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### **DIPLOM-/ MASTERARBEIT**

### WASTE INFRASTRUCTURE IN LUJIAZUI DISTRICT IN SHANGHAI

Urban Infrastructure for the Managing of Waste, the Recovery of Resources and the Creation of Arts and Crafts

ausgeführt zum Zwecke der Erlangung des akademischen Grades einer Diplom-Ingenieurin unter der Leitung von

O.Univ.Prof.Dipl.-Ing.William Alsop

E253/ 4 Institut für Architektur und Entwerfen Abteilung Hochbau und Entwerfen

### eingereicht an der Technischen Universität Wien

Fakultät für Architektur und Raumplanung

von

Silvia Elisa Flores Frixione, B.Sc. [0427727]

Wien, am

eigenhändige Unterschrift

#HYBRIDINFRASTRUCTURE #WASTEMANAGEMENT #ENVIRONMENTALAWARENESS #RESOURCERECOVERY #REDUCE #REUSE #UPCYCLE #WASTETOENERGY #CUSTOMMADE #DIY#CRAFTS #PEDESTRIANBRIDGE #SHANGSHUI#WATER-MOUNTAIN

## SHANGHAI RESOURCE RECOVERY ARTS & CRAFTS CENTER

MASTER THESIS

05 |

| 06

# ACKNOWLEDGEMENTS

Accomplishing a goal in life, allows us to look forward to new dreams and focuses our gaze to the future. At the same time, though, almost in a reflex, we start to look back to the path which took us to the finish line.

We observe how fruitful our efforts can be, and we recognize, above all, how much we have been given; out of mere generosity. This is why I want to take this opportunity to express my gratitude, to the generous people around me.

First: thank you God for my life, for the talents, the opportunities, the health, and for the wonderful people you have placed in my life. Thank your for watching after me, and being every step of the way with me. I know it. Thank you!

Thank you, my beloved husband Christof, for your encouragement, unconditional support and being a sunshine, as well as for bringing me food when I had no time to eat, for carrying the materials for my models, for having such good advice and for the proofreading. Thank you papá y mamá, Oscar & Isolda; for always believing in me, for the unconditional support and your example.

Thank you Professor Alsop, for being a role model architect. For your advice, your time and encouragement.

Thank you Cornelia Fisher and Walter Fritz, from the model building workshop at the university, for the good advice and the 3d printing preparation.

Thank you Harald Trapp, Alexander Hagner, and Mladen Jadric from the TU Wien for also being role models during my studies and offering me inspiration for my work.

Thank you, siblings and friends.

Vienna 26 February, 2018

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# **ABSTRACT-DE**

Abfallwirtschaft ist gewöhnlich von geringem Interesse für Stadtplaner und -designer, ganz zu schweigen von Architekten. Verständlicherweise, da es mit Schmutz assoziiert wird und daher nicht attraktiv erscheint. Auch die mangelnde Ästhetik jener Gebäude, die im Rahmen von Abfallwirtschaft zum Einsatz kommen, sowie ihre Positionierung außerhalb des eigentlichen Stadtlebens, dient nicht dazu, ihr eigentliches Potential zu erkennen.

Die hier vorgelegte Diplomarbeit behandelt die Frage, wie man Abfallwirtschaft attraktiv machen könnte. Der Zugang geht über die Frage, wie man ein Gebäude schaffen kann, dass nicht nur eine technische Umsetzung darstellt, sondern dem Leben der Stadt auch einen Zusatznutzen bringt. Es geht nicht nur um Abfallentsorgung, sondern vielmehr um Ressourcen-Rückgewinnung, Sinnstiftung und die Aufwertung eines bislang eher sterilen Stadtteils.

Das vorliegende Projekt bezieht sich auf den Bezirk Lujiazui in Shanghai. China ist eines der fünf wichtigsten Entwicklungsländer in der Welt und wird oft dafür kritisiert, im Rahmen seines wirtschaftlichen Wachstums nicht genug Rücksicht auf die Umwelt zu nehmen. Die Botschaft der zentralen Positionierung des Projekts ist, dass Abfall auch an seinem Entstehungsort verwertet werden muss: sowohl aus logistischen Gründen aber mehr noch, um auf den Lebenszyklus der Güter und deren Einfluss auf die Umwelt, hinzuweisen. zu definieren. Es versucht, die Wichtigkeit der Ressourcen-Wiederverwertung für den Produktionsprozess, zu unterstreichen.

In diesem Gebäude werden jene Materialien, die dem Abfall entnommen wurden, zu Rohmaterialien für einen neuerlichen Produktionsprozess und finden damit zu einem neuen Lebenszyklus. Das Gebäude soll Innovation und Kreativität anregen, durch eine Symbiose unterschiedlicher, kreativer Erfahrungsmöglichkeiten, mit der Verfügbarkeit von Verarbeitungsmöglichkeiten, Materialien und Energie.

Das Ziel dabei ist es, einzigartige, authentische und wertvolle Produkte, aus wiederverwerteten Materialien zu schaffen. Das Hauptaugenmerk liegt dabei auf handwerklichen Gütern, da sie den üblichen Konsumismus nicht fördern. Die zeitintensiv und handwerklich hochwertig hergestellten Objekte sind wertvoller und sollten daher weniger schnell Gefahr laufen, ersetzt und entsorgt zu werden.

Allerdings sollen nicht nur erfahrene Handwerker die wiedergewonnenen Materialien, die Energie und den ihnen dort zur Verfügung gestellten Raum nützen. Alle Menschen sollen sich angesprochen fühlen und dort einen Ort finden, an dem sie ihre eigenen Objekte schaffen können. Modernste Technologien, wie zum Beispiel 3d Modellierung, 3d Druck, Robotik, 2d Lasertechnik sollten dort zur gemeinsamen Verfügung stehen. einzigartigen Objekte ausgestellt und verkauft werden können. Der Tradition früherer Handwerksmessen folgend, kann man im Ressourcen-Rückgewinnungs-, Kunst- und Handwerkszentrum an der Produktion teilnehmen, lernen und beobachten oder einfach nur einzigartige Produkte erwerben.

Auf dem Gelände befindet sich außerdem ein Theater. Das Theater soll die kreative Atmosphäre ergänzen und jene Menschen anziehen, die an den anderen Aktivitäten des Zentrums sonst kaum Interesse zeigen würden.

Durch die Verbindung all dieser Funktionen und Prozesse sollte der Besucher das Zentrum nicht verlassen ohne, dass seine Sinne angeregt und sein Verständnis für unsere Umwelt geschärft wurde.

Ein wichtiger städtebaulicher Effekt des Ressourcen-Rückgewinnungs-, Kunst- und Handwerkszentrum und seiner zugrundeliegenden Philosophie sollte auch die Belebung des derzeit eher sterilen und für den persönlichen Besuch wenig ansprechenden Bezirks sein. Die Verbindung durch eine Fußgängerbrücke vom Bezirk Bund über das Center bis zum zentralen Park von Luijazui, soll den Bezirk öffnen. Das für China kulturhistorisch wichtige Konzept von Berg & Fluss, als Ausdruck von Harmonie und Schönheit, soll dem Bezirk eine neue Identität geben und ihn für Besucher ansprechender machen. Die Wasserströme sollen als Design-Strategie die Orientierung durch den Bezirk erleichtern. Die sie umgebenden Stadtmöbel bieten ein freundliches und einladendes Element und unterstreichen das Bedürfnis nach einer lebenswerten Umgebung. Das Zentrum wurde so positioniert, um als Tor zu dienen und den Bezirk zu öffnen.

Das Ressourcen-Rückgewinnungs-, Kunst- und Handwerkszentrum versucht das Verhältnis zwischen der Produktion, dem Konsum, dem Abfall und der Wiederverwertung, innerhalb einer Stadt, neu

Kreativität ist eine Form des individuellen Ausdrucks und die Zeit und Mühe, die in ein Objekt investiert werden, geben ihm seinen Wert.

Es gibt auch einen Bereich, in dem diese

# ABSTRACT

Waste management is an unusual subject of interest for planners and urban designers, not to say for architects. This is understandable because it is associated with mess and therefore not attractive. Also, the lack of esthetics of such buildings designed to deal with waste, and the fact that they are outside the city life, do not help to see its potential.

The following thesis deals with how to make Waste Management attractive. The approach is to conceive a building which works not only technically, but also delivers added value to the city life. It is not only about waste disposal but moreover about recovering resources, creating meaning and upgrading of a currently rather sterile district.

The Project is located in the District of Lujiazui in Shanghai. China is one of the five major emerging national economies in the world and has often been criticized for not properly taking care of the environment throughout its booming growth process. The central location is a statement, that waste must be treated where it is produced; for logistical reasons and to be a sign of awareness of the life cycle of goods and its impact on the environment.

The Resource Recovery, Arts and Crafts Center seeks to redefine the relationship between a city's production, consumption, disposal, and recovery of resources. It seeks to underline the importance of the process of recovery for production. The goal is to create unique, authentic, and valuable products, from recovered resources. Its main focus will be set on handmade crafts and goods, since they do not encourage consumerism.

The time-consuming and skillful creation of handcrafted objects makes them more valuable and less prone to be replaced or thrown away easily.

Nevertheless, not only experienced craftsman should make use of the materials, energy and space made available to them. All people should feel addressed and find a space, where they can live out their creativity and create their own objects. Contemporary technologies like 3d modeling and 3d printing, robotics, 2d lasering, will be available and shared in the workshops.

Creation is a form of individual expression, and the time and effort required to make something, give a product value.

There is also space available for the exhibit and trading of these unique products. Following the tradition of craft fairs, at the Resource Recovery, Arts and Crafts Center one can take part in the production, learn and observe or just shop for unique products.

You will also find a theater on the premises.

the revival of the currently rather sterile and not inviting district. The connection from the Bund, through the Center and to the central park of Lujiazui through a pedestrian bridge will open the district. The culturally important Chinese concept of Mountain-River as a sign of harmony and beauty, should give the district identity and make it more pleasant for the visitors. The streams should act as a design strategy to help orientate through the district, and the urban furniture around them will offer a friendly and inviting element which underlines the need for a more human scale. The location of the center was chosen to create an opening gate to the whole area.

In this building, the products withdrawn from waste, will be recovered into resources and find a new life cycle. This building should inspire innovation and creation through the symbiosis of different creative experiences, and the availability of tools, materials and energy. This theater should also add to the creative environment, and act as a magnet for people who might otherwise not be interested in the other activities of the center.

Thanks to the intertwined functions and processes, no one should go home without stimulation and an improved awareness about our environment.

A further important urban design function of the Resource Recovery, Arts and Crafts Center and its basic philosophy should be

Figure 1 | Shanghai in East Asia Figure 2 | Provinces of China Figure 3 | Districts in Shanghai



After taking part in a joint urban design workshop at the Tongji University in Shanghai, I was confronted with the failed Masterplan of the Financial District of Luijiazui, on the eastern bank of the Huangpu River.

I spotted this district as a good place to make a statement, that a city should not grow at the expenses of the environment. China is a booming nation and economy and is constantly growing. Sustainability will be key to profiting as much as possible from this growth.

The whole concept for this Resource Recovery Center, should propose solutions for other problems of the district, functionally as well as for the infrastructure.

At architecture school, I was introduced through a design studio to the question of Waste Management. We were challenged to design an infrastructure which provides this function to the cities.

Our starting point was thinking about waste

water: Since the beginning of civilizations, cities have tedious and well-developed infrastructure to treat waste water. Sewage systems are a key element to distinguish a developed city from a high culture, to a mere settlement. Today, in the developed world, every household has a connection to the municipal sewage system.

It seemed quite obvious that if a large infrastructure is required to distribute clean waters within a city, a similar sized infrastructure will be needed to manage the delivery out and disposal once the resource has been used.

If at all, waste recovery centers are normally located far out of major cities, thus making collection and transport another issue. Large amounts have to be invested into transportation, adding an extra burden to the environment. This lead to the idea of keeping the facility within the city. We were encouraged to think how and under which circumstances this could happen.

After an extensive research, I realized that





# INTRODUCTION & RESEARCH

tying the two ends of a product's life cycle "cord", would be a good strategy to make society more conscious about these problems.

Combining different stages of this product life cycle might be a way to show the fundamental relationship between disposing and consuming. Hence, since the cycle of waste, does not start at the dump, but at the production, I have decided to take matters further and not only combine functions where consumption and recycling take place, but have added an extra layer where recovery and recreation can happen.

Today, we observe an increasing trend of customers demanding f.e. food products that are not only healthy but do also not harm the environment. Buying local, fair trade, and organically grown products is "hip". From there follows the idea that at times, less is more - quality is preferred over quantity and homemade is considered better than an instant meal. Likewise, in the retail industry we might find a similar trend: Handmade, personalized objects and vintage items are considered more valuable and thought after than items sold by mass retail chains.

The Resource Recovery Center should take advantage of this increasing trends and propose the return to a value oriented market, instead of a mere efficiency and revenue oriented market. <image>

Figure 4 | Waste to Energy

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Figure 5 | 3D printed metal objects





Figure 9 | 3d printing of glass

Figure 6b | 3D printed plastic Eiffel Tower

Figure 7 | Recovered and redesigned plastic





# STRATEGY REDUCE - RECOVER-PRODUCE

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Figure 11 | Plastic filaments, and printed objects

Figure 12 | Printing with glass



### **INPUT FLOWS IN 3 STREAMS** 1. MAIN INPUT OF RECYCLABLE WASTE TO EACH PLANT 2. FLOW BETWEEN EACH RECYCLING PLANTS 3. REST WASTE FLOWS THROUGH EACH PLANT FOR SORTING BEFORE INCINERATION **OUTPUT** sorting RECOVERED MATERIALS GLAS, METAL, PAPER AND PLASTIC ENERGY GAINED FROM INCINERATION USED FOR THE BUILDING Figure 13 | Waste to Energy concept of flows

Figure 14 | Steps to recover and create with waste recyclables

recyclable >

transportation >





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## STRATEGY RECOVER IN THE CITY



17 |

<sup>1</sup> "Municipal solid waste management in Pudong New Area, China", pg 1

2 Governor reveals plans for future on 20th anniversary of new area

3 See "Municipal solid waste management in Pudong New Area, China", pg 1

4 Waste Management in China: Issues and Recommendations May 2005, World Bank, pg. 13

Figure 15 |Delivery through conveyor belts and communication in the system

### CURRENT SITUATION OF SOL-ID WASTE MANAGEMENT IN PUDONG

China is the world's largest municipal solid waste (MSW) and carbon dioxide emissions generator.

Lujiazui district is one of the highest density quarters of Pudong with 10,593 <sup>1</sup> inhabitants/ km<sup>2</sup>. In addition, as the city's financial hub, Lujiazui is home to more than 3,000 financial institutions and companies with about 470,000 white collars working on the 1.7-square-kilometer area.<sup>2</sup>

The citizens of Lujiazui produce 1,11 kg of MSW a day per person of which 48 % is organic or food remnant waste, 33 % is plastic waste, 4 % is paper waste, 3 % is glass waste, 7 % is fruit waste - which could be directly composted-, 5 % is other waste<sup>3</sup>. But according to a study made by the World Bank in 2005, it is expected that by 2030 the MSW per capita per day will increase from 1,1 kg to 1,5 kg.<sup>4</sup>

For the population of the Financial District this would mean an amount of 20 tons/day. Which makes for 600 tons a month. Of which 30 tons could be transformed into energy, and the rest recycled. Since the calorific value of urban waste is high, it is suitable for combustion to produce energy.

The waste has a heterogeneous composition and unfortunately it gets collected without sorting. The Resource Recovery Center is designed so that there is a flow between all plants so that every different material reaches its final destination in case it was not well sorted.



# AVOID WASTE, AVOID TRANSPORT AND IMPROVE SORTING

Principle: Waste is a valuable product. Waste must be treated where it is produced, thus avoiding an extra burden to the environment.

Solution: Creating a center IN the city, which combines the production of waste (supermarket) with it's disposal, treatment and recovery. (4 recycling plants + 1 waste to energy treatment plant).



19 |



Figure 16 |Flows in the sytem



Along came the Super Market... and what used to be a labor-intensive market became a labor-intensive street.





The mall is a good evidence to the fact, that we live in a consumerist society. Our society became used to buying many things, as a way of entertainment. Small and individualized sales points have developed into supermarkets, but unfortunately this easy and mass consumption created a negative impact to the environment.

In the early days of the market, products were fetched by an assistant from shelves behind a counter, while customers waited in line. Also, products and merchandise did not come in individually wrapped consumer-sized packages.

These practices were very labor-intensive and therefore more expensive. This process seemed to be optimized by pre-wrapping everything in plastics or cans for the individual consumer. Unfortunately, the fast and easy mass purchase from the supermarket, means ultimately more consumption and more packaging materials and thus produces much more unnecessary waste.

Figure 17 | Original Unverpackt, "orginally unpackaged" a new supermarket store concept in Berlin



## STRATEGY NEW CONCEPTS: SUPERMARKET, SHOPS AND WORKSHOP

There are already some progressive shops with new concept that are trying to fill the demand of those costumers who are environment friendly, and want to live up to it.

From supermarkets that are specialized only in regional and organic products, to very daring new concepts like the Supermarket "Original Unverpackt" in Berlin, which offers all kinds of products without any packaging. From vegetables and fruits, up to wine, shampoo and even toothpaste, everything comes without wrapping and everyone has to take their own containers from home.

Also, online marketplaces like Etsy, Bonanza, iCraft and Silkfair are some examples of commerce that is more sustainable and enviroment friendly. For example Etsy focuses only on vintage items and hand crafted products. It is a plattform where creative people, craftpeople, artisans, and even artists can offer their products and make money with it.

Usually people selling on such e-commerce plattforms use materials that are more natural. This is a way to make their products more attrative, and they have found the demand for products from certain materials, or products of tradition that have gotten lost in the era of industrialization, like hand embroidered knapkins made out of pure linen. People, even of young generation appreciate the "purity" of such handmade products.

Another new concept at the Resource Recovery Center is the workshop. With the rising use of 3d modelling and printing, and its domestic use, people have already started printing or prototyping at home. Many architecture students already have a 3d printer at home, or at least have used it for their designs.

The workshops, should provide the material in form of recycled filaments or sheets, the technology and the tools, the energy, and the synergy amongst experts or mere hobbyers; and should become a space of creation and communication.

Figure 18 |Etsy online crafts shop (left)

Figure 19 |Etsy Pop-up crafts fair (right)

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Figure 20 | Pudong's Skyline



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## PUDONG'S CENTER LUJIAZUI FINANCIAL DISTRICT

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Figure 21 | Historical picture of Pudong seen from the Bund, 1950



Figure 22 |Skyline of Pudong seen from the Bund today



## PUDONG'S CENTER LUJIAZUI FINANCIAL DISTRICT

### LUJIAZUI, A FORMER SWAMPLAND

After half a century broken ties with the West, due to the communists gain of power in 1949, the city of Shanghai started opening to the world once again. The so called second Open Door Policy embraced foreign businesses and globalization, and has shaped Lujiazui.

As seen in the pictures below Lujiazui has gone through quite a transformation beginning in the 1980s. From being a rural swamp land <sup>5</sup> full of warehouses and docks, to becoming the most emblematic skyline of Shanghai.

Lujiazui, where among many other landmarks,

in the world, used to be rural lands. Although rural, there were 49 234 people living in Lujiazui before the existing residential low rise buildings were demolished in the 1990's.

### FACING THE BUND

During the 1980's there was an idea to create a Central Business District in the core of Pudong, which is located on the other side of the Huangpu River, opposite to the iconic district the Bund-a district known for its neoclassical buildings.

Lujiazui literally means "'a mouth-shaped waterfront" <sup>6</sup>, and it is the area of Pudong, closest to the center of Shanghai.

5 Article Governor reveals plans for future on 20th anniversary of new area

6 "Shaping Lujiazui", pg. 5



Figure 25 | Current of the Huangpu River







Figure 28 |Lujiazui's "three towers"

## PUDONG'S CENTER LUJIAZUI FINANCIAL DISTRICT

### THE TOWERS, ROADS & PEDESTRIAN BRIDGES

The masterplan of the Lujiazui Financial District is the result of an international consultation made by the government of Shanghai in 1992. Four world renowned architects were invited to propose a new scheme for the area. Among them were Massimiliano Fuksas, Toyo Ito, Dominique Perrault and Richard Rogers.

The district is negatively characterized by 23 super-sized blocks, ranging from three to twelve hectares in area. Being surrounded by solitary skyscrapers which on top are separated by very wide streets, gives one the feeling of being trapped in a canyon.

The district completely lacks diversity of function, since 70% is dedicated to office space, which is understandable for a Financial District, but it's privileged location and iconic skyline could be developed to a new level.

Though there is a park in the middle and a waterfront surrounds the whole area, one does

not get a relaxed feeling. The central park is surrounded by highways, among them the century avenue which is 100 meters wide. This makes accessibility difficult. On top of that, it is prohibited to sit on the grass, and there is not one single place to sit down to take a snack or drink.

Connectivity is as well missing. The Lujiazui district can only be reached by foot from the historical district "Bund" through an underground tunnel. One can also reach it by Metro or by car. Once at the district, accessing the green spaces is also difficult. Due to the mere monumentality, and distances, one loses the orientation easily and there are no sign or landmarks, that might help a visitor get around. The problem of connectivity was mainly due to the fact that the planned pedestrian deck was not completely realized. Nevertheless, there are some bridges connecting the metro station to the park, and to the Shanghai tower, which to this date is the second highest skyscraper in the world.





Figure 29 | Comparison of the blocks in Lower Manhattan Financial District





Figure 31 | Highest towers in the world

with



## LUJIAZUI ANALYSIS DIFFERENT FUNCTIONS IN THE DISTRICT



Figure 32 | Lujiazui Bird View (left page)





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## LUJIAZUI ANALYSIS ACCESIBILITY BY ROADS AND METRO



CENTURY AVENUE

PEDESTRIAN BRIDGES

P PARKING



Figure 33 | Lujiazui planned Century Avenue with buildings oriented towards it and with trees, design not carried out. (top left, left page)

Figure 34 | Lujiazui Pedestrian Roundabout (top right, left page)

Figure 35 | Lujiazui Century Avenue reality (bottom, left page)





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## LUJIAZUIANALYSIS ACCESIBILITY BY FERRY AND TUNNEL



Figure 36 | Lujiazui Ferry (top, left page)

Figure 37 | Lujiazui Pedestrian tunnel from the Bund (bottom, left page)





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SHANGHAI'S CRAFT SANDARTS RESOURCE RECOVERY CENTER

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## ±0,00 GROUNDFLOOR - WASTE CONVEYORS

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counter area check-outs packing maintenance room counter refrigeration room shelves storage elevators toilettes 10 check-outs entrance 12 packing 13 shops 14 conveyor - recyclable glass conveyor - recyclable plastics conveyor - rest waste 15 16



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green rooftop area open air craft fair stands open air workshop space open air craft fair stands counter double height workshop space elevator for transportation of recycled material toilettes INPUT of recyclable glass through conveyor glass found in rest waste delivery RECYCLING plant - glass flow between plants OUTPUT-recycled glass conveyor - rest waste conveyor - recyclable glass conveyor - recyclable plastics craft fair



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## ±15,00 3. FLOOR WASTE CONVEYOR AND PLANTS

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# ±15,00 FUNCTIONS 3. FLOOR



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access to café and bar 1 entrance to craft fair 2 water cascade 3 river 4 access to restaurant craftspeople chill-out area elevator for transportation of 5 6 1 recycled material toilettes and changing rooms 8 lecture room 9 meeting room computer room RECYCLED glass workshop 10 11 12 individual storage room 13 computer room 14 **RECYCLED** plastic workshop 15 plastic found in rest waste 16 **RECYCLING** plant - plastic 17

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							<u>╱/ू`<sup>≈</sup>/</u>
	1	café kitchen	E	A L	HTT XX X		S G Ca
	3	void workshops chill-out area	k,	A A		$\checkmark$	
	4	storage	E		CHR ;		× X
	<b>)</b> //	to energy plant	11: 1				
	6	office waste to energy plant	110		1 H		$\overline{}$
	/1	recycled material	March in the state			$\neq$ $\land$ $\land$ $\land$	
	8	toilettes and changing rooms				•18, 50 ×	
	9 10	meeting room					
	11	entrance visitors					
//	12	visitors reception					
	14	rest waste flow					
	15	conveyor					
	16	rest waste flow				12	8
	17	void RECYCLING plant - plastic				$\mathbb{Z}_{0}$	
//							$X \times \rangle$
//	20 21	storage toilettes					$\times \times$
	22	ticket check		2			$\times$ $\times$ $\rangle$
	<b>23</b>	balcony void theater			Contraction of the second s		$\times$
	25	void stage					/ / / >
	26 27	void backstage					
	28	storage technical					$\bigwedge$
	20	equipment storage					
	29 30	theater deposit					
	31	performer lockers					N X
	32 33	kitchen					
	34	costumes deposit					



- 36 37





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- bar 1 terrace 2 bar kitchen 3 storage 4 toilettes 5 restaurant kitchen elevator delivery 6 78 toilettes 9 10
- 11
- toilettes cooler/ fridge event space entrance to restaurant and bar void WASTE TO ENERGY plant storage restaurant storage bar storage café staff chill-out area restaurant office 12

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- 13
- 14
- 15 16
- restaurant office 17 18
  - changing rooms



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<sub>\$\phi\$</sub>22,00 toilettes ticket check balcony void theater void stage storage large rehearsal room 26 

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![](_page_63_Figure_0.jpeg)

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![](_page_65_Figure_0.jpeg)

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# N 1:500 |0 |5 | | | |25

![](_page_66_Figure_0.jpeg)

![](_page_66_Figure_1.jpeg)

![](_page_67_Figure_0.jpeg)

![](_page_67_Figure_1.jpeg)

SCALE 1:500 SECTION A-A

![](_page_68_Figure_1.jpeg)

**71** |

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![](_page_69_Figure_0.jpeg)

![](_page_69_Figure_1.jpeg)

SCALE 1:500 SECTION B-B

![](_page_70_Figure_1.jpeg)

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# CONCEPT STRUCTURAL SYSTEM

The main structural system of the building is made of reinforced concrete. The supporting structure is based on a column grid spanning 12 meters in both directions. The cores, slabs, and walls act as bracing elemens.

![](_page_71_Figure_5.jpeg)

![](_page_71_Figure_6.jpeg)


#### A SHAN SHUI LANDSCAPE: FLOWING STREAMS THROUGH MOUNTAINS

When one walks the Lujiazui district, you get the feeling of being trapped in a canyon. The height of the buildings, their monstrosity and their disconnection from each other due to the enormous distances, enhance the feeling of being lost.

This city tried to resolve that in the past through pedestrian bridges which help guide the visitors into at least some of the places of interest. Although that was a good start, this strategy has to be further developed. Water streams and their flows should allow the visitor to intuitively find his way around the district.

The public recreational space should also be revived. By looking at the skyline of Lujiazui, I was reminded of the beautiful chinese landscapes I visited in Guilin. I found out there is a traditional form of Chinese landscape painting called Shanshui - meaning Water-Mountain. there will be a pedestrian bridge connecting Lujiazui with the Bund. It will act as a gate into the district, enabling orientation and the visiting of the landmarks, thus truly opening the financial district to citizens as well as to visitors.

Figure 39 |Shan Shui landscape painting (top)

Figure 40 |Lujiazui resembling a chinese Shan Shui landscape (middle)

Figure 41 | Chinese landscape (bottom)



Water-Mountain has been used as the inspiration for the design of the landscape around the Resource Recovery Center, which could be extended to the whole district. Taking advantage of the resemblance of the existing skyline and water, visitors will find a recreational space reflecting their traditional sceneries. The new functions will also invigorate the district, by attracting more visitors and provide for recreation purposes.

The RR- Arts & Craft center will extend the existing structure to its grounds. Beyond that,







## CONCEPT MATERIALITY

At the Resource Recovery Center each plant should reflect it's individual function. Plastics, Metals, and Glass will have a corresponding facade, allowing visitors to orientate, and adding a playful atmosphere to the whole structure. The Paper Recycling Plant will have a wooden facade evoking the raw material of paper.

The Resource Recovery Center should be a place where creativity is promoted. It is not only a center for professional artists and craftspeople but also for kids and simply amateurs experimenting with their creativity potentials.

The different materials, allow for an easy reading of the process that is taking place inside the Center. The intertwining, connections, and communication of the Plants amongs each other should be made visible.



Figure 42 | Plastic facade (top left) Figure 43 |Glass facade (top right) Figure 44 | Metal perforated facade (bottom left) Figure 45 | wood cladding facade (bottom right)











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Unless otherwise stated, all conclusions and analysis for this project, have been made out of my own observations and conversations with locals, during my study trip to Shanghai, during September and October 2015. 97 |