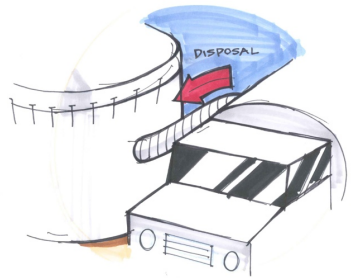
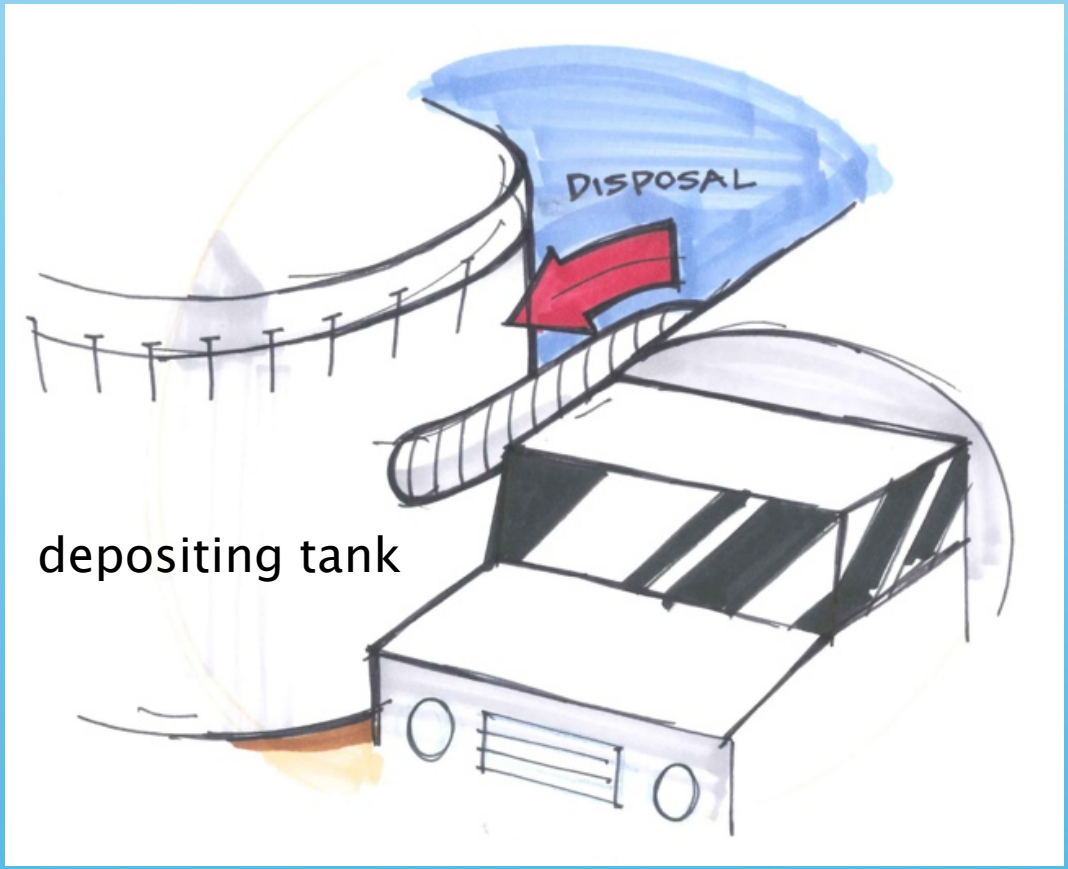



# Inspiration for product development - Disposal

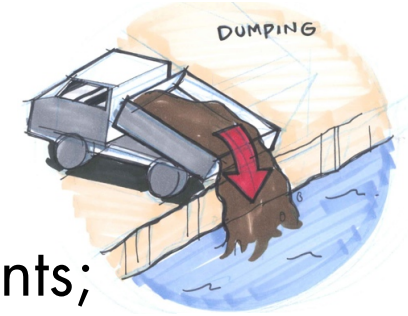
June 15th 2012

Aldus bouwinnovatie
eigenwijze ingenieurs I inventieve adviseurs

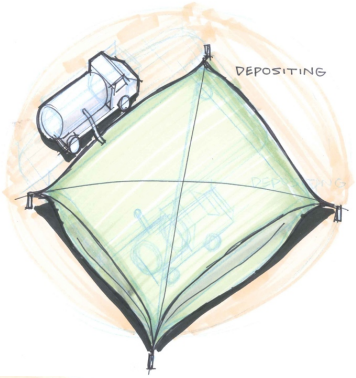
# Disposal



# Disposal

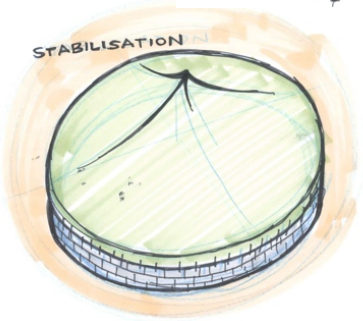


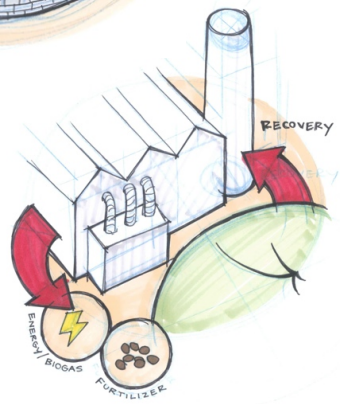

Research into disposal requirements;




New technology inspiration;

- Dumping
- Depositing
- Stabilization
- Resource/energy recovery




Challenges & discussion points;

# Research into disposal requirements

Problem:

there is no acceptable (kit) solution available to be deployed in all emergency situations

Goal:

to establish an unambiguous set of requirements for new disposal facilities:

1. General consensus
2. Feasible solution in all emergency situations

# Research into disposal requirements

Method:

1. Evaluating current solutions
2. Response to concept requirements
3. Search for new inspiration
4. Reaching consensus in workshop

# Research into disposal requirements

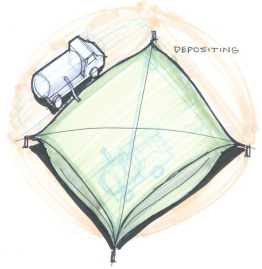
Different methods for waste management

## Dumping

* infiltration into ground /water

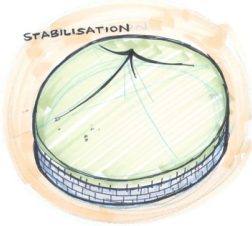

## Depositing

* discharge in temporary storage medium




## Stabilization

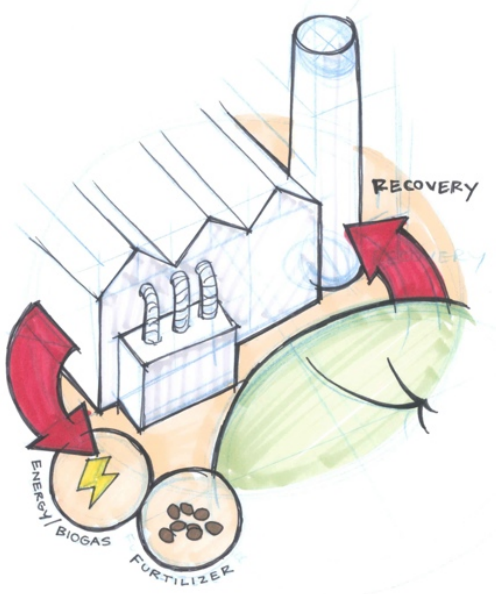
* stabilization ponds
* thermal stabilization (e.g. incineration)
* chemical stabilization



# Research into disposal requirements

Resource and/or Energy recovery

* composting
* constructed wetlands
* digestion/biogas usage



# Responses to concept requirements

Conclusion 1: Ideal disposal facility:

100% pathogen reduction, 100% nutrients recovery, high capacity, fast deployment at low costs and high processing

# Responses to concept requirements

Conclusion 2:

* High amount of disposal methods available, however none (to little) of them are used in emergency situations
* constructed wetlands 100% pathogen reduction, 100% nutrients recovery,
* Simple (covered) storage requires good ventilation

# Responses to concept requirements

Conclusions 2:

* Composting requires the least equipment for recovery, however is slow in processing
* Incineration is a very fast method of stabilization, but requires advanced equipment.
* Biogas installations have high equipment intensity

# Responses to concept requirements

Conclusions 2:

- Consensus regarding priorities of requirements
  1. High safety
  2. Speed of deployment
  3. Scalable configuration
- some specifications are not quantified:

  e.g. process type, speed of deployment, range of capacity, efficiency rate, time: volume ratio
- negative correlated specifications lead to challenging requirements:

# Responses to concept requirements

Conclusions 3:

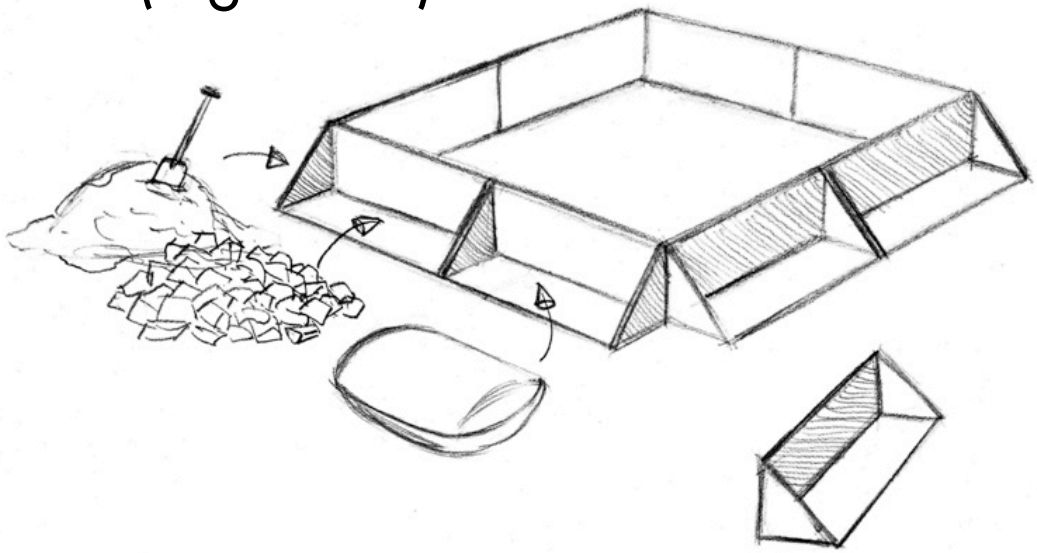
- Not enough consensus on quantitative specifications
- Doubts on feasibility of requirements…
- Process knowledge is required to judge criteria

# New technology inspiration;

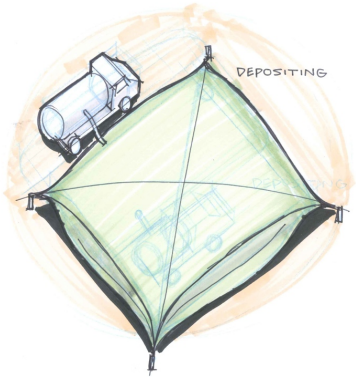
# Dumping


## Temporary dumping constructions

* appropriate for large quantities
* modular configuration by building blocks
* reinforcement with local abundant material (e.g. sand)



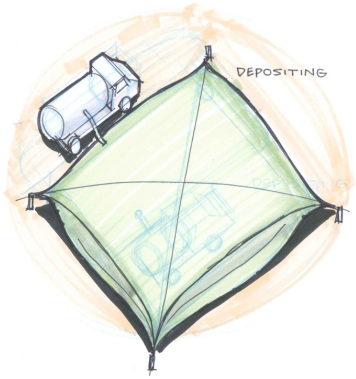
# Depositing




Large (manure/water) tanks

* appropriate for large quantities
* compact transportation
* robust and solid construction

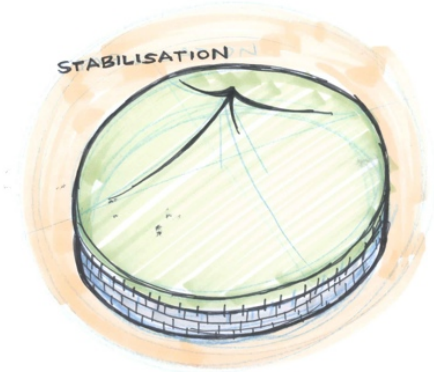
# Depositing




## Flexible water tanks

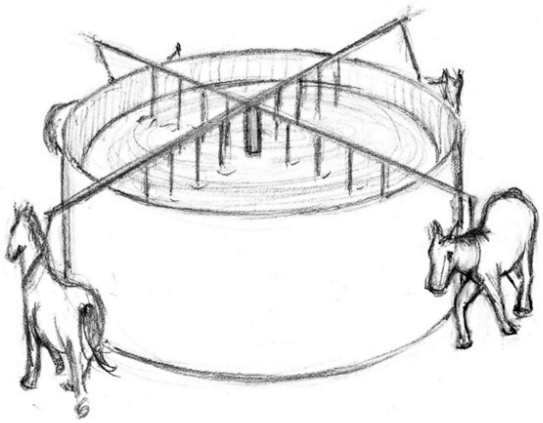
* appropriate for large quantities
* compact transportation
* can be placed on different types of surfaces

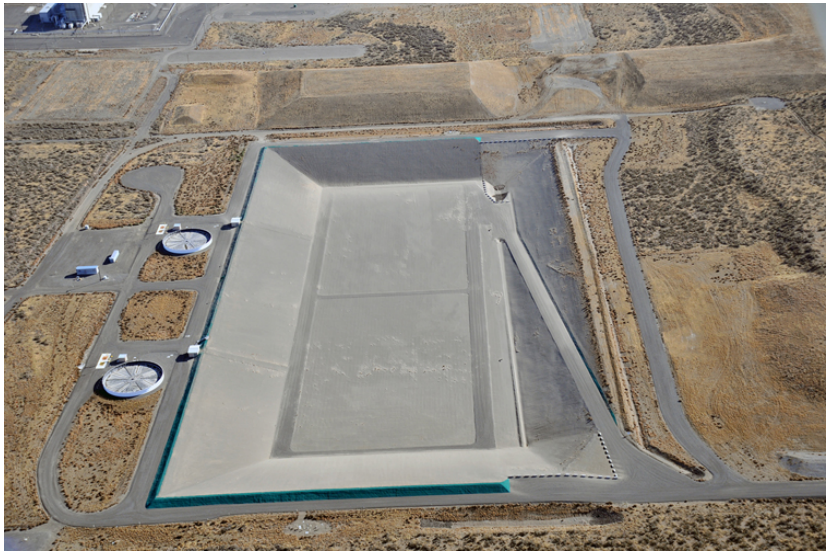
# Stabilization



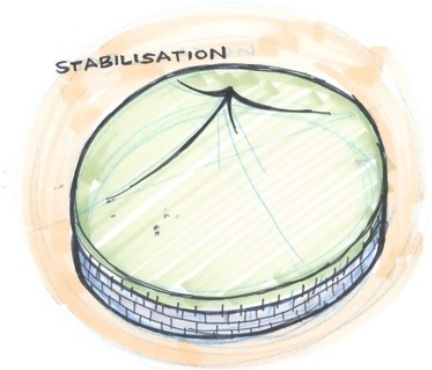

## Stabilization pond

* appropriate for large quantities
* modular configuration by building blocks
* reinforcement with local abundant material (e.g. sand)

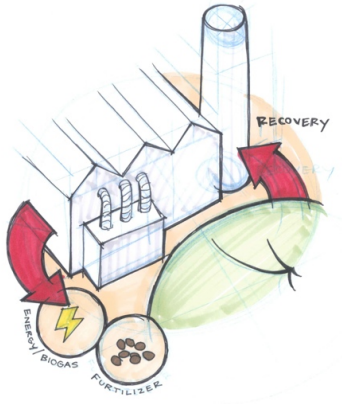




# Stabilization

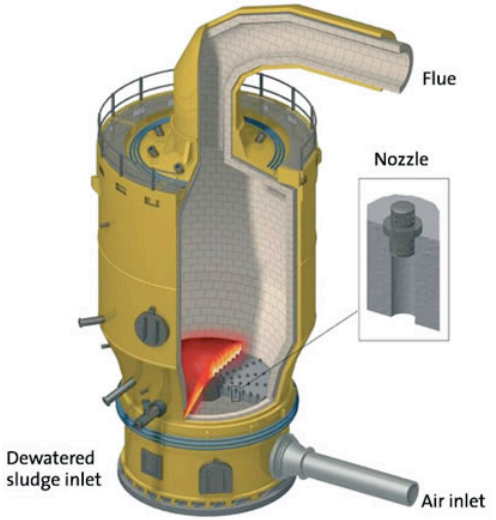



# Resource/energy recovery

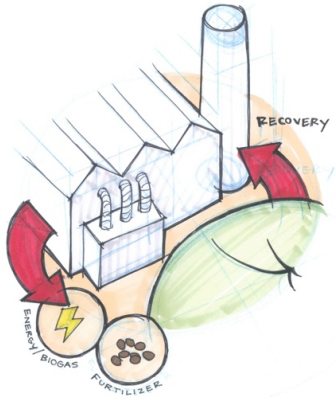



## Compact incineration units

* very safe and fast disposal method
* modular configuration by building blocks
* high throughput and energy output
* nutrient rich ashes

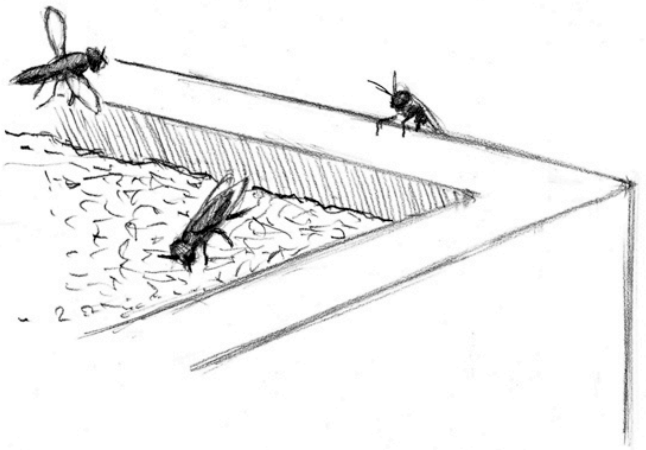


# Resource/energy recovery

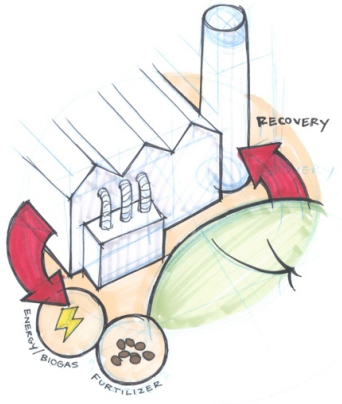



## Black Soldier Fly (BSF)

* biological conversion: the larvae of the BSF are able to consume pit latrine content

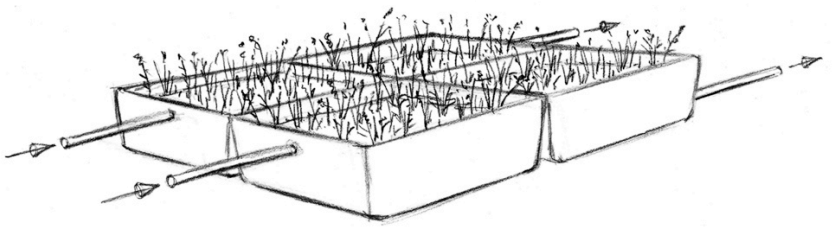


# Resource/energy recovery

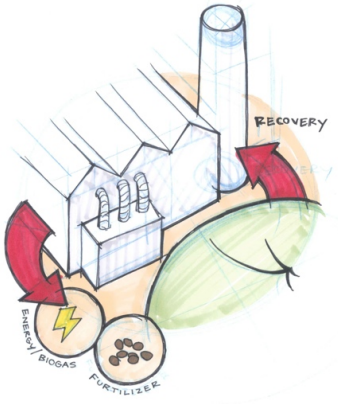



## Plant beds

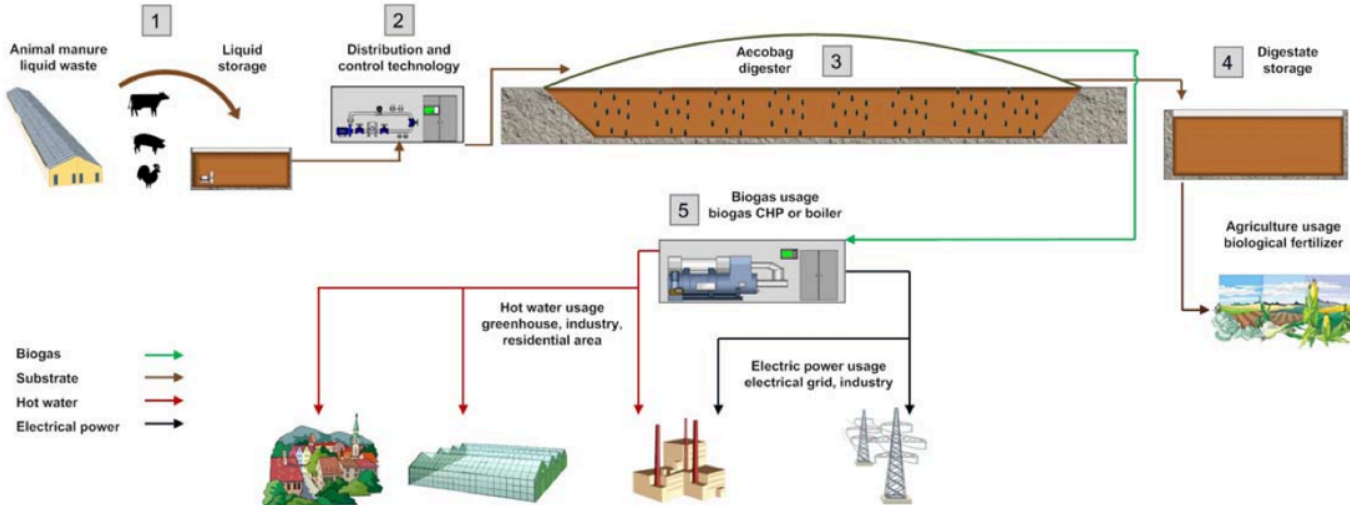
* very safe and fast disposal method
* modular configuration by building blocks
* high throughput and energy output



# Resource/energy recovery




## Anaerobic digestion systems




# Challenges & Discussion points;

# Challenges

- Development of rapid solution for first three months of an emergency
- Development of a product solution witch can be transported by air plane
- Development of a system with low product & life cycle cost
- Development of a product able to process high volumes

# Discussion points

- What process is most suitable for different emergency situations?
- Is composting capable of handling large number of people?
- Is it feasible to treat different types of waste in one type of facility?
- Does the disposal unit need specific desludging facilities?
- Does the disposal unit need specific desludging facilities?

# Discussion points

* Would a phased solution of intial disposal and later on stabilization and energy- and resource recovery be helpful?

# Group sessions

# Group session:

All participants divided in 7 groups

Each group receives a short briefing and emergency context scenario

Group assignment:

1. Decide with your group what disposal solution is best suited in your given context. Draw how it would work! 20 minutes
2. Quantify and specify the criteria stated in your group briefing: 30 minutes
3. Add 3 most relevant specs missing: 10 minutes

# Requirements to be discussed:

A1. The disposal facility should require a limited amount of space at required treatment capacity of X m3 sludge per day

B3. Ability to deploy the disposal facility within short period (X weeks) upon arrival in the field

C1. Items required for the disposal facility should be low in volume (easy to transport/low airfreight) according the following volume factor 1 m3 transport volume : X m3 operational volume

C2. Items required for the disposal facility should be low in weight (easy to transport/low airfreight), with a maximum of X kg per module

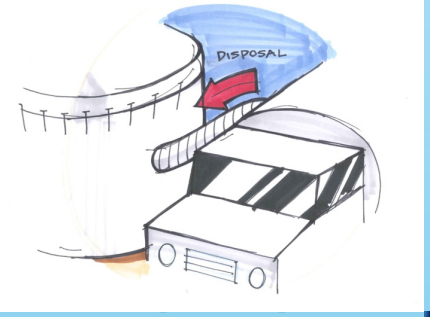
# Requirements to be discussed:

D2. Ability to process different types of sludge (liquid, semi solid, solid)

D3. The disposal facility should be an effective solution to decrease and remove pathogens, by a minimum reduction of X %

D7. The disposal process should consume a limited amount of time per volume sludge unit (preferably less than X days)

E2. Affordability Operation and maintenance costs: Operation Expenditures should not exceed 500 USD per….


DISPOSAL