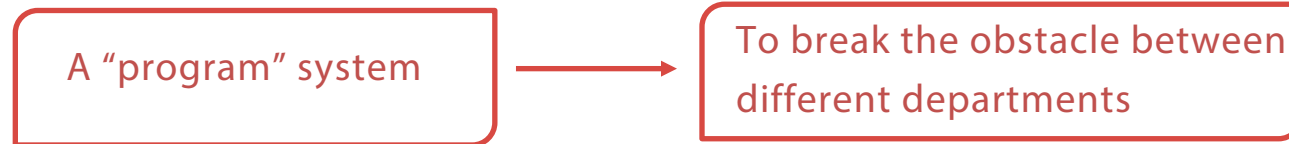
- The rapid development of technology has brought a new round of social change, and the requirements for design are becoming increasingly complex. In this context, College of Design and Innovation ( D & I ) was established in May 2009 as an independent colleges of Tongji University.

D&I has put forward a 3D T-shaped educational framework based on the prevailing Undergraduate-Master-PhD system (Lou & Ma, 2015) :

- Undergraduate education focuses on vertical capability— innovative thinking and broad knowledge;
- **Master education focuses on horizontal development, emphasizing fostering learning experience of interdisciplinary knowledge;**
- PhD education emphasizes the depth of knowledge and theories.

# ■ A 3D “T-shaped” Design Education Framework

Obviously, the emphasis on cultivating horizontal capability in master education is a positive response to the interdisciplinary trend.



## 2.2 Research question

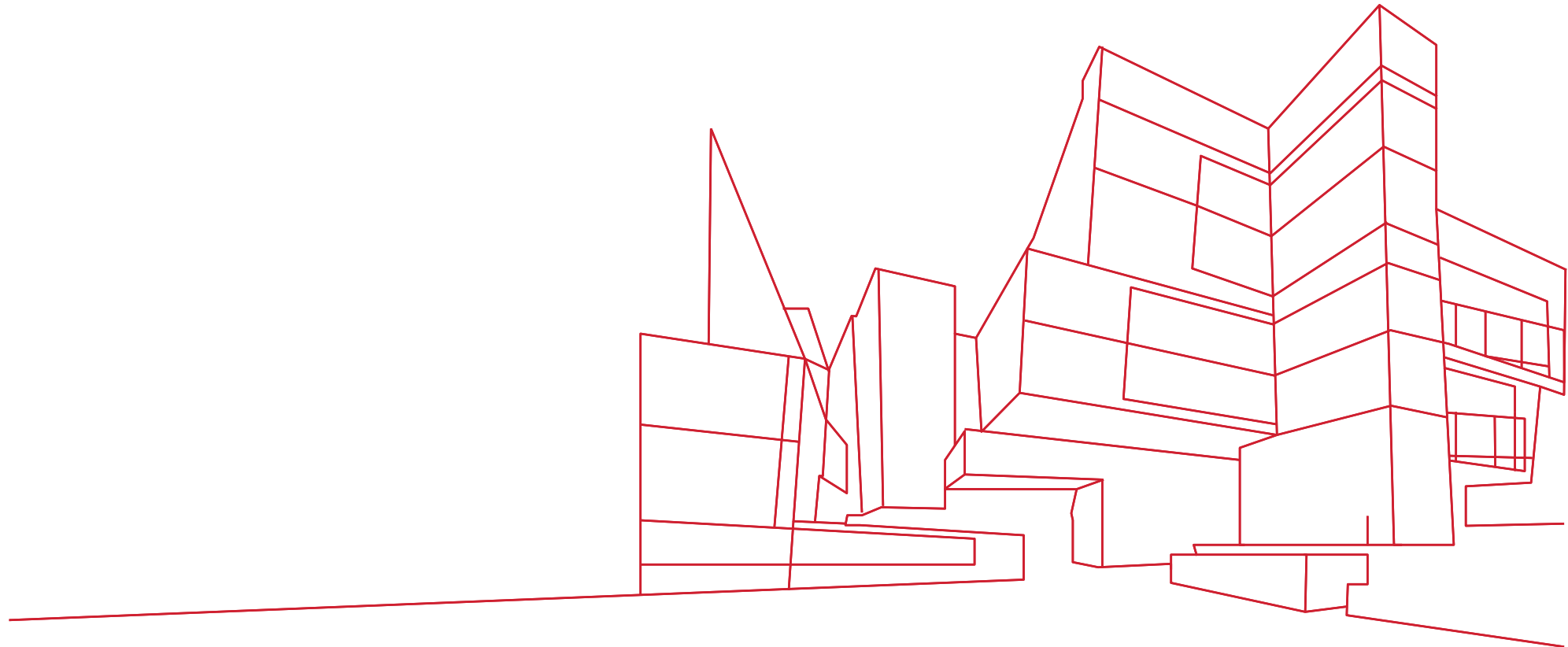
As D&I came into being in the transition era of design, and its reform was carried out step by step during the process of exploration. Reconsider this process, we would like to ask:

**How much does the idea of fostering cross-disciplinary capability impacts the students?**

**And what is the actual performance of the students in the interdisciplinary design and research?**



# 3 Research Discoveries



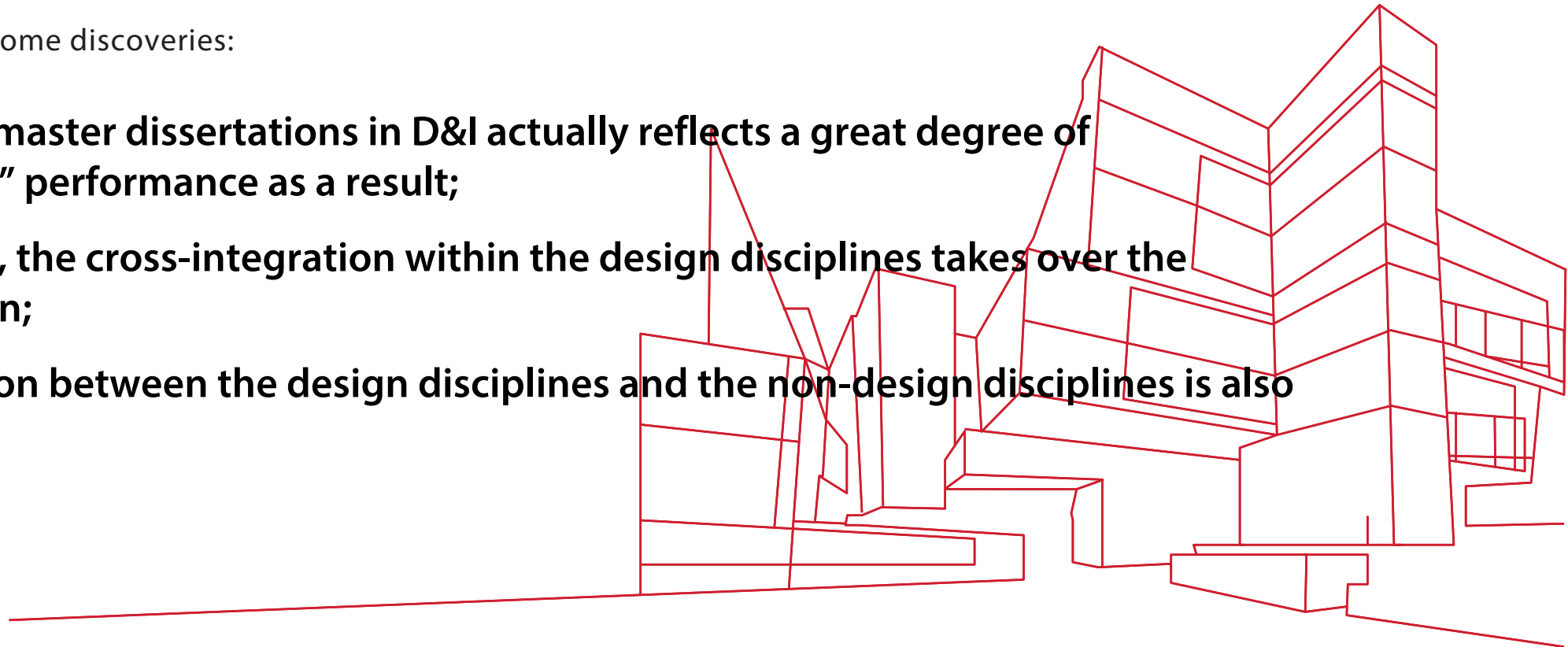
# ■ Research Discoveries

To answer the above questions,



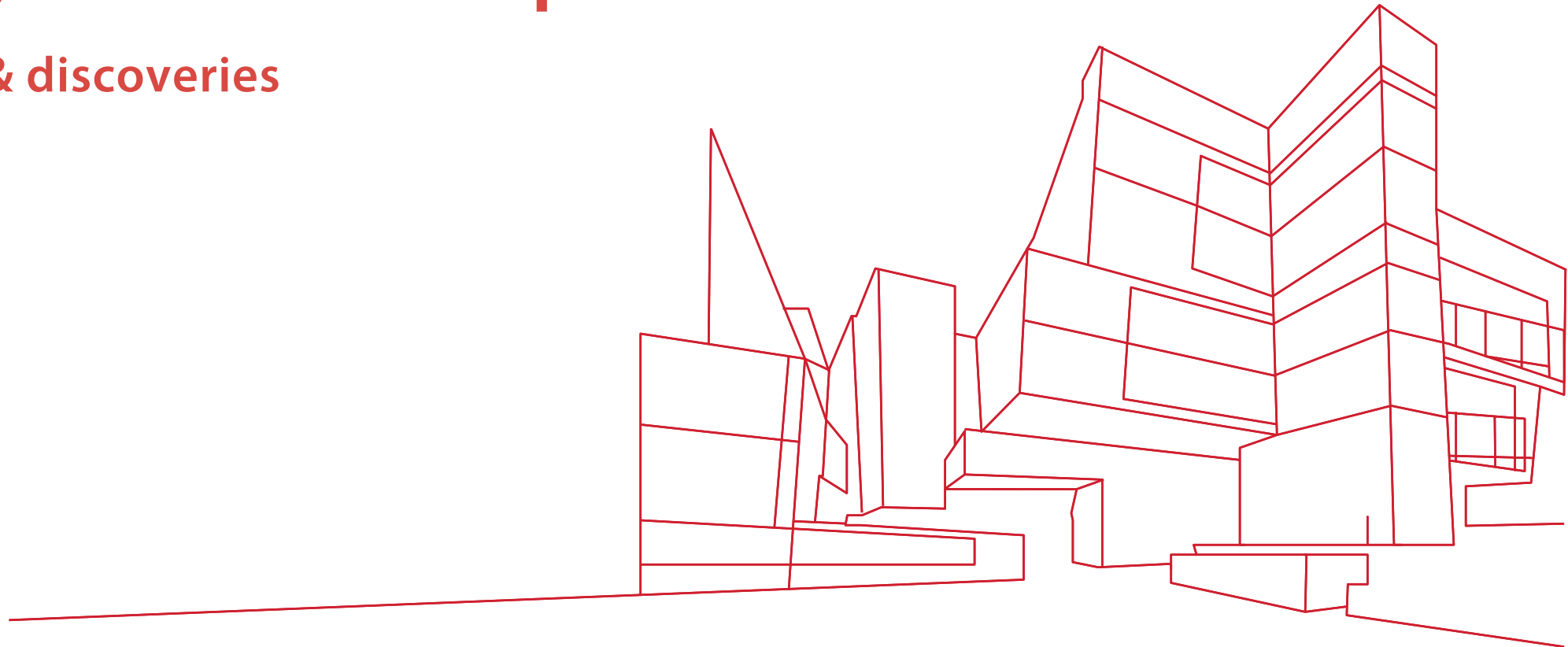
Here we have gotten some discoveries:

- ① **The topics of master dissertations in D&I actually reflects a great degree of “interdisciplinary” performance as a result;**
- ② **Among them, the cross-integration within the design disciplines takes over the dominant position;**
- ③ **The integration between the design disciplines and the non-design disciplines is also significant.**



# 4 Analysis of the Sample

— Results & discoveries



## Discovery 1

The topics of master dissertations in D&I reflects a great degree of “interdisciplinary” performance



# ■ Analysis of the Sample

## 4.1 The distribution of disciplines and the interdisciplinary trends

Table 1 Distribution of the number of master dissertations in different years

Year of degree granted	2010	2011	2012	2013	2014	2015	2016	Total number of dissertations
Total number of dissertations	61	56	57	82	69	68	65	458

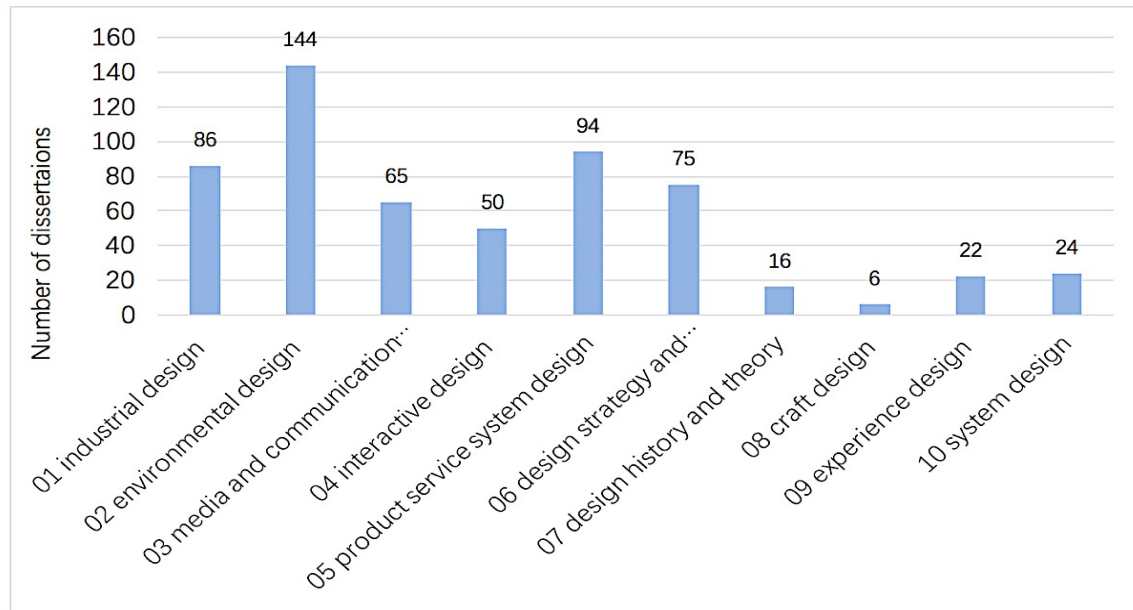


Figure 2: Distribution of the number of master dissertations at D&I in different design disciplines

- In this sample, **458 master dissertations are collected in total**. The number of dissertations is **basically stable at 60-70 per year**.
- The main research contents of many master dissertations involve different disciplinary dimensions, and the **dissertations involved in all disciplines is not uniform** (Figure 2).
- **Environmental design** (144), **product service system design** and **industrial design** (86) are the most concentrated directions. Although **product service system design** has been frequently mentioned in China only in recent years, the master dissertations in D&I has been a large number, up to 94.

# ■ Analysis of the Sample

## 4.1 The distribution of disciplines and the interdisciplinary trends

Table 2 Proportion of interdisciplinary dissertations

<i>Number of crossed disciplines</i>	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>
Number of dissertations	274	170	13	1
Proportion	59.86%	37.12%	2.84%	0.22%

- In the total master dissertations, there are **183 significant interdisciplinary dissertations, and the proportion is over 40%**, which proves that the topics of master dissertations in D&I reflects a great degree of interdisciplinary trend as a result;
- Among all the interdisciplinary dissertations, a large part of them mainly involves the research of **two disciplines**, with a **proportion of 92.3%**, and there are still a few involving 3 to 4 subjects. (Table 2).

## Discovery 2

**The cross-integration within the design disciplines takes over the dominant position**



# ■ Analysis of the Sample

## 4.2 Interdisciplinary research within design disciplines

Figure 3: The Correspondence of two crossed disciplines

Number of crossed master dissertations	01	02	03	04	05	06	07	08	09	10	Non - design discipline
01			2	3	3	8	2	1	3	1	20
02			9	3	6	8	1		10	11	17
03	2	9		6	3	8	3	1	1	1	3
04	3	3	6		2	2			2		5
05	3	6	3	2		3	1		2		6
06	8	8	8	2	3		1				8
07	2	1	3		1	1		1			
08	1		1				1				
09	3	10	1	2	2						1
10	1	11	1								2
Non - design discipline	20	17	3	5	6	8			1	2	
Totally	43	67	37	23	26	38	9	3	19	15	62

It is more convenient for us to observe the relationship between two variables, Here we **grouped the statistics of dissertations involving two disciplines** , and then got the **the correspondence between various disciplines** (Figure 3).

- The figures in the cells of Figure 3 represent the number of dissertations involving the two disciplines that correspond to the horizontal and vertical directions. The number within design disciplines is quite unbalanced, as you can see, the largest number is 11, and the smallest number is 1.

**Legend:**

- 01 industrial design      02 environmental design      03 media and communication design  
 04 interactive design      05 product service system design      06 design strategy and management  
 07 design history and theory      08 craft design      09 experience design      10 system design

# ■ Analysis of the Sample

## 4.2 Interdisciplinary research within design disciplines

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04	3	3	6		2	2			2		5
05	3	6	3	2		3	1		2		6
06	8	8	8	2	3		1				8
07	2	1	3		1	1		1			
08	1		1					1			
09	3	10	1	2	2						1
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- In all the cross-disciplinary dissertations ,the direction with the largest number is **environmental design**, followed by **industrial design, design strategy and management, media and communication design** (Figure 3).
- **Obviously, most of the main interdisciplinary directions involved in are within the range of design disciplines:**
  - ✓ environmental design + system design
  - ✓ environmental design + experience design
  - ✓ Industrial design +media and communication design
  - ✓ environmental design +media and communication design
  - ✓ industrial design + design strategy and management
  - ✓ environmental design + design strategy and management
  - ✓ media and communication design + design strategy and management
  - .....

# ■ Analysis of the Sample

## 4.2 Interdisciplinary research within design disciplines

Table 3 Title list of Master dissertations involving environmental design and system Design

<i>Year of degree granted</i>	<i>Author</i>	<i>Title</i>
2013	Francisco	Application of System Design in Xianqiao Village of Chongming Island
2013	Bao Peijin	Systematic Design of Traffic <b>Space of Subway and bus transit hub</b> in Shanghai
2014	Zhou Huping	Research on the Interior System Design of <b>Old People 's Residence</b> in Shanghai
2014	Tao Ruoshi	Research on the System Design of Indoor Residential Energy Saving in Shanghai - Based on the Encouragement Policy of <b>Small Households</b> in China
2014	Li Na	Research on Method of Sustainable Design for <b>Exhibition Space</b>
2014	Su Zhaoyang	Research on System Design Method of Sustainable Design in Campus
2015	Andrea	System Design of Xingen <b>Farming Community</b>
2015	Zhang Yi	Research on Community - based <b>Urban Family Storage Space</b> System Design
2016	Tang Wen	Research on System Design of Temporary Sale Space under <b>Exhibition Space</b>
2016	Han Xinhui	Research and Application of Market Ecosystem Design in Shanghai Core City
2016	Chen Qiming	Research on the Systematic Design of Narrative Space in Specialized Museums under Tourism 4.0: A Case Study of Shanghai Urban Historical Development <b>Exhibition Hall</b>

### “ Environmental design + X design ”

- The interaction between environmental design and other disciplines is the most frequent (Figure 3), especially the integration of **environmental design with system design** as well as **experience design** ,with **media and communication design** followed by them.
- Observing the specific dissertation titles, the integration of environmental design and system design is mainly based on the design for **residential space, exhibition space, farm community, subway transfer space** . In general, the systematic environmental design focuses more in **global organization and overall optimization** (Table 3).

# ■ Analysis of the Sample

## 4.2 Interdisciplinary research within design disciplines

Table 4 Title list of Master dissertations involving industrial design and design strategy and management

<i>Year of degree granted</i>	<i>Author</i>	<i>Title</i>
2010	Pan ming	A Study on the <b>Strategy of Concept Product Design Competition</b> - Taking the College Students' Entry as an Example
2010	Gao song	The Relationship between the <b>Image system</b> of Engineering machinery products and its <b>Brand</b>
2010	Liu lian	Research on Enterprise - led <b>Industrial Design Competition</b>
2011	Fabio	Application and Research of <b>Design Management</b> in Automobile Wheel Development System
2011	Chen xu	Research on the Relationship between Luxury Design and Luxury <b>Brand Image</b> - Based on the Learning and Practice of Richemont School
2011	Jiang yan	Exploration of <b>Automobile Design Management</b>
2012	Yin chuan	Research on Innovative Design of Data Behavior of Industrial Designers - Taking Handheld Power Tools as an Example
2012	Cao wei	A Preliminary Study on the <b>Design Process</b> of Household Medical Devices

### “ industrial design + X design ”

- In many design majors, the **association of industrial design and design strategy and management is the most obvious**, including strategies research for design competition, and the improvement of brand image for industrial design-related enterprise , as well as process research of specific product design ( Table 4).

### “ X design + X design ”

- Except , the interdisciplinary phenomenon is relatively frequent **between other design disciplines** . For example, "brand design" is usually locate the brand image through strategic method, and express its concept effectively by the means of media and communication design.

## Discovery 3

The integration between the design disciplines and the non-design disciplines is also significant



# ■ Analysis of the Sample

## 4.3 Cross research between design disciplines and non-design disciplines

Figure 3: The Correspondence of two crossed disciplines

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- Except for combination between design disciplines , there are also 62 dissertations related to both design and non-design disciplines, indicating that **the cross between design disciplines and non-design disciplines is also significant.**
- Among them, **environmental design** and **industrial design** are the disciplines that communicated with non-design disciplines most actively (Figure 3).

# ■ Analysis of the Sample

## 4.3 Cross research between design disciplines and non-design disciplines

Table 5 distribution of non-design disciplines mainly involved in the Master dissertations

<i>Non - Design Discipline/ majors</i>	<i>Number of dissertations</i>	<i>Non - Design discipline/ majors</i>	<i>Number of dissertations</i>
<b>Psychology</b>	<b>8</b>	Environmental Engineering	1
<b>Materials science</b>	<b>8</b>	Structural mechanics	1
<b>Culture</b>	<b>7</b>	Green design	1
<b>Behavioral science</b>	<b>7</b>	Transport Engineering	1
<b>Economics</b>	<b>4</b>	Kansei engineering	1
<b>Animation design</b>	<b>4</b>	Mathematics	1
<b>Computer science</b>	<b>4</b>	Aesthetics	1
Pedagogy	3	Fine art	1
Agriculture	3	Information visualization	1
Market science	2	Network engineering	1
Acoustics	2	Bionics	1
Optics	2	Biology	1
Sociology	2	Public management	1
Statistics	2	Physical education	1
Manufacturing	1	Transportation Organization	1
Human engineering	1		

- All non-design disciplines included in the samples cover a wide range of disciplines, exceeding 30 categories.
- **Psychology** and **materials science** appears the most frequently, followed by **behavioral science** and **culture**. Computer science also appears, especially in the application research of the current cutting-edge technology such as VR and AR.
- Some disciplines appear few times in the sample, but are quite characteristic, such as **information visualization, network engineering, mathematics, kansei engineering** and so on (See Table 5).

# ■ Analysis of the Sample

## 4.3 Cross research between design disciplines and non-design disciplines

### “ Industrial design + X non-design ”

- In the 10 design directions, **industrial design integrates with non-design disciplines most actively** ( 20 dissertations ). Among them, the combination of industrial design with **psychology** or **material science** has a high quotient of the master dissertations. Interestingly, the three dissertations which shows such a combination in the sample all have discussed the application of **bamboo material** in product design, it might because bamboo itself has excellent characteristics and Chinese have a deep affection for it.
- Moreover, **behavioral science** and **culture** are also the non-design disciplines that industrial design combined with frequently (Table 7).

### “ Environmental design + X non-design ”

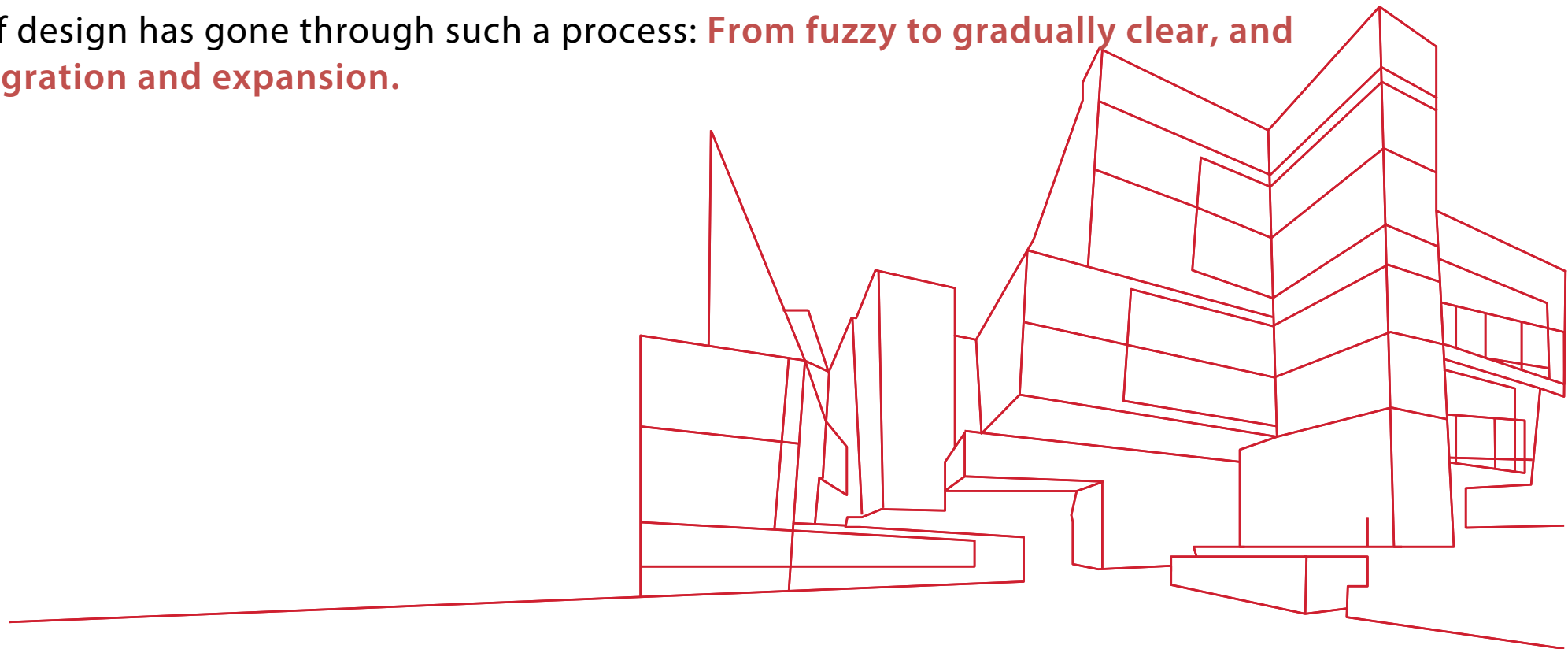
- Discussing how materials can be used in environmental design;
- Exploring how to incorporate culture or bionics into space design;
- “ Family farm ” is also typical in the combination of agronomy and environmental design.

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## ■ Final Words

- The rapid development of society has spawned a series of emerging design areas that are mostly interdisciplinary and innovative. **To adapt design education to the practical social needs is particularly significant.**
- The boundary of design has gone through such a process: **From fuzzy to gradually clear, and then to the integration and expansion.**



# Reference

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**Thank you !**

