

# PROJECT No.2 DESIGN A SELF CLEANING TOILET SEAT

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- ☞ Introduction to the project
- ☞ Identity customer needs
- ☞ Establish product specification by building HOQ
- ☞ Concept generation
- ☞ Concept selection
- ☞ Conclusion and Question time!

# Introduction

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- ☞ The objective of the project is to design a self cleaning toilet seat.
- ☞ This kind of toilet is much rarely in Vietnam

# Identify customer needs

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- ☞ Product description
- ☞ Gather raw data from customer by using technique of articulated method.
- ☞ Interpret the raw data in term of customer needs
- ☞ Establish relative importance of needs
- ☞ Reflects on the results and process



# Product description

|                            |  |
|----------------------------|--|
|                            | <b>Mission statement: an Automatic Self-Cleaning Toilet</b>  |
| <b>Product description</b> | An automatic Toilet-seat-Cleaner ( <b>the TSC</b> ) to quickly clean, dry toilet seat right after being used         |
| <b>Key business goals</b>  | Product introduced in third quarter of 2006<br>50% gross margin<br>40% share of TSC market by fourth quarter of 2007 |
| <b>Primary market</b>      | Public sanitary companies that use toilets in public area such as public toilet, toilet super-market.                |
| <b>Secondary market</b>    | Home users   |
| <b>Stakeholder</b>         | User<br>Retailer<br>Sales force<br>Service center<br>Production  |

# Gather raw data

- Articulated method is employed to revealed customer needs. For example
  - Do you usually use public toilet?
  - How do you feel about that?
  - ...
- Customers selection matrix

|                | Lead user | Users |
|----------------|-----------|-------|
| Public sectors | 2         | 4     |
| Home users     | 0         | 10    |

Customer selection matrix

# Interpret data

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| No | Customer needs                              | Yes | No |
|----|---|-----|----|
| 1  | Toilet seat must be clean and dry           | 16  | 0  |
| 2  | Need a TSC                                  | 14  | 2  |
| 3  | Should locate at suitable location          | 12  | 4  |
| 4  | Electrical safety, anti electrical leakage. | 16  | 0  |
| 5  | Stable operation                            | 16  | 0  |
| 6  | Less power consumption                      | 16  | 0  |
| 7  | Easy to install and maintenance             | 12  | 14 |

# Relative importance of needs

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| No | Customer needs                              | Imp |
|----|---|-----|
| 1  | Toilet seat must be clean and dry           | 5   |
| 2  | An automatic operation                      | 5   |
| 3  | Locate at suitable location                 | 4   |
| 4  | Electrical safety, anti electrical leakage. | 5   |
| 5  | Less power consumption                      | 3   |
| 6  | Stable operation                            | 3   |
| 7  | Easy to install                             | 3   |
| 8  | Easy to maintain                            | 3   |





# The HOQ's



## Product Description

One-off film cover, cleaned and free from germs;

Easy to use, environmentally friendly product.

<http://www.noya.cn>

## The Self-Cleaning Toilet !



## Product Description

Eliminate contact with unsanitary seat, flush button

Reduce odor and ensure sanitary in public restroom

<http://www.autosanit.com/contacteng.html>

# The HOQ's

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## ☞ Importance needs

- ☼ Toilet seat to be clean and dry
- ☼ Automatic cleaning toilet seat
- ☼ Suitable location
- ☼ Electrical safety

# The HOQ's

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## ☞ Importance of Product Characteristics

- ☀ Cleaning
- ☀ Automation
- ☀ Drying
- ☀ Safety
- ☀ Size



# The HOQ's – Target specification

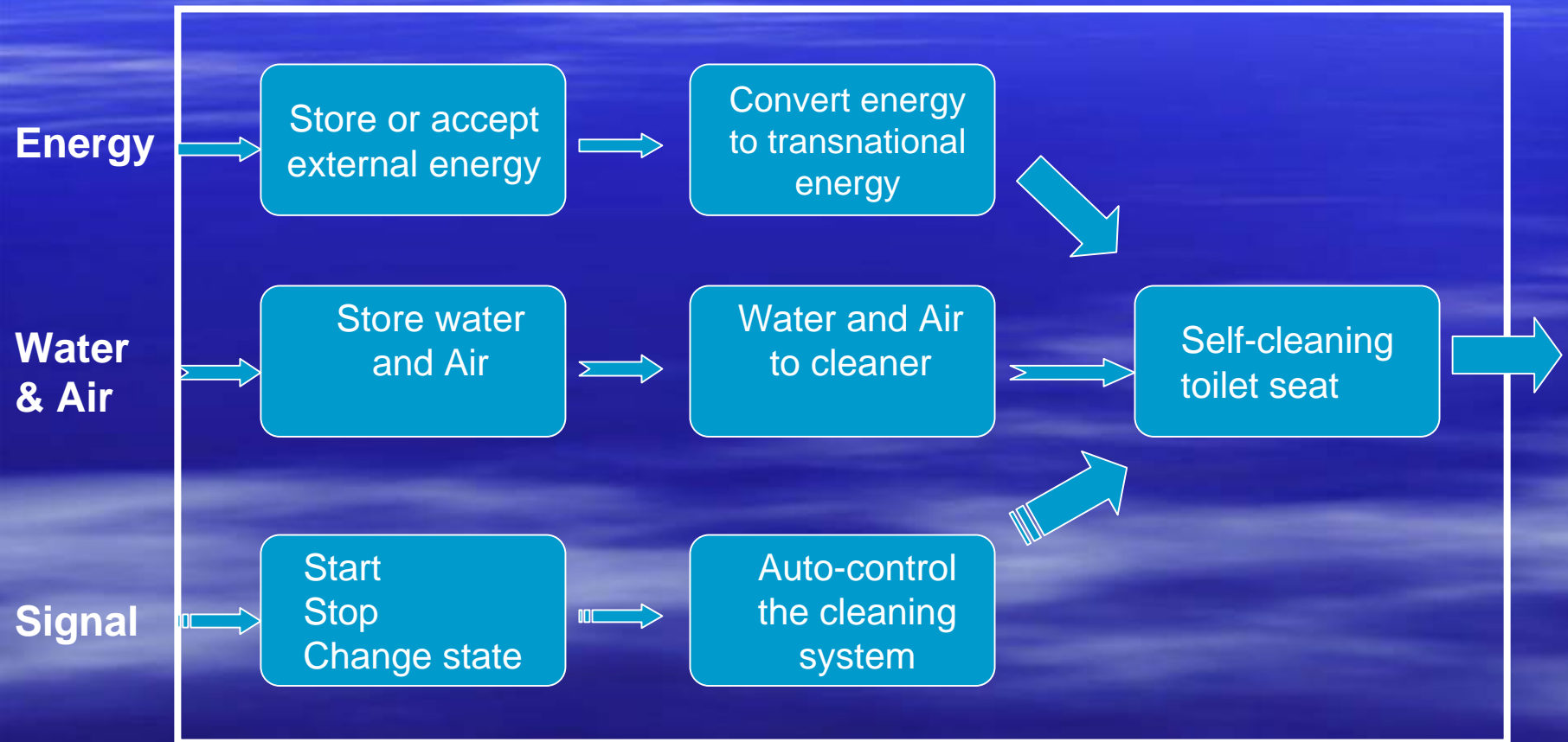
| Metric No. | Metrics           | Units | Marginal values | Ideal value |
|------------|-------------------|-------|-----------------|-------------|
| 1          | Size              | mm    | Subjective      |             |
| 2          | Weight            | kg    | 7-10            | 8           |
| 3          | Cleaner           |       | Subj            | -           |
| 4          | Dryer             |       | Subj            | -           |
| 5          | Power consumption | kWh   | 0.200 – 0.450   | 0.300       |
| 6          | Time operation    | min.  | Less than 3     | 2           |
| 7          | Assembly          |       | Subj            | -           |
| 8          | Safety            | TCVN  | -               | -           |

# Concept generation-Black box

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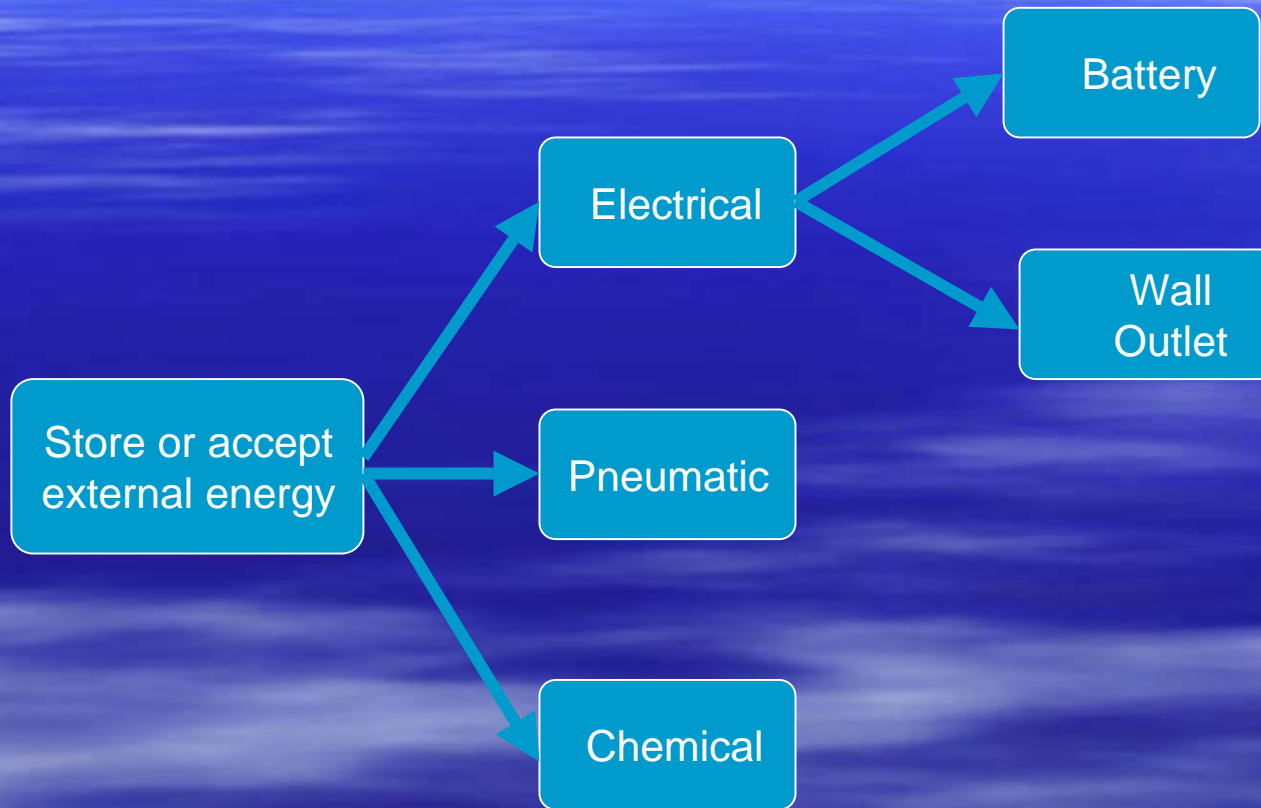


# Concept generation



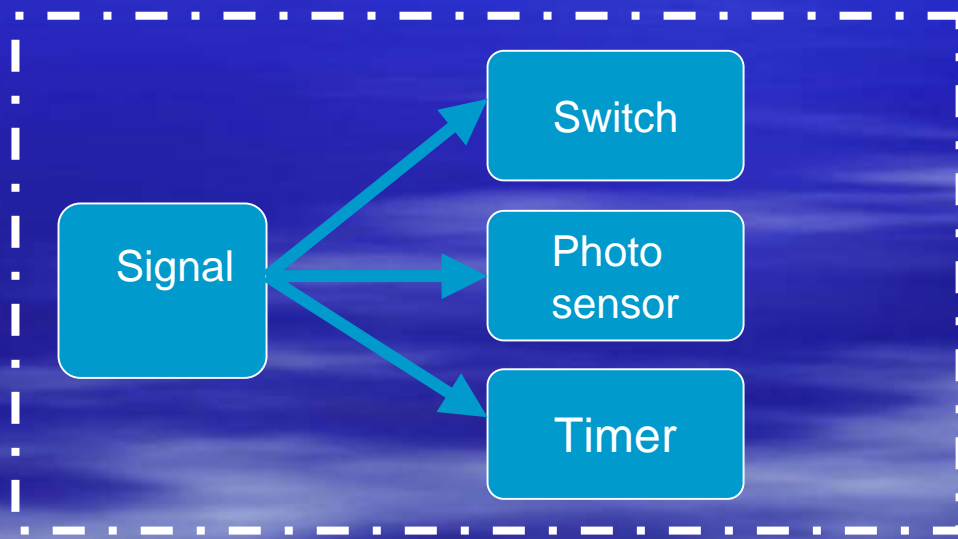
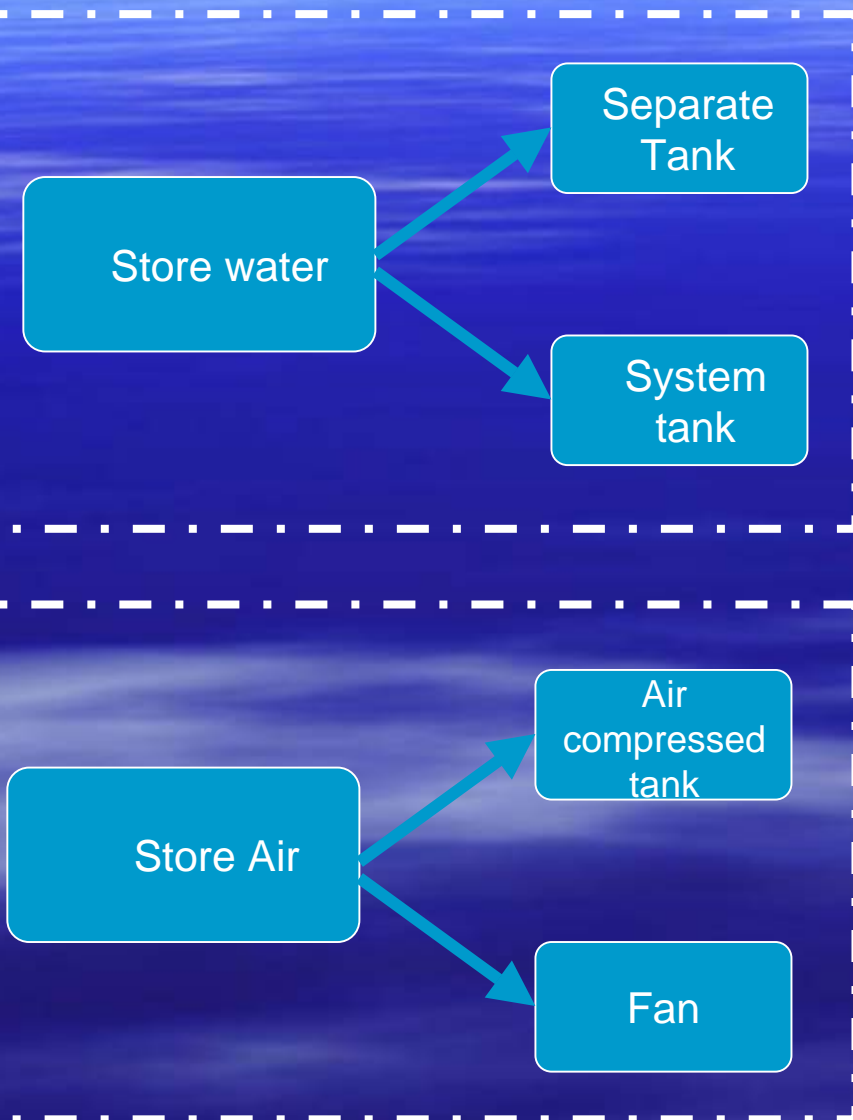
# Concept generation

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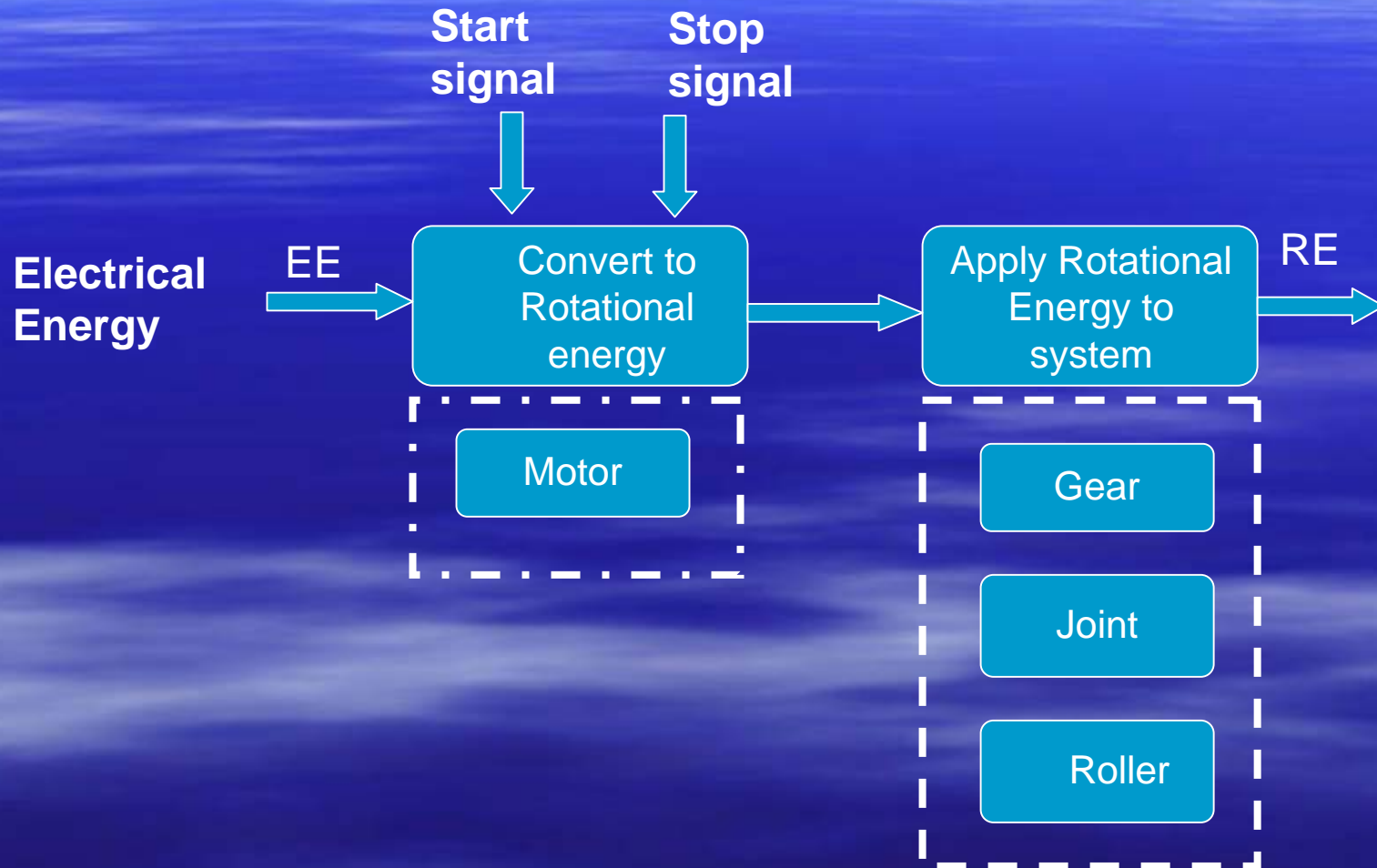




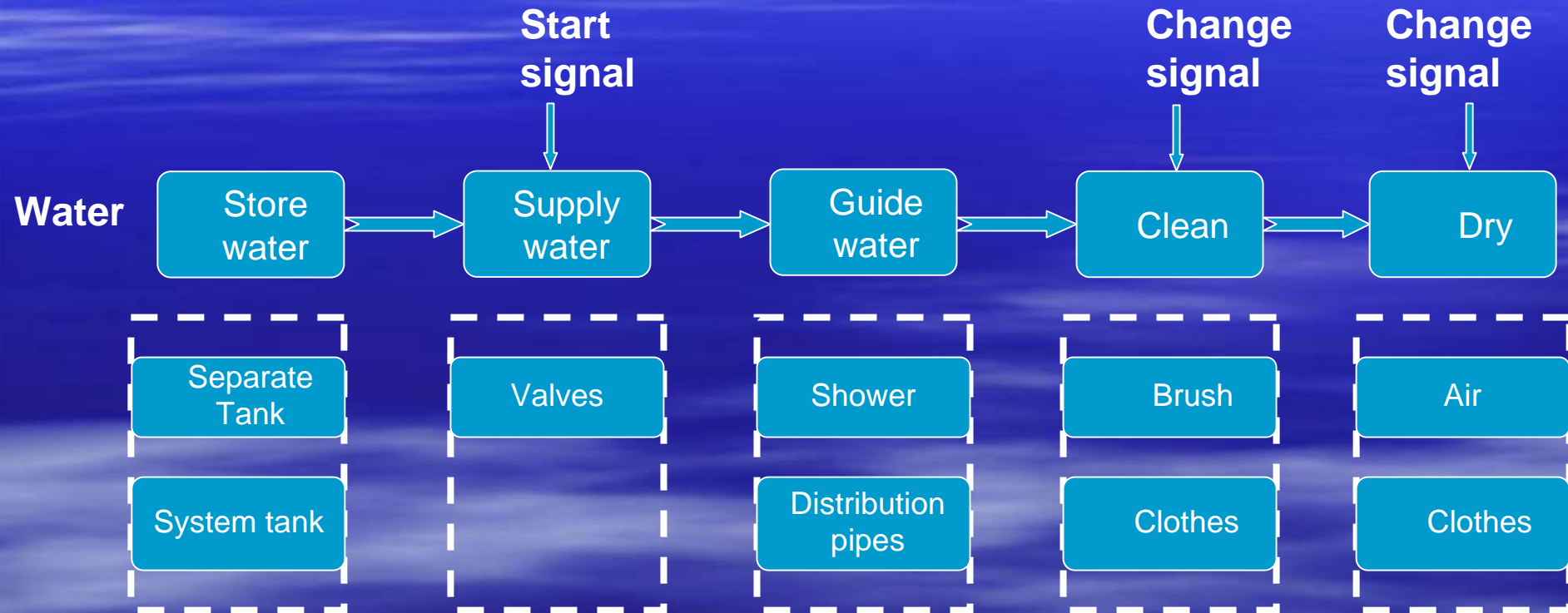
# Concept generation



# Concept generation

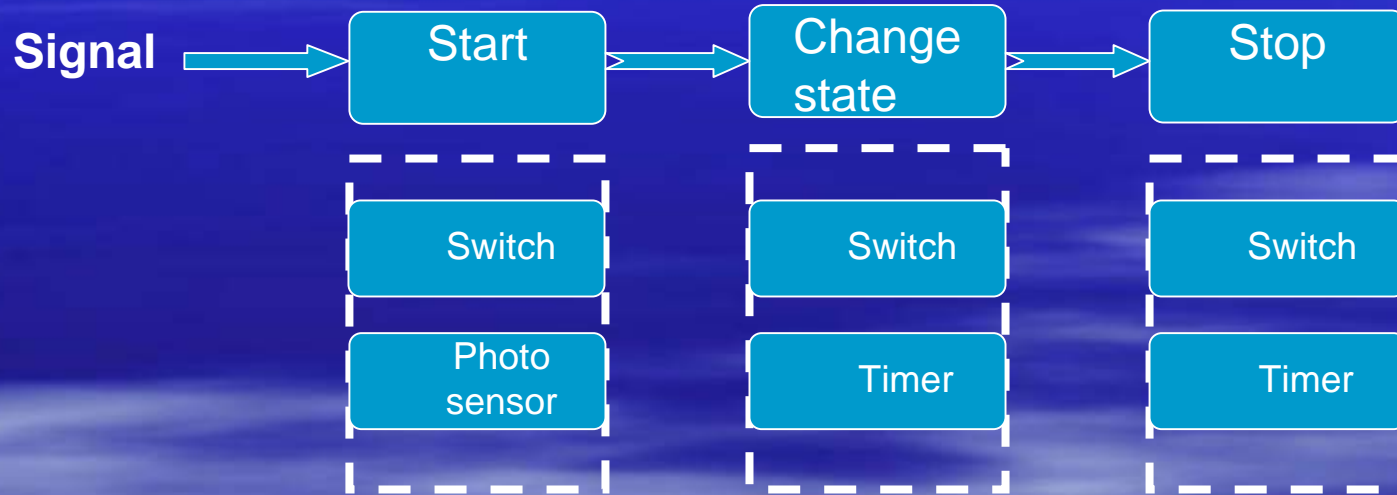


# Concept generation



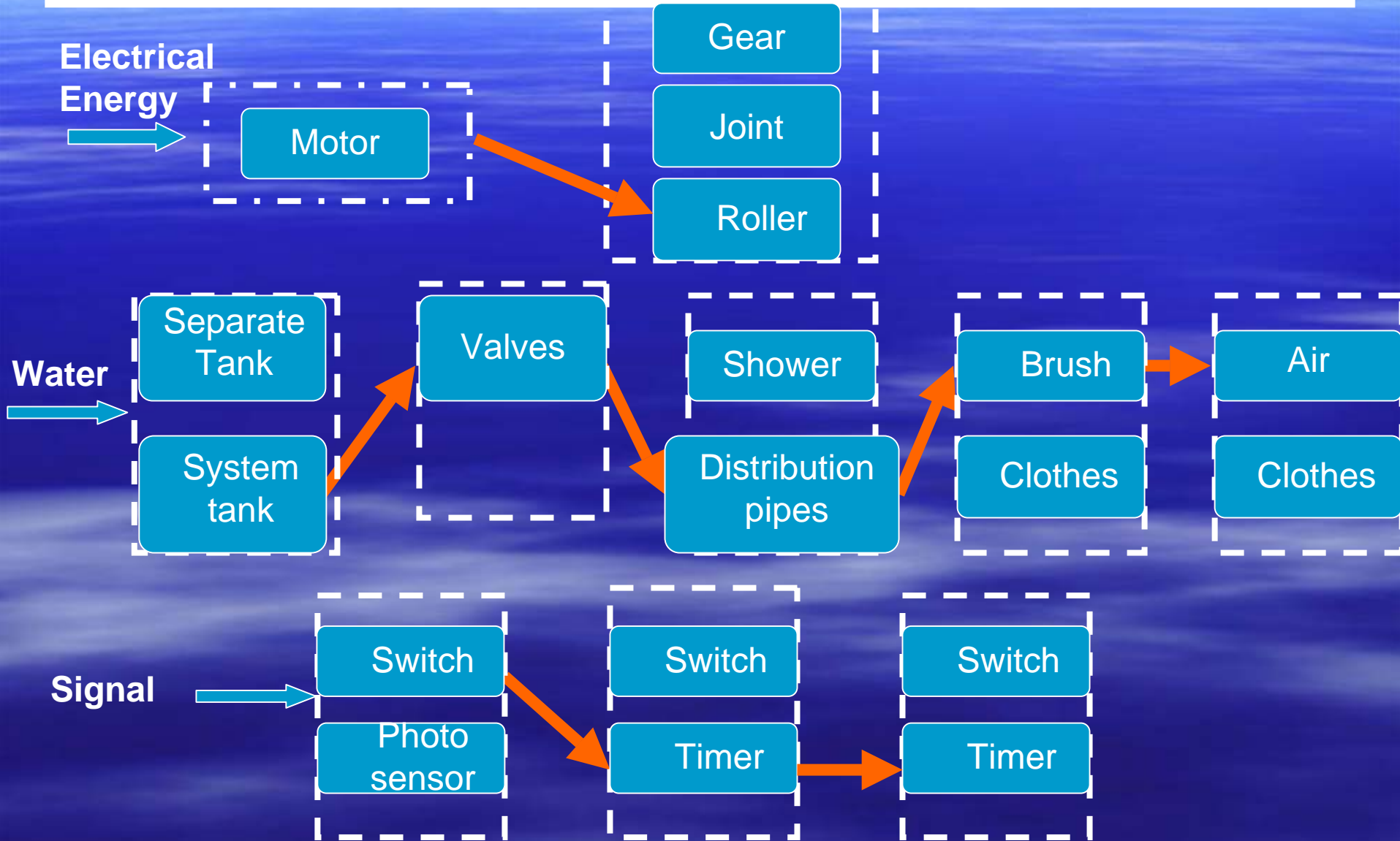
# Concept generation

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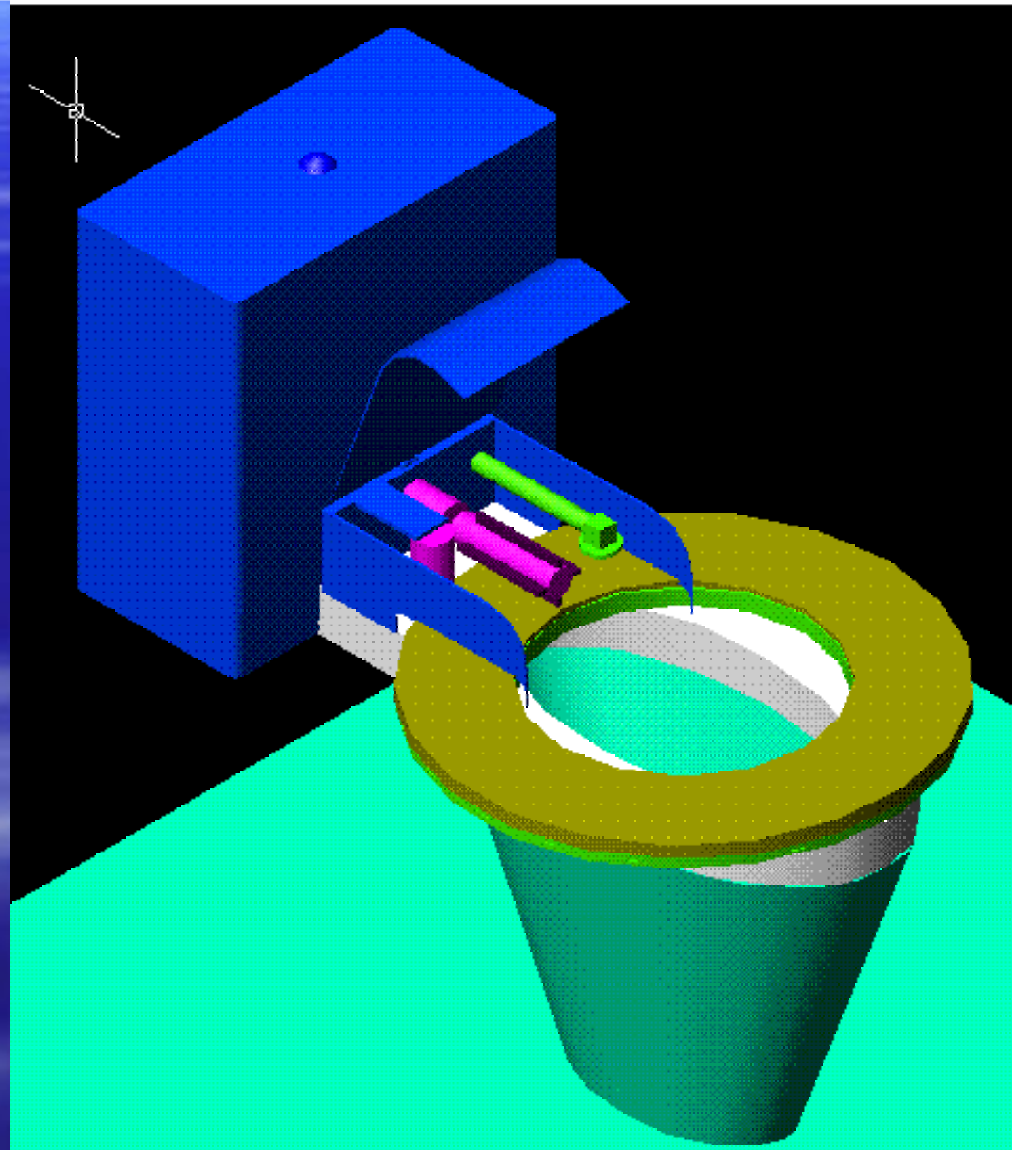




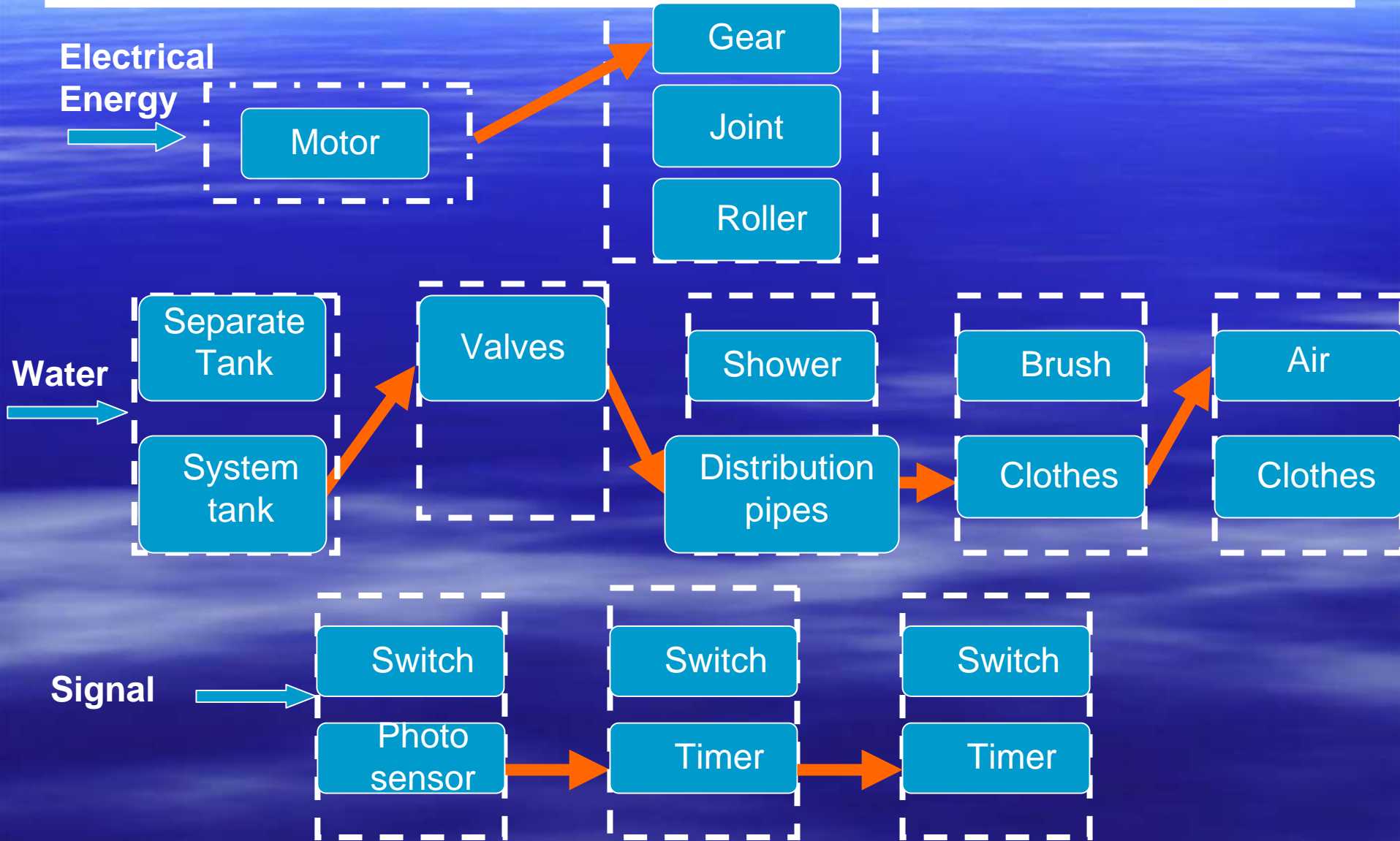
# Concept 1



# Concept 1

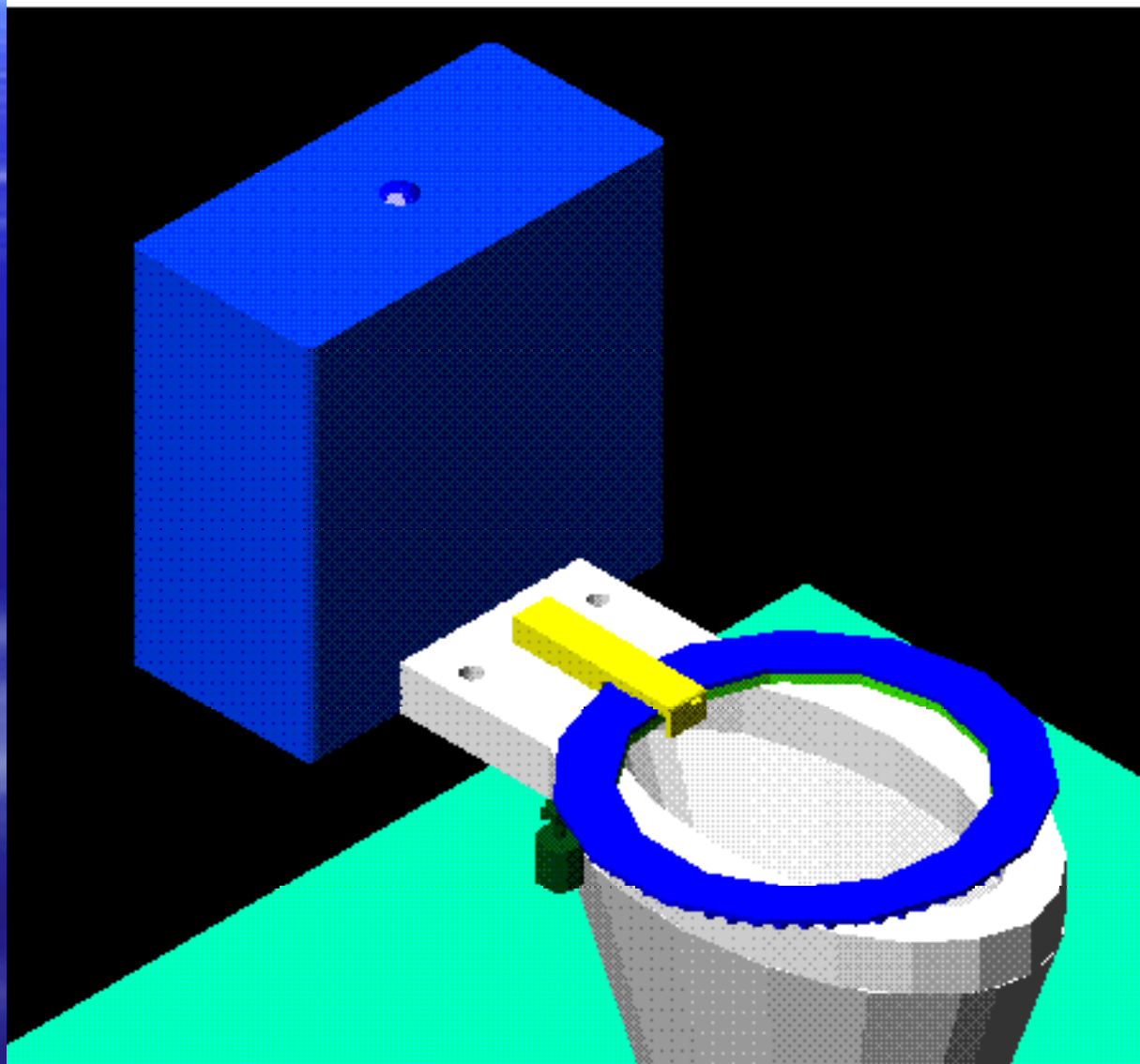


# Concept 2

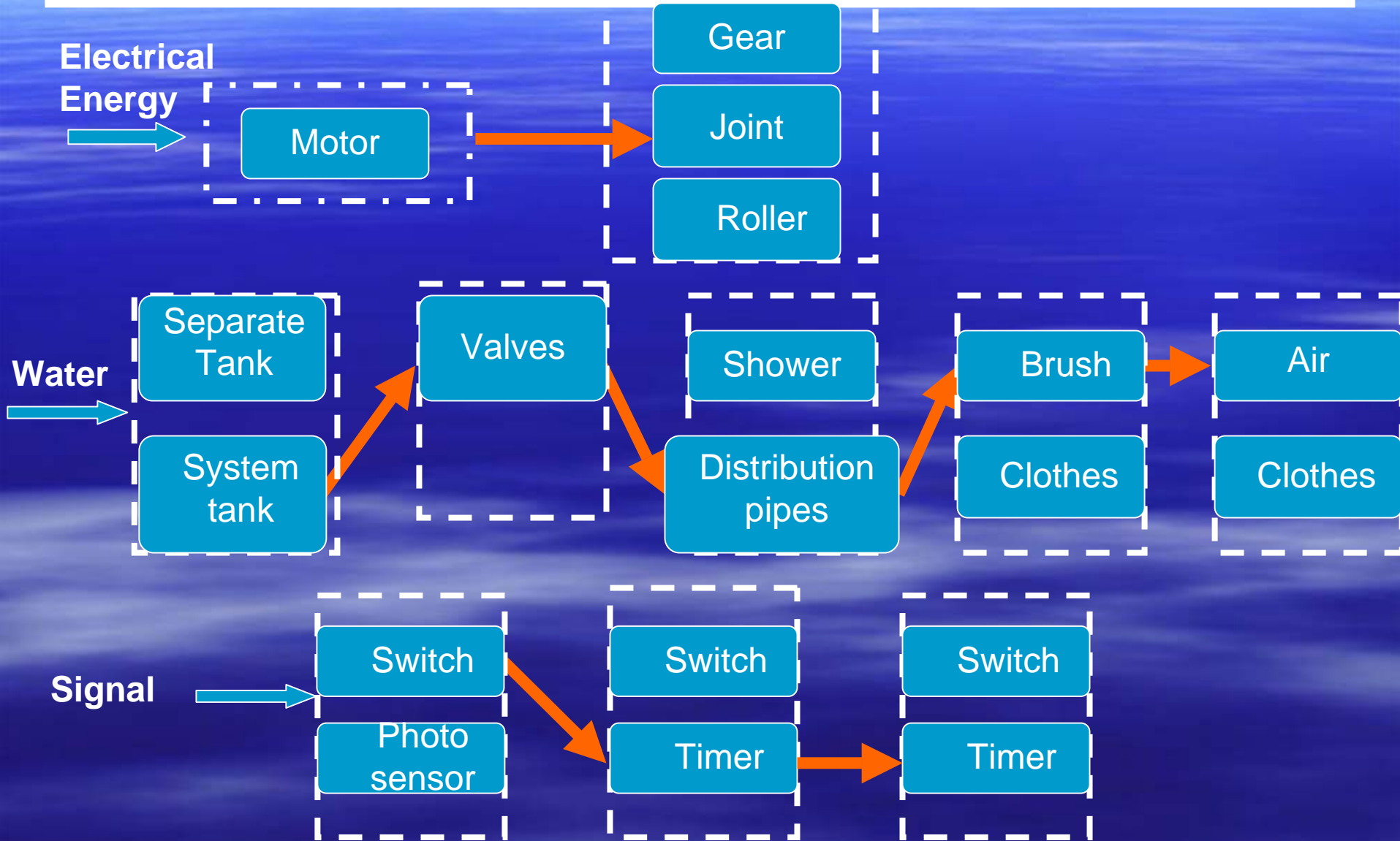


# Concept 2

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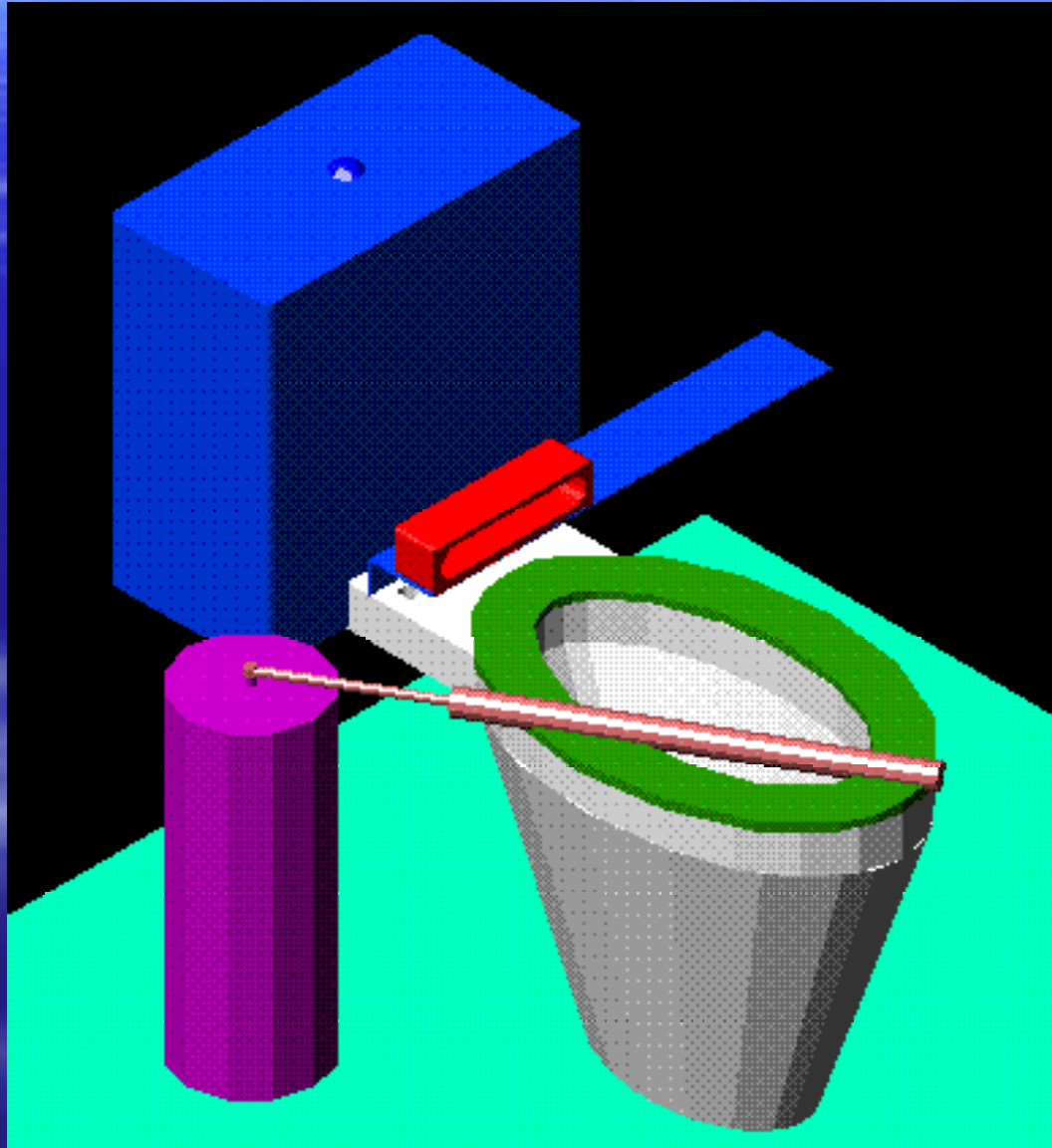
# Concept 3





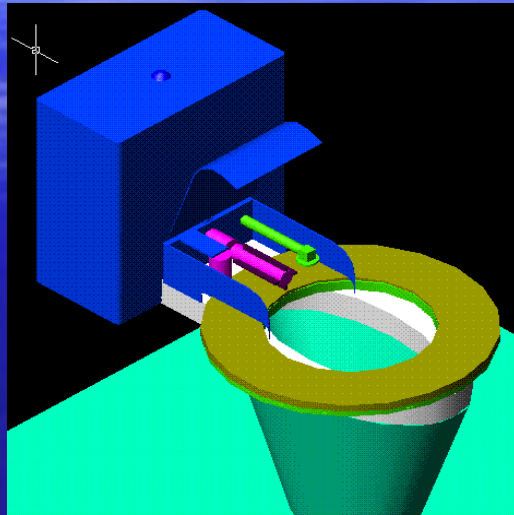
# Concept 3

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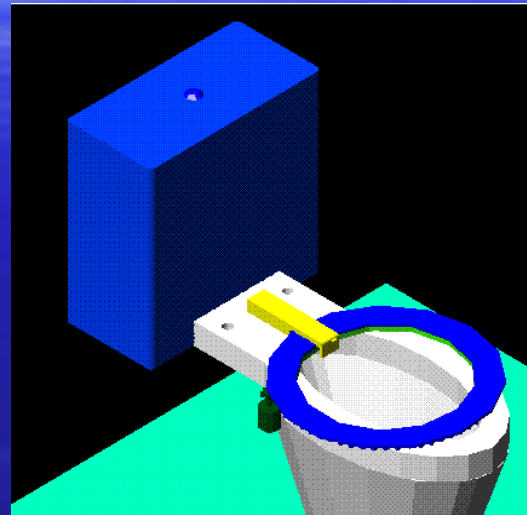


# Concept selection - Review

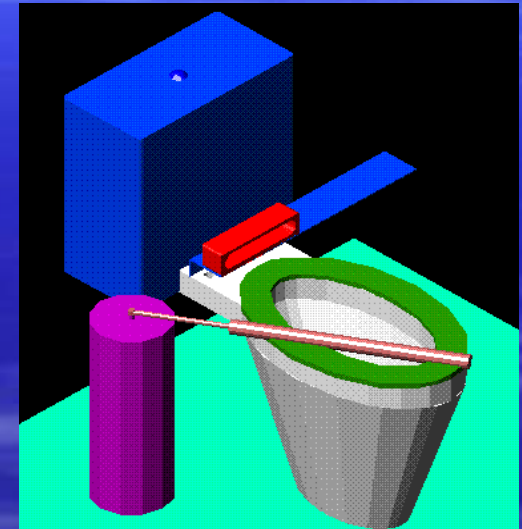
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Concept 1



Concept 2



Concept 3

# Concept selection - Review

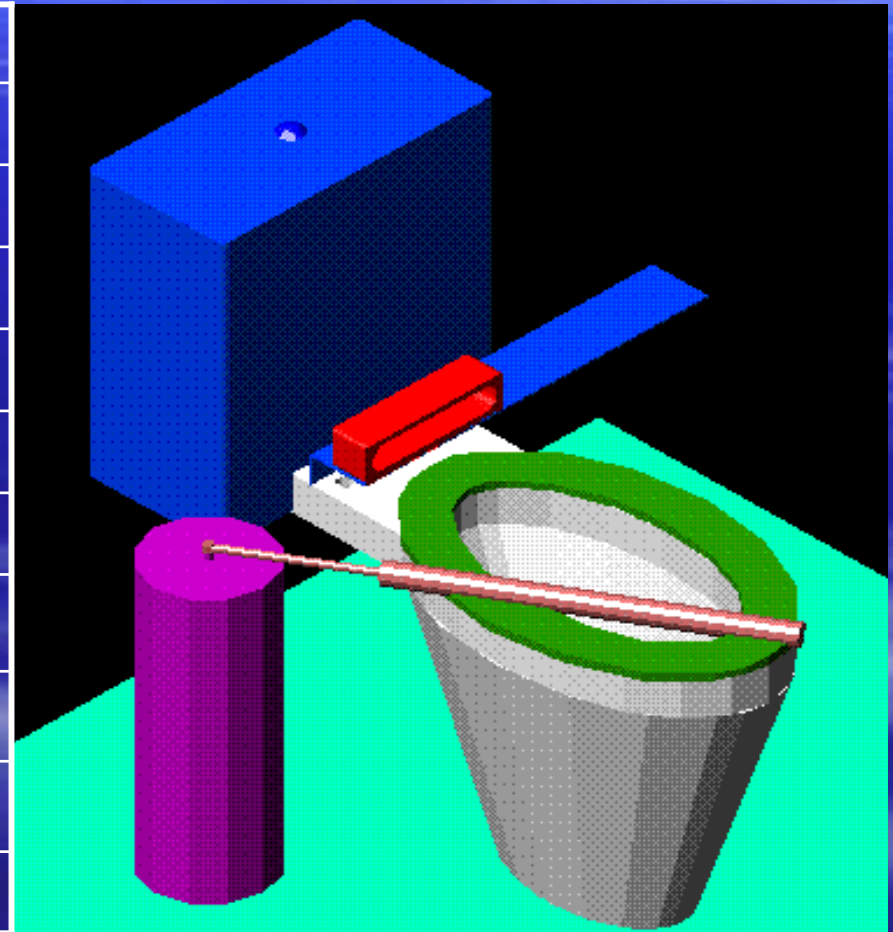
| Item | Metric                        | Unit                | concept 1 (ref)       | concept 2              | concept 3             |
|------|-------------------------------|---------------------|-----------------------|------------------------|-----------------------|
| 1    | Total mass                    | kg                  | 5                     | 7                      | 4                     |
| 2    | Size                          | mm                  | Appr. 385             | Appr. 400              | 500                   |
| 3    | Shape                         | subj                | Circle                | Circle                 | Cylinder              |
| 4    | Time operation                | min                 | $\leq 3$              | $\leq 3$               | $\leq 3$              |
| 5    | water pressure input          | Mpa                 | 0.75                  | 1                      | 0.75                  |
| 6    | Motor velocity                | rpm                 | 20                    | 25                     | 20                    |
| 7    | Wind volume                   | m <sup>3</sup> /min | 0.3                   | 0.5                    | 0.3                   |
| 8    | power supply                  | V                   | 220                   | 220                    | 220                   |
| 9    | power consumption             | W                   | 300                   | 400                    | 250                   |
| 10   | Time to assemble to the frame | min                 | 10                    | 20                     | 10                    |
| 11   | Controlability                | <i>mm</i>           | <i>semi-automatic</i> | <i>fully-automatic</i> | <i>semi-automatic</i> |
| 12   | Brush diameter                | <i>mm</i>           | <i>50</i>             | <i>45</i>              | <i>50</i>             |

# Concept selection – Scoring matrix

| Item | Selection criteria    | Weight % | Concept               |                |           |                |           |                |
|------|-----------------------|----------|-----------------------|----------------|-----------|----------------|-----------|----------------|
|      |                       |          | Concept 1 (Reference) |                | Concept 2 |                | Concept 3 |                |
|      |                       |          | Rating                | Weighted score | Rating    | Weighted score | Rating    | Weighted score |
| 1    | Automatic level       | 20       | 3                     | 0.6            | 4         | 0.8            | 3         | 0.6            |
| 2    | Operation time        | 10       | 3                     | 0.3            | 3         | 0.3            | 3         | 0.3            |
| 3    | Power consumption     | 20       | 3                     | 0.6            | 3         | 0.6            | 4         | 0.8            |
| 4    | Clean efficiency      | 10       | 3                     | 0.3            | 3         | 0.3            | 4         | 0.4            |
| 5    | Easy of manufacturing | 10       | 3                     | 0.3            | 3         | 0.3            | 4         | 0.4            |
| 6    | Safety                | 10       | 3                     | 0.3            | 3         | 0.3            | 3         | 0.3            |
| 7    | Easy to installation  | 10       | 3                     | 0.3            | 3         | 0.3            | 3         | 0.3            |
| 8    | Less maintainance     | 10       | 3                     | 0.3            | 3         | 0.3            | 4         | 0.4            |
|      | <b>Total score</b>    | 100      |                       | 3.00           |           | 3.20           |           | 3.50           |
|      | <b>Rank</b>           |          |                       | 3              |           | 2              |           | 1              |
|      | <b>Continue?</b>      |          |                       | No             |           | No             |           | Develop        |

# Conclusion

| Item | Character     | Value     | Unit     |
|------|---------------|-----------|----------|
| 1    | Total mass    | 4         | kg       |
| 2    | Size          | 500       | mm       |
| 3    | Shape         | Cylinder  | Obj.     |
| 4    | Time ope-n    | Min       | $\leq 3$ |
| 5    | Water input   | 0.75      | Mpa      |
| 7    | Motor velo-ty | 20        | rpm      |
| 8    | Power con-n   | 250       | W        |
| 9    | Time assem.   | 10        | min      |
| 10   | Control-lity  | Semi auto | Obj..    |
| 11   | Brush dia-er  | 50        | mm       |





THANK YOU FOR YOUR ATTENTION!



Question time!

