



Innovative Product Service System Design of Ecological Public Toilets



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HIGH-SPEED TRAIN Likely Symbolized the HIGH-SPEED Development Of China



PUBLIC TOILETS Likely Symbolized the CIVILIZATION... and is also a part of CULTURE

In rural areas, many public toilets still lack basic sanitation, comfort and dignity; in urban areas, public toilets face the quantity, distribution and other problems as well as serious disproportion between men and women toilet seats; and some toilets are extremely luxurious as a face-saving project...

Existing problems that Chinese public toilets mainly face

- Insufficient quantity and uneven distribution;
- Disproportion between men and women toilet seats and area;
- Hygiene and health problems;
- Mismanagement, lack of standards;
- Excessive water wasting;
- Improper handling of manure and other waste, serious environmental pollution;
- Incompleteness of accessible facilities, inadequate attention to vulnerable groups;
- Lack of user-friendly design;
- Difficulty to find the toilet;
- A serious lack of public toilets in rural areas;
- ...



The project of Reinvent the Toilet Challenge

OPPORTUNITIES:

The Chinese government is calling for a "toilet revolution", in order to greatly enhance the quality of public health services; enterprises' activeness in advancing, including technical research and development and financial support...

It is foreseeable that in the coming years, the number of public toilets in China will be greatly increased and toilet quality will be also improved. But some serious problem still exist ...

Why to redesign the toilets?

Flush toilet, which we are accustomed to now, is undoubtedly a landmark of the development of human civilization and the invention of modern sanitation equipment is also called the most important milestone by medical field in recent centuries. However, Due to waste of water resources, a huge investment in network construction, the huge cost of sewage treatment and loss of valuable organic matter (nitrogen, phosphorus in human excreta), the flushing sewage solution invented in 18th century to connect urban distribution network can no longer face a series of urban problems in the 21st century --- environmental degradation, population explosion, lack of resources ...

At the same time, a large number of people in underdeveloped areas still lack the most basic sanitation facilities, they do not have the capacity to undertake the construction of such sanitation projects and cannot fully adapt to this cosmopolitan lifestyle. And, in the absence of municipal pipeline network, the flushing toilets may lead to more serious environmental problems in the construction boom of "beautiful countryside".

See Zhang Jian Concept and Application Demonstration for Ecological Sanitation, China Water & Wastewater, Vol.24, No.2, 2008.

Chinese traditional concept of recycling economy:

Recycling of excrement (human + livestock)

Pig raising and fish farming; decomposed organic fertilizer; biogas ...

Ecological Concern

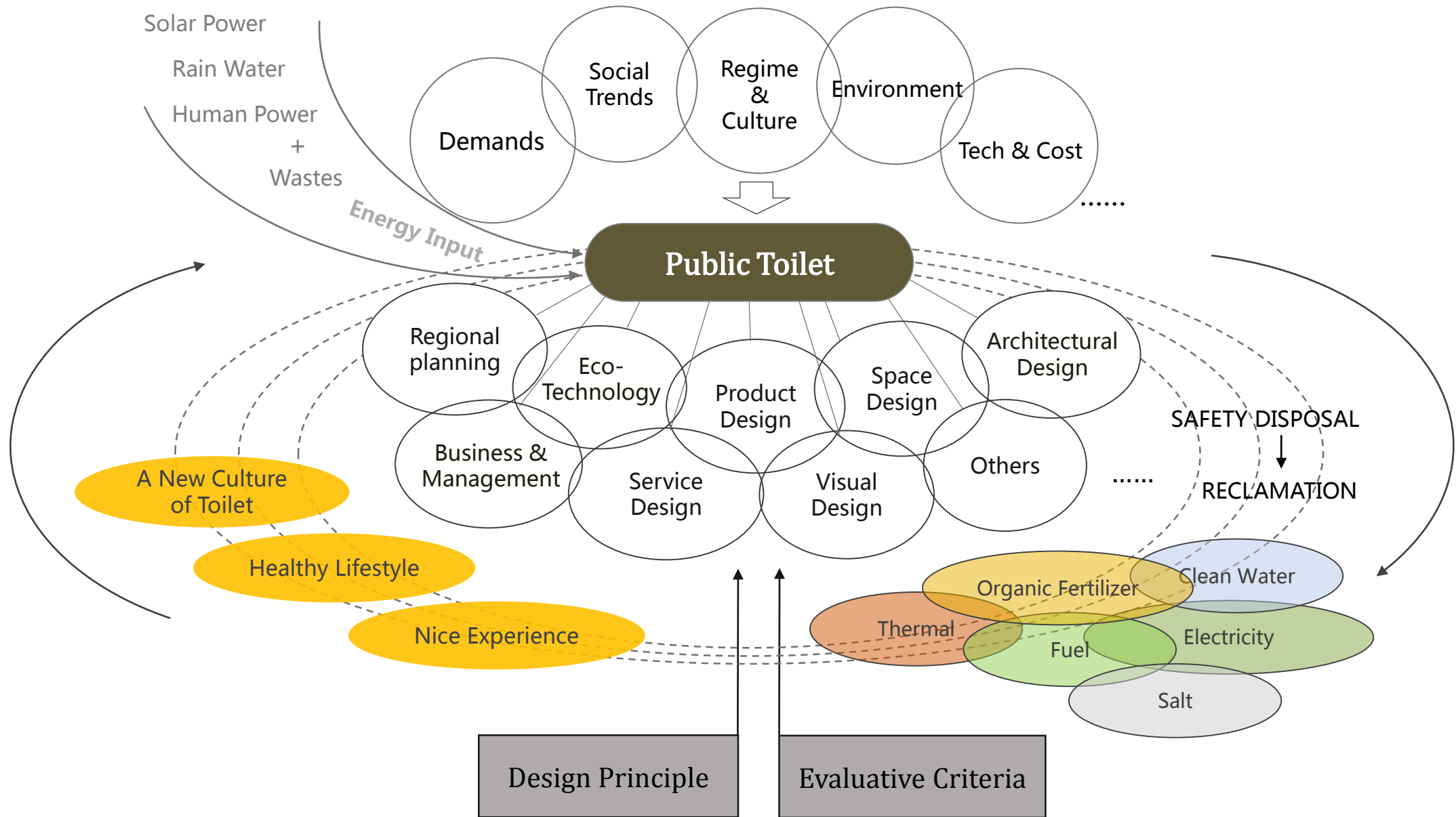
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graph TD; A[Ecological Concern] --> B[系统思维  
System Thinking]; B --> C[协同设计  
Collaborative Design]; C --> D[Eco-Toilet Design];
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系统思维
System Thinking

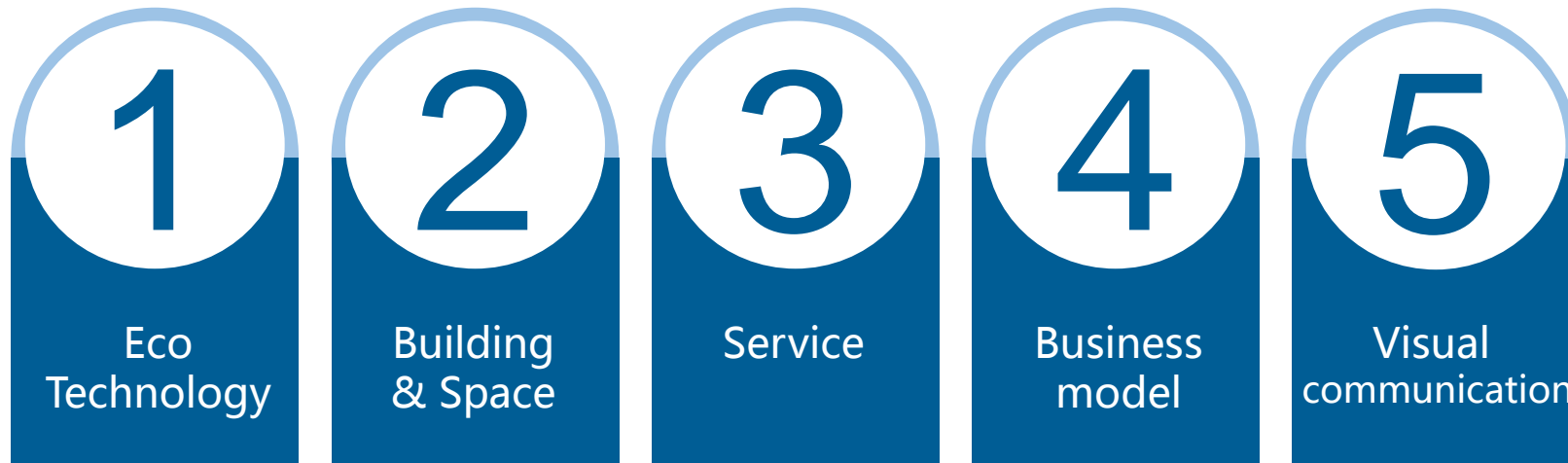
协同设计
Collaborative Design

Eco-Toilet Design

SYSTEM DESIGN DIAGRAM

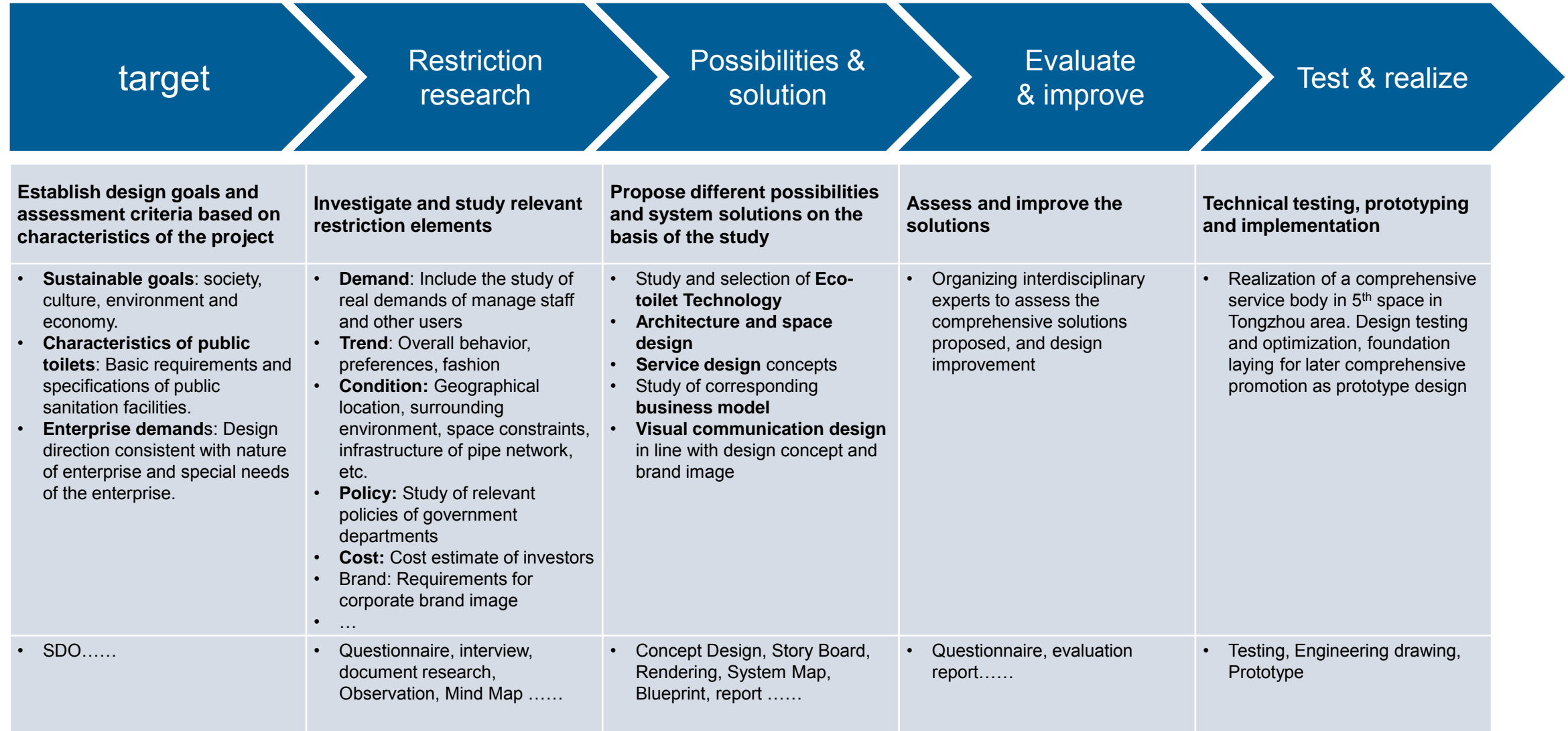


The 5th Space : Innovative Service and System Design of Eco-Public Toilet



Beijing Environment Sanitation Engineering Group defines “public toilets” to the 5th Space, which in a manner quite different from the traditional one. It argues public toilets will be the fifth multi-function space following family space, work space, public space and virtual space (cyberspace). It’s a composite space with multiple functions that centres basically on satisfying people’s daily life needs and on this basis, gives rise to derivative services.

Design Methodology





Design Orientation and Target:

- Comprehensive Community public service space with the function of public toilets.
- Technical route for water saving, energy saving, resources recycling
- User-friendly multi-purpose community service facilities, building and space
- Selection of service type and business model under the concept of green recycling
- High identification, visual image design with brand influence

Design Evaluation Criteria:

ENVIRONMENT	Energy saving Material recycling	<ul style="list-style-type: none">• Reduce resource consumption• Choose materials easy to clean / compost / burn• Effectively treat pollutants (harmless treatment)• Choose renewable energy and biodegradable materials• Try to promote waste recycling• Product / Service localization
SOCIETY	Social participation Diversity and equity Sustainable way of life	<ul style="list-style-type: none">• Promote the building of social integration system among different cultures• Enhance the user experience: safer, more comfortable, easier• Encourage and drive user to participate in design• Promote users' behavioral change and guide sustainable lifestyles• Effectively enhance the health and happiness• Develop shared system, and promote resource sharing, cooperation and mutual assistance• Be conducive to social security (reduce crime rate)• Focus on the design for the vulnerable groups, help the integration of vulnerable and marginalized groups in mainstream society• Healthy, safe and comfortable working environment• Improve social life, strengthen social cohesion• Cultivate the environment of using innovation and creativity
CULTURE	Localization Sanitation and health	<ul style="list-style-type: none">• Adapt to local architectural style• Meet the diverse needs of different cultural backgrounds or not• Strengthen local residents' sense of identity and belonging to• Public health infrastructure and environment meeting basic physical needs, conducive to the shaping of new toilet culture• Meet global standards or not
ECONOMY	Sustainable business model	<ul style="list-style-type: none">• ROI of products or services, sustainable profitability• Foster and strengthen the effect of brand image• Nurture and develop potential business opportunities (such as: long-term competitiveness; continuous innovation capacity; macro-economic results)• The benefits of all partners (not only the supplier)

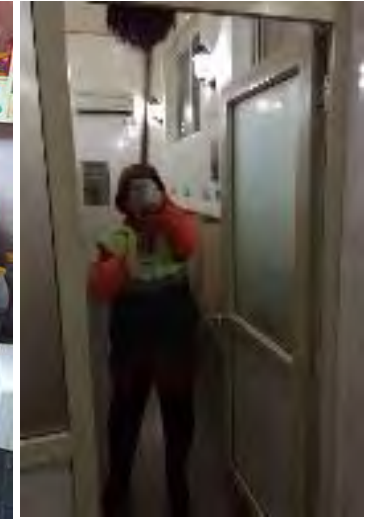
target

Restriction
research

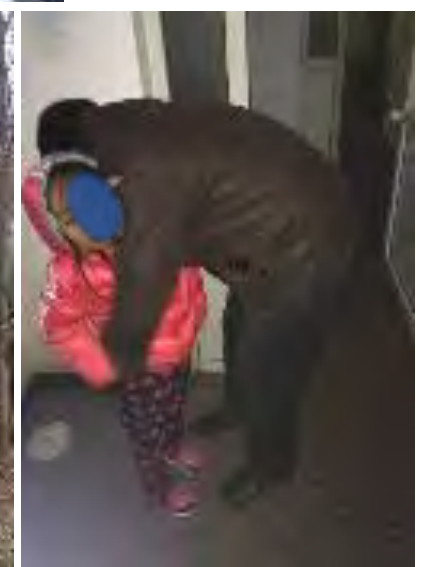
Possibilities &
solution

Evaluate
& improve

Test & realize



Field research and investigation



target

Restriction
research

Possibilities &
solution

Evaluate
& improve

Test & realize



Geographical location, surrounding environment,
space constraints, infrastructure of pipe network, etc.



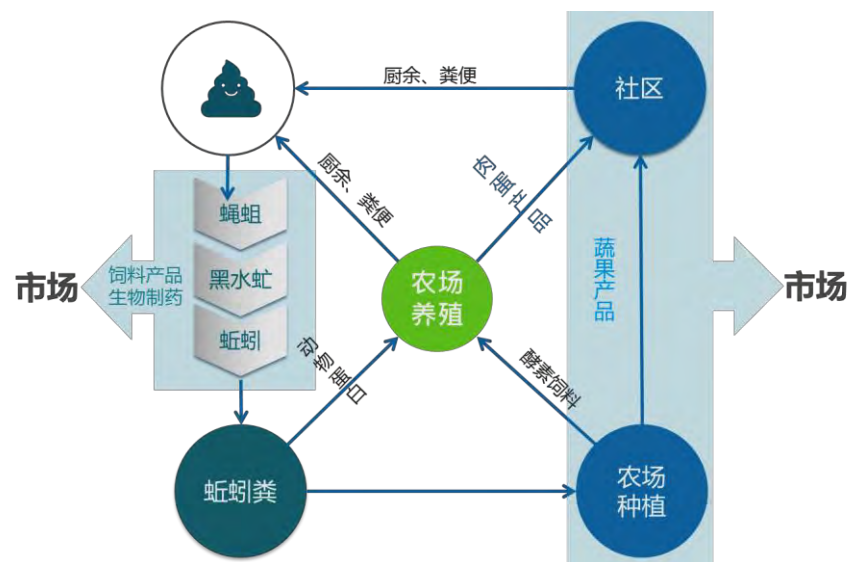
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Restriction
research

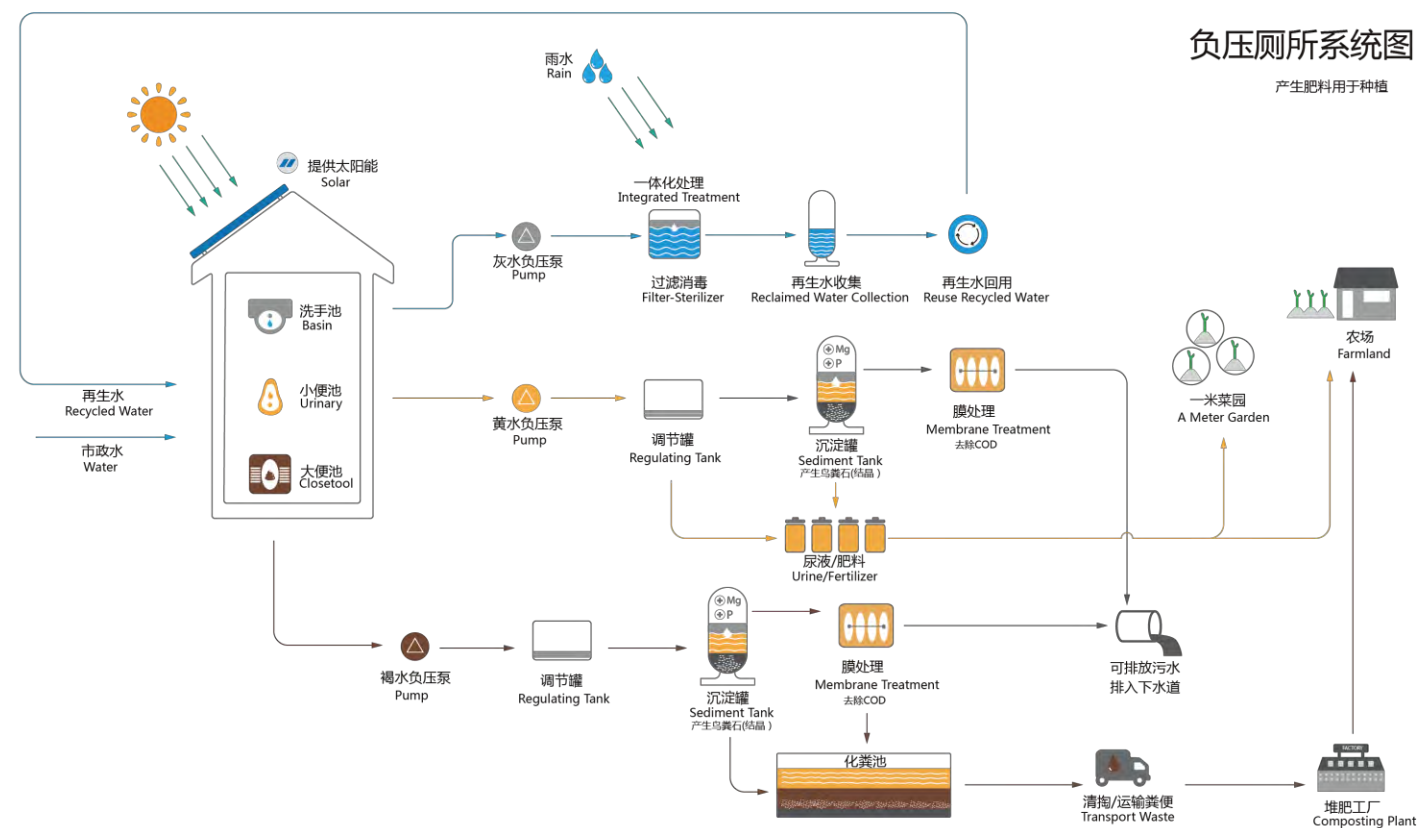
Possibilities
& solution

Evaluate
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Test & realize



Study and selection of Eco-toilet Technology



target

Restriction
research

Possibilities
& solution

Evaluate
& improve

Test & realize



The 5th space architecture design in Tongzhou district

通州区示范性生态公共厕所建筑设计图

target

Restriction
research

Possibilities
& solution

Evaluate
& improve

Test & realize



The 5th space interior design



target




Restriction
research



**Possibilities
& solution**



**Evaluate
& improve**



Test & realize



The 5th space planning design

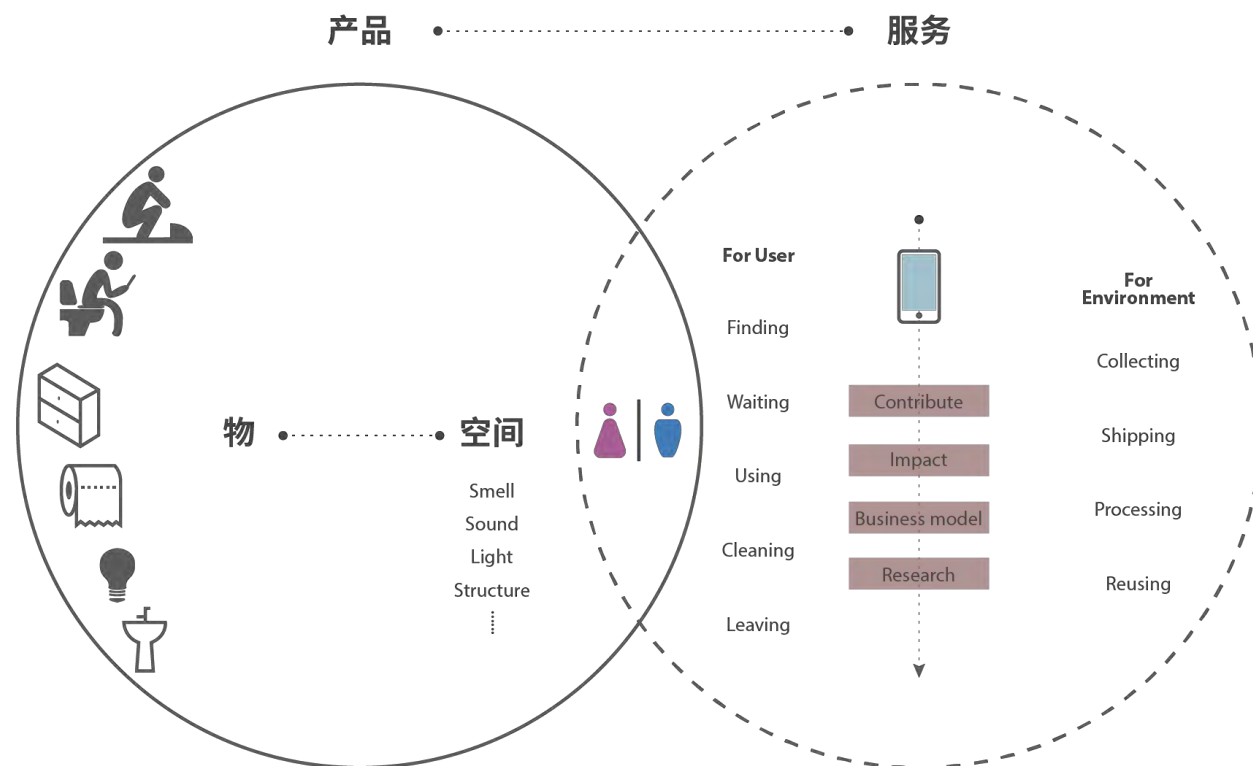
target

Restriction
research

Possibilities
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Evaluate
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The 5th space service research and design



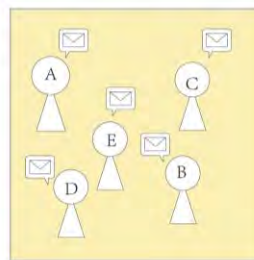
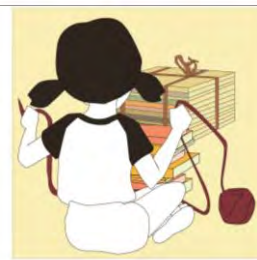
target

Restriction
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target

Restriction
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Possibilities
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Evaluate
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Test & realize



The 5th space visual communication design



target

Restriction
research

Possibilities
& solution

Evaluate
& improve

Test & realize

ON-GOING

DESIGN PRINCIPLE:

1. **FUNCTIONAL RATIONALITY:** confirm the function according to the type of toilets and the characteristics of population and their behavior so as to ensure necessary functional space and facilities, avoid excessive design and be flexible;
2. **TECHNOLOGICAL APPROPRIATENESS:** Choose proper techniques according to the limitation of costs and conditions. Technology adopted should be appropriate, no matter it's new or old, advanced or outdated;
3. **USER-CENTERED DESIGN:** Give consideration equally to physical and psychological needs and attach importance to humanized and emotionalized design;
4. **SATISFYING SERVICE:** Find out critical points from the use of users and management staff and provide comprehensive value-added services, such as the finding of toilets, sale of necessities, health testing and display of management information;
5. **QUALITY & AESTHETICS:** Quality lies in the care for details and aesthetics is a type of harmony as well as an echo to environment, culture, need and emotion;
6. **OPERATIONAL SUSTAINABILITY:** Maintain a favorable and sustainable pattern of business operation;
7. **DISTINCT PHILOSOPHY:** The core value (recycling, ecological and service for communities) of the 5th Space should be embodied in each element of the system.

CONCLUSION

As the design of the 5th Space is a completely new topic, the challenges are derived from the value definition of innovative ecological toilets, a public and community space, besides the requirements on technology and building.

The 5th Space breaks through the traditional definition of public toilets and also brings the public toilet service system to a bigger and more complicated field of system design.

In the design of this prototype, lot of problems are discovered and identified, solutions are improved and design methodology and principle that can be applied in the future is explored. The project is in construction.

谢谢

THANKS, TO BE CONTINUED.....



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