Drawing excreta flow diagrams and additional fluxes, combined with simulation – the Simba# technical tool

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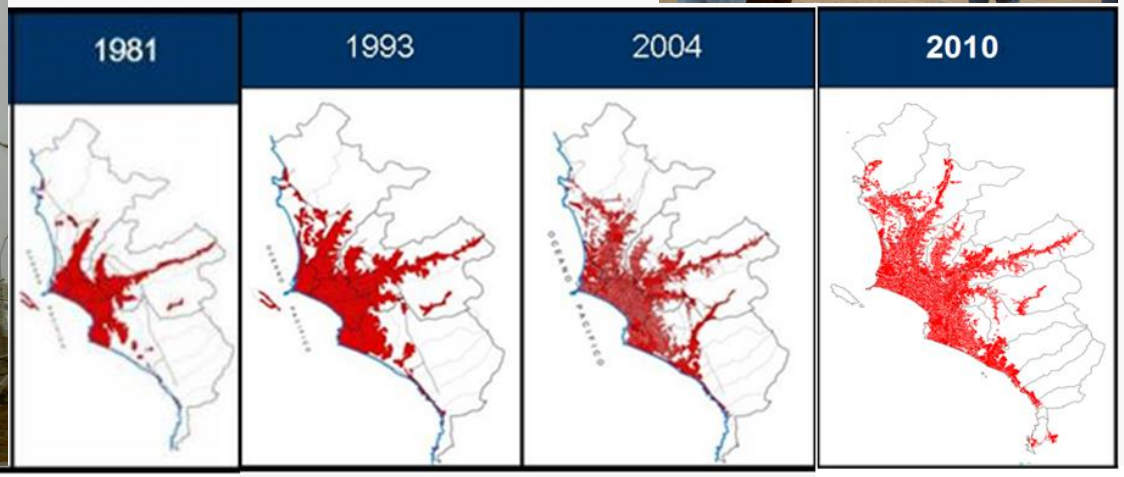
ifak Magdeburg (Flooding June 2013)

A:
Lima/Peru: A city with water challenges

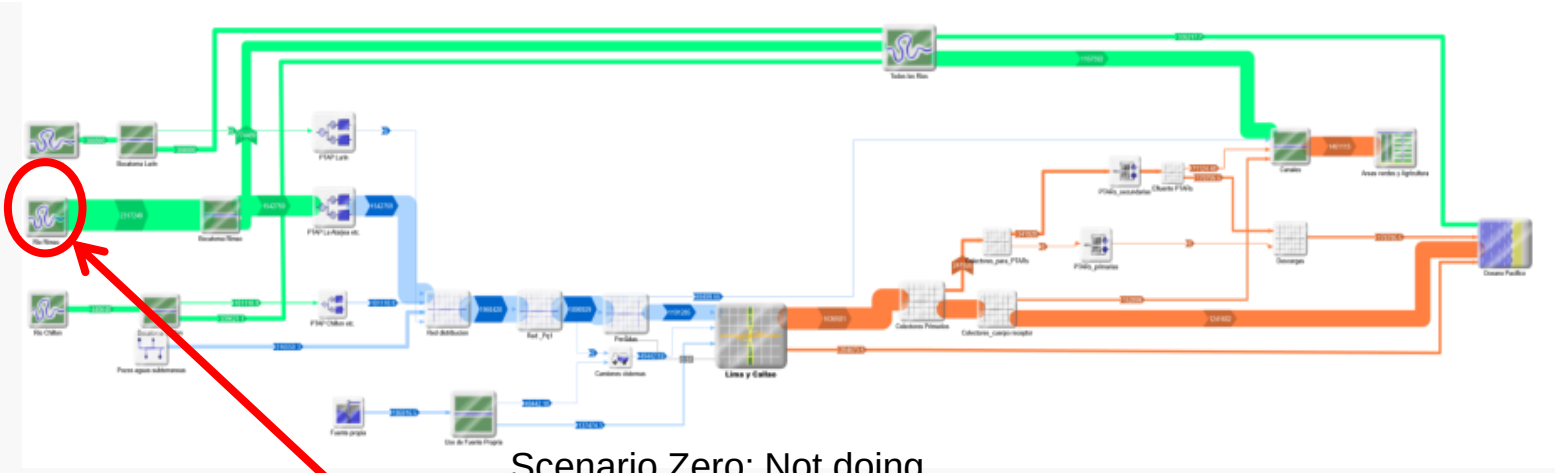
Some characteristics of Lima

- Second-driest city of the world (Rainfall: 9 mm p.a.)
- Rivers with trans-Andean tunnels, groundwater
- Some wastewater reuse (parks, agriculture) – untreated wastewaters
- Water production: approx. 20 m^3/s
- Main worry of population: Access to water
- Challenges in administrative framework

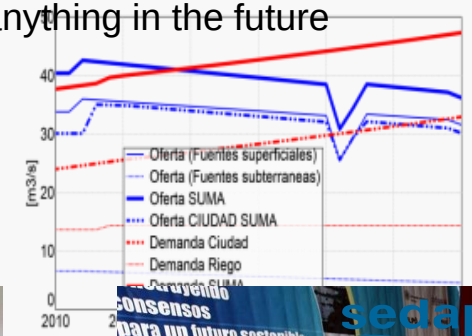


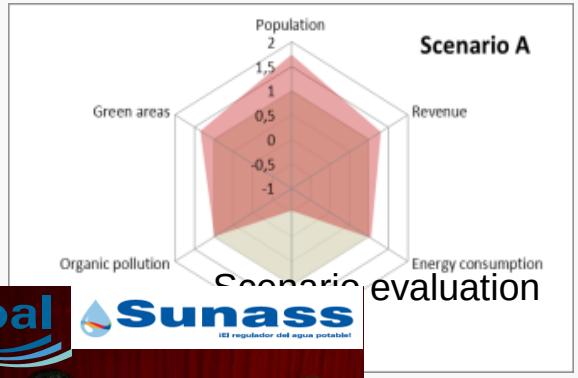
Present population: 9 million

A:
Lima: Modelling for stakeholder participation



Scenario Zero: Not doing anything in the future





Scenario evaluation

www.lima-water.de

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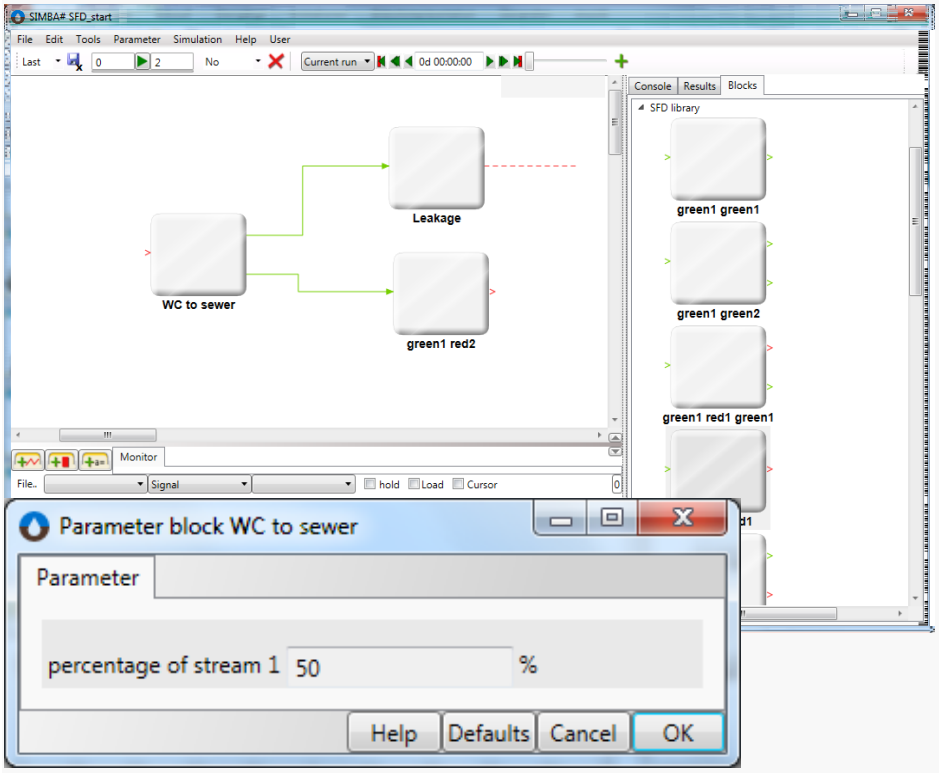
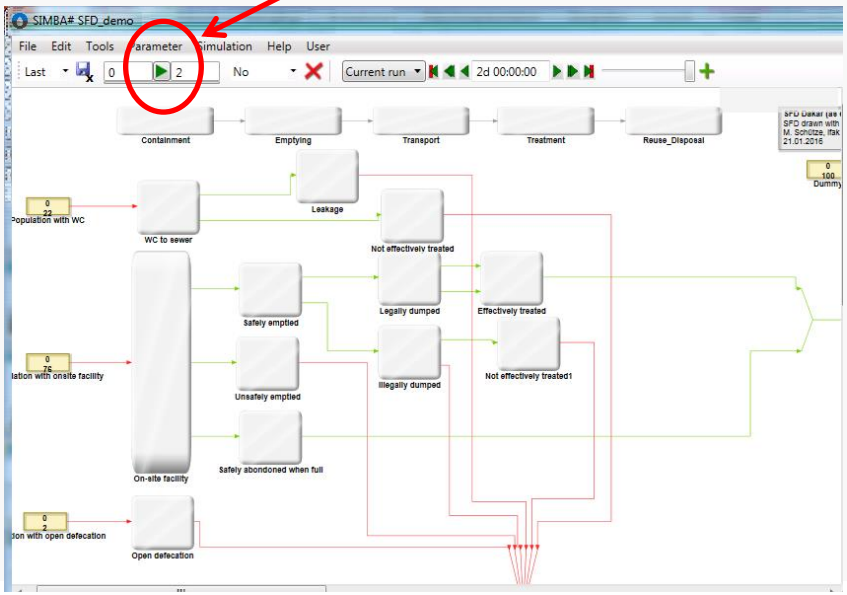
B:
Drawing an SFD



1. Setting up of blocks

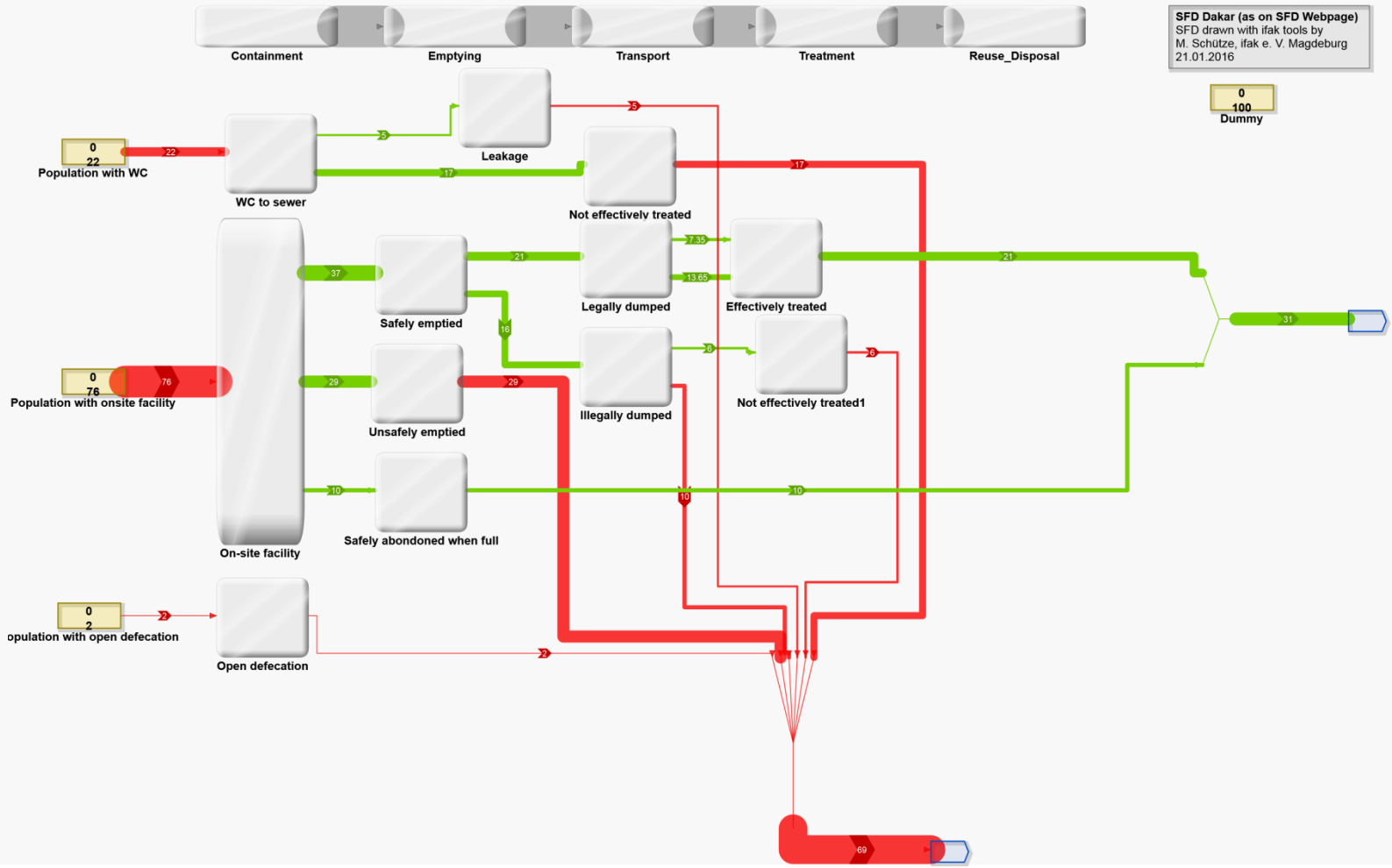
3. Start “simulation” (calculation)



2. Connecting blocks

B:
Drawing an SFD

4. Result: SFD Dakar (as on SFD Webpage)



A+B:
Simulation, visualisation and SFD (1)

A:
The “LiWa” experience

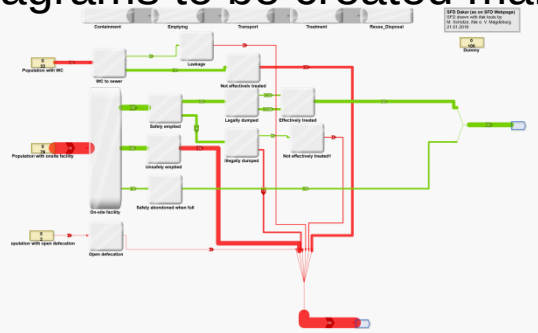
- “Macromodelling of water system”
- Visualisation extremely helpful,
  - Supported informed discussions,
  - Created ownership of Action Plan

- Water quantities, quality
- Availability – demand
- Feedback loops

- Diagram as result of simulation

B:
SFD

- % of excreta flows
- „good“/“bad“ flows
- „just“ a diagram (but very useful!!!)
- Diagrams to be created manually



Combination of these two?

A+B:
Simulation, visualisation and SFD (2)

- Are the following of interest?
  - Time series (future developments/scenarios)
  - Spatial distribution (e.g. city districts)
  - Particular substances (e.g. nutrients)
  - Calculation of additional criteria (e.g. costs, GHG)
  - Individual technologies?
- Who are the users?

  - Visualisation, assistance of strategic planning
  - NOT: detailed modelling

    (for that: other tools, modules – of same simulator)
  - Scripts to assist/automate model building and application process

New and alternative sanitation systems (NASS): System visualisation

- **Concept:**
  - Consideration of resource fluxes

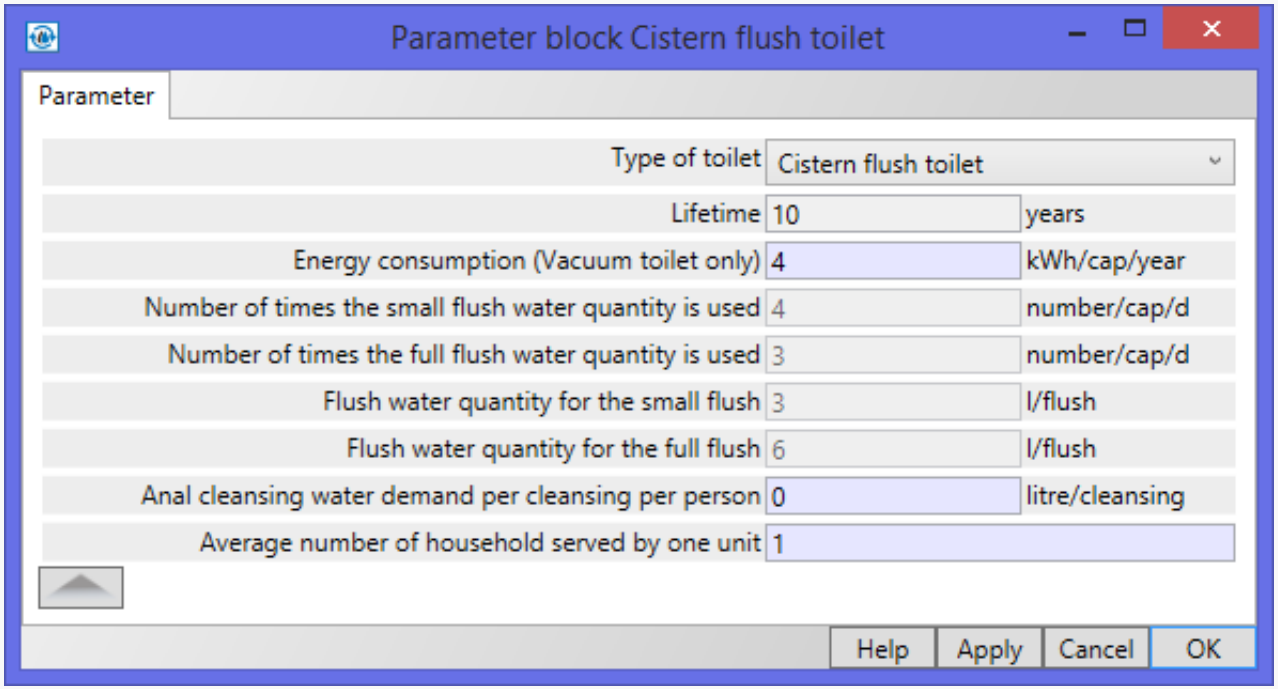
Input/Output	Colour used	Input/Output	Colour used
Anal Cleansing water		Faeces	
Black water		Flush water	
Biogas		Faecal Sludge	
Brown water		Organics	
Compost/ Ecohumus		Stored Urine	
Dried Faeces		Treated Sludge	
Dry cleansing Materials		Urine	
Effluent		Excreta	

Adapted from: Tilley *et al.* (2008)

  - Sanitation chain: User interface - Collect/Storage/Treatment – Conveyance - (Semi)centralised treatment - Use/Disposal
  - Block-based composition of systems

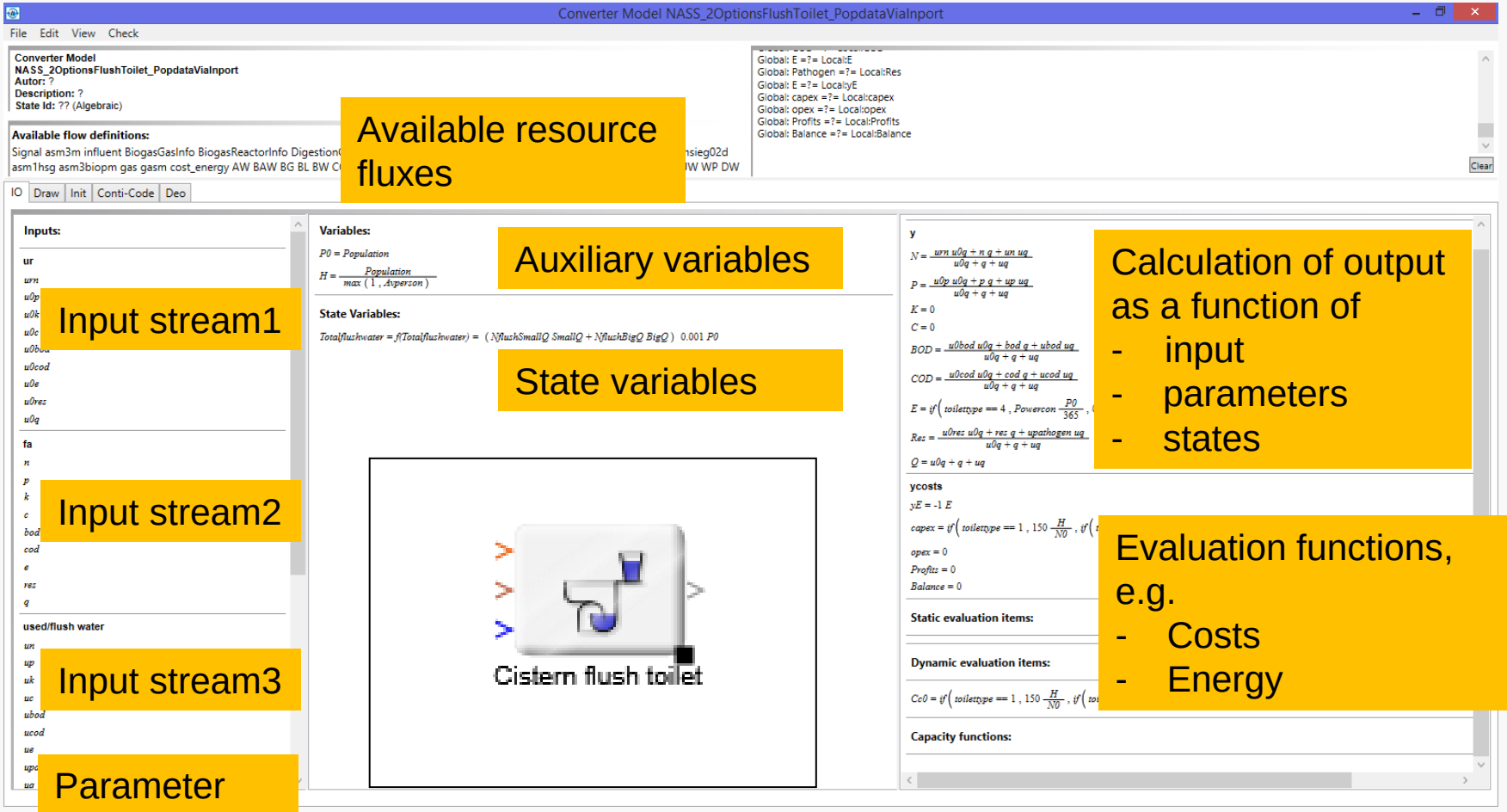
New and alternative sanitation systems (NASS): System visualisation

User Parameter dialogue

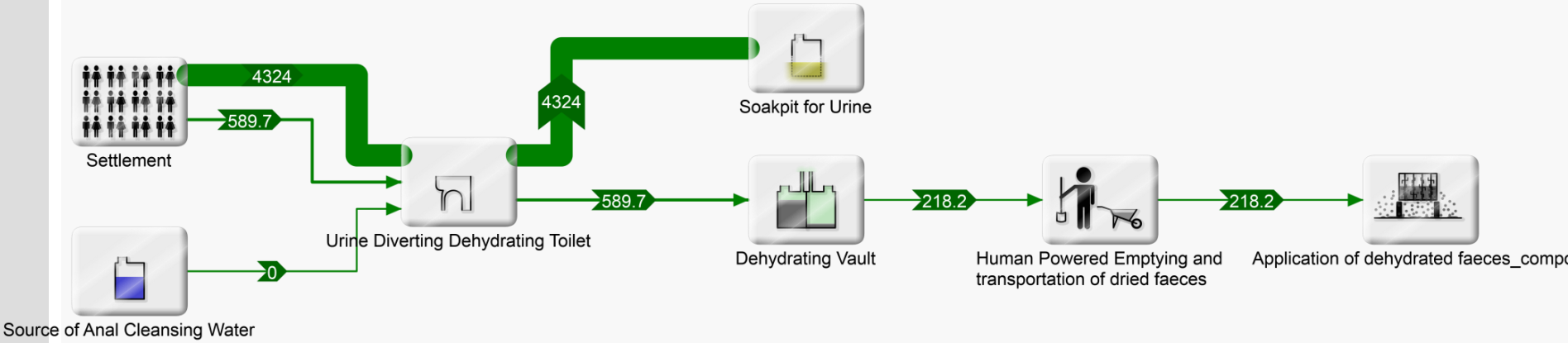


New and alternative sanitation systems (NASS): System visualisation

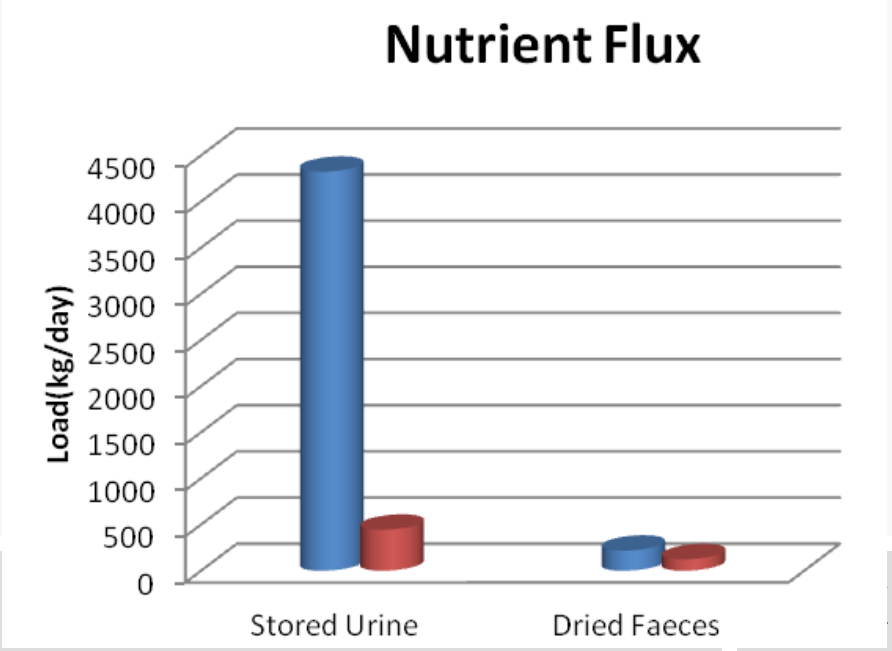
Definition of modules



Example: eThekwini (Durban)/South Africa



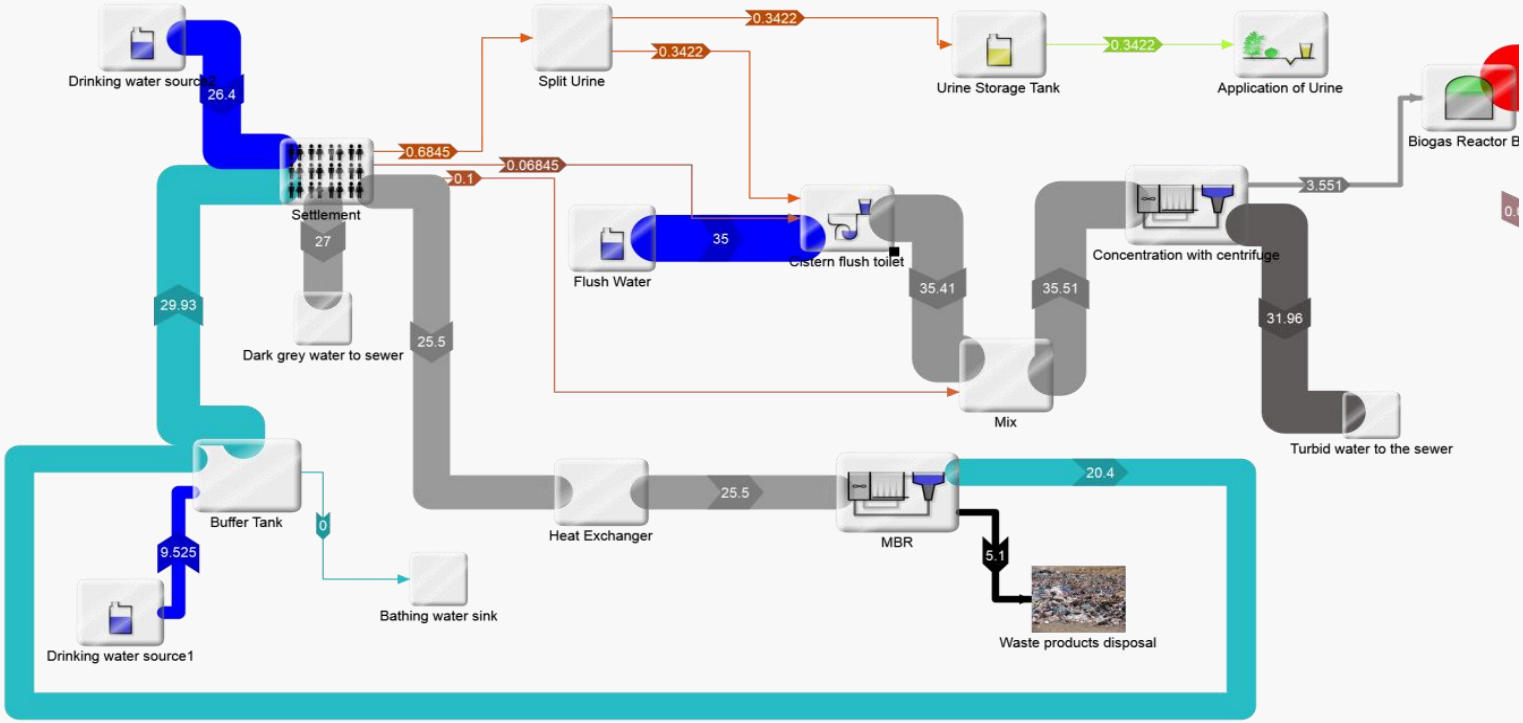
Simulation of N fluxes (kg/day)



Daily load (kg/day) for Scenario "A" (Blue cone = Nitrogen; Red cone = Phosphorus)

New and alternative sanitation systems (NASS): Potential scenarios (von Horn *et al.*, 2013)

- NASS-Option 2: Environmentally-friendly hotel
  - Separation of urine, used as fertiliser
  - Greywater treated for reuse
  - Blackwater composted or used for biogas production



Drawing excreta flow diagrams + simulation: Conclusion

- Summary
  - Combinations of SFD with simulation possible
  - Some specifications and then go ahead! The tools are there!

- Related projects
  - “LiWa – Lima Water”
  - NewSan (with UCL London)
  - nidA200
  - Sampsons
  - Rapid Planning
  - ifak preparatory research

New and alternative sanitation systems (NASS): Summary

Bureaucratic hindrances

Thank you!

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