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Eawag/Sandec, SEI, BGR, TTZ, IWA, WSSCC, BOKU, UNESCO-IHE, AEE/INTEC, GTZ, IWWA, IWA-SG, UN-Habitat, UNDP, Ecosanlac, KfW

Sanitation Systems, Technology Options, Hygiene and Health

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Delhi, 2 Nov. 2007, Sandec / Eawag

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Working group 4: Sanitation systems, technology options, hygiene and health

The SuSanA Approved Statement, draft 05/2007 addresses health as a central issue for Sustainable Sanitation:

"The main objective of a sanitation system is to protect and promote human health by providing a clean environment and breaking the cycle of disease."

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Understanding sustainable sanitation system and technology options

Understanding sustainable sanitation systems and technologies means to address:

- Function of health risk reduction
- Technical appropriateness
- Economic viability
- Institutional appropriateness
- Socially acceptability
- Minimal environmental impact
- Minimal resource use and potential for maximal resource reuse

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A Sanitation System – a multi-step process

By considering ‘sanitation’ as a multi-step process, and not a single point, waste products are accounted for from the point of generation to the point of ultimate disposal.

Introducing the concept of **waste products**, **processes** and **technologies**

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Conceptualizing a Sanitation System

No.	System name	Flowstreams
1	Wet mixed blackwater and greywater system with offsite treatment	▪ blackwater mixed with greywater flowstream ▪ faecal sludge flowstream
2	Wet mixed blackwater and greywater system with onsite treatment	▪ blackwater mixed with greywater flowstream ▪ faecal sludge flowstream
3	Wet blackwater systems (blackwater separated from greywater)	▪ blackwater flowstream ▪ faecal sludge flowstream ▪ greywater flowstream
4	Wet urine-diversion system	▪ urine flowstream/ yellowwater ▪ brownwater mixed with greywater flowstream ▪ faecal sludge flowstream
5	Dry greywater-separate system	▪ excreta flowstream ▪ greywater flowstream
6	Dry urine- and greywater-diversion system	▪ urine flowstream ▪ faeces flowstream ▪ greywater flowstream
7	Dry all mixed systems	▪ excreta mixed with greywater flowstream

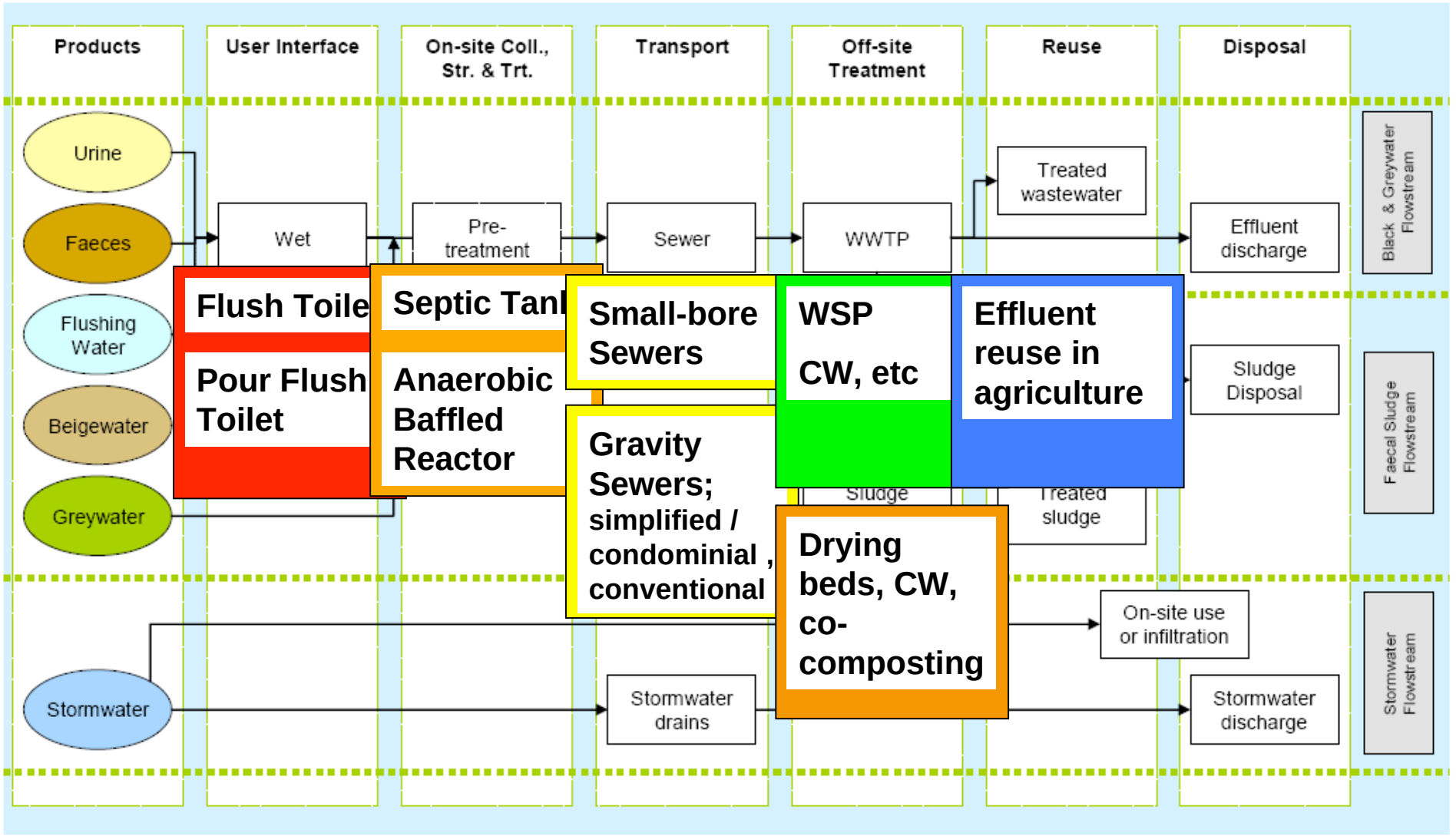


Figure 1. Wet mixed blackwater and greywater system with offsite treatment

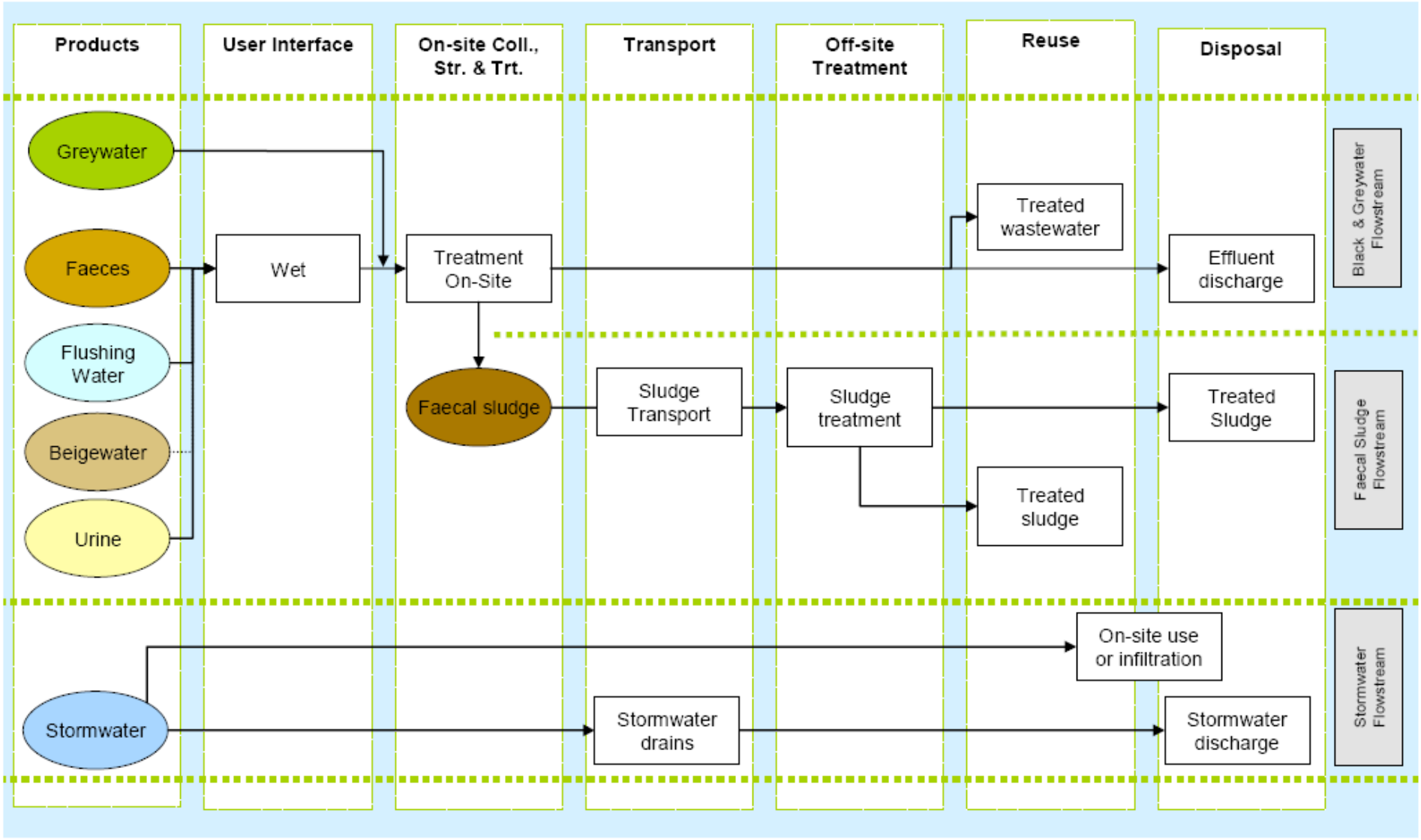


Figure 2: Wet mixed blackwater and greywater system with onsite treatment

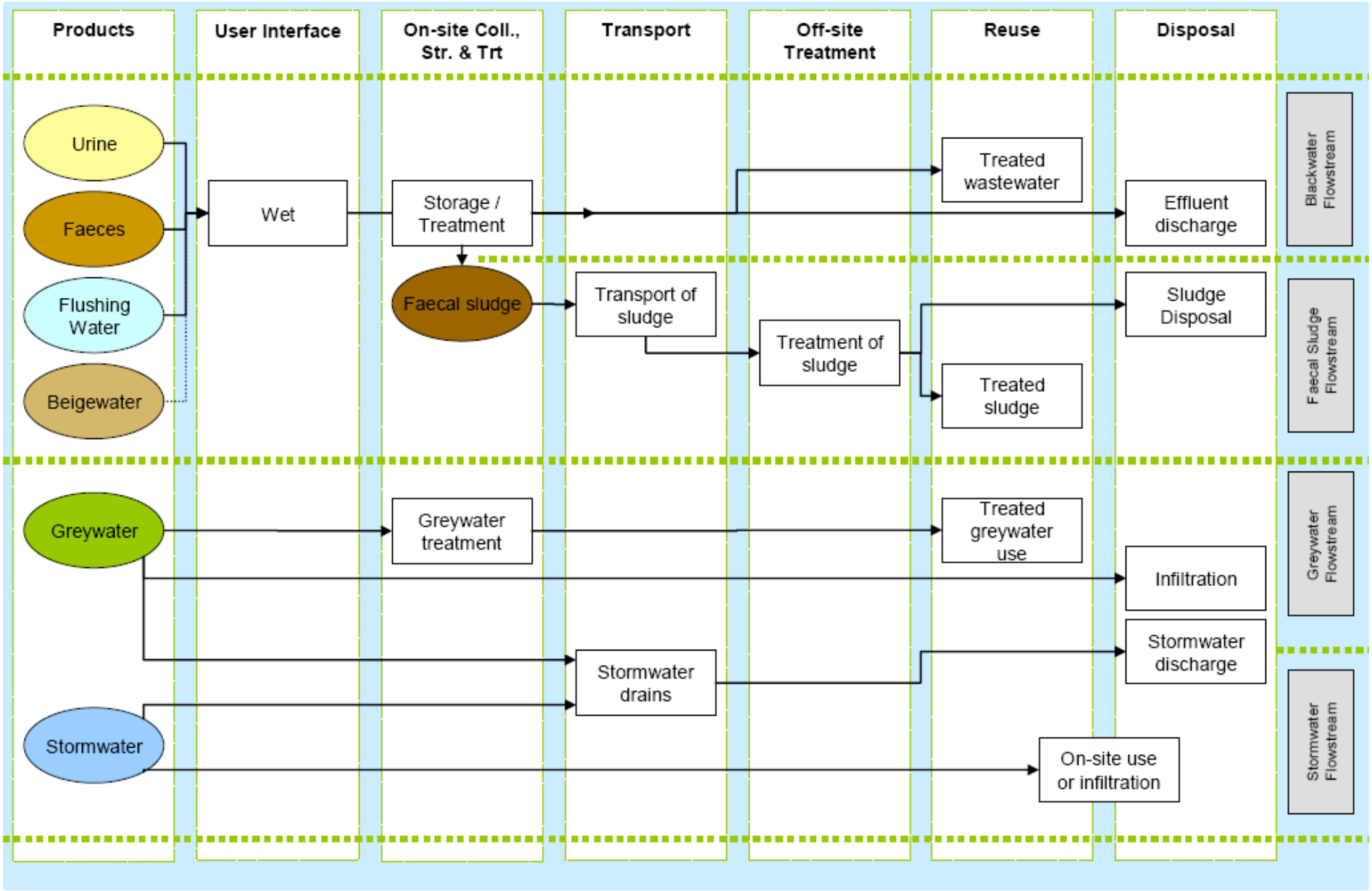


Figure 3. Wet blackwater system where greywater is managed separately

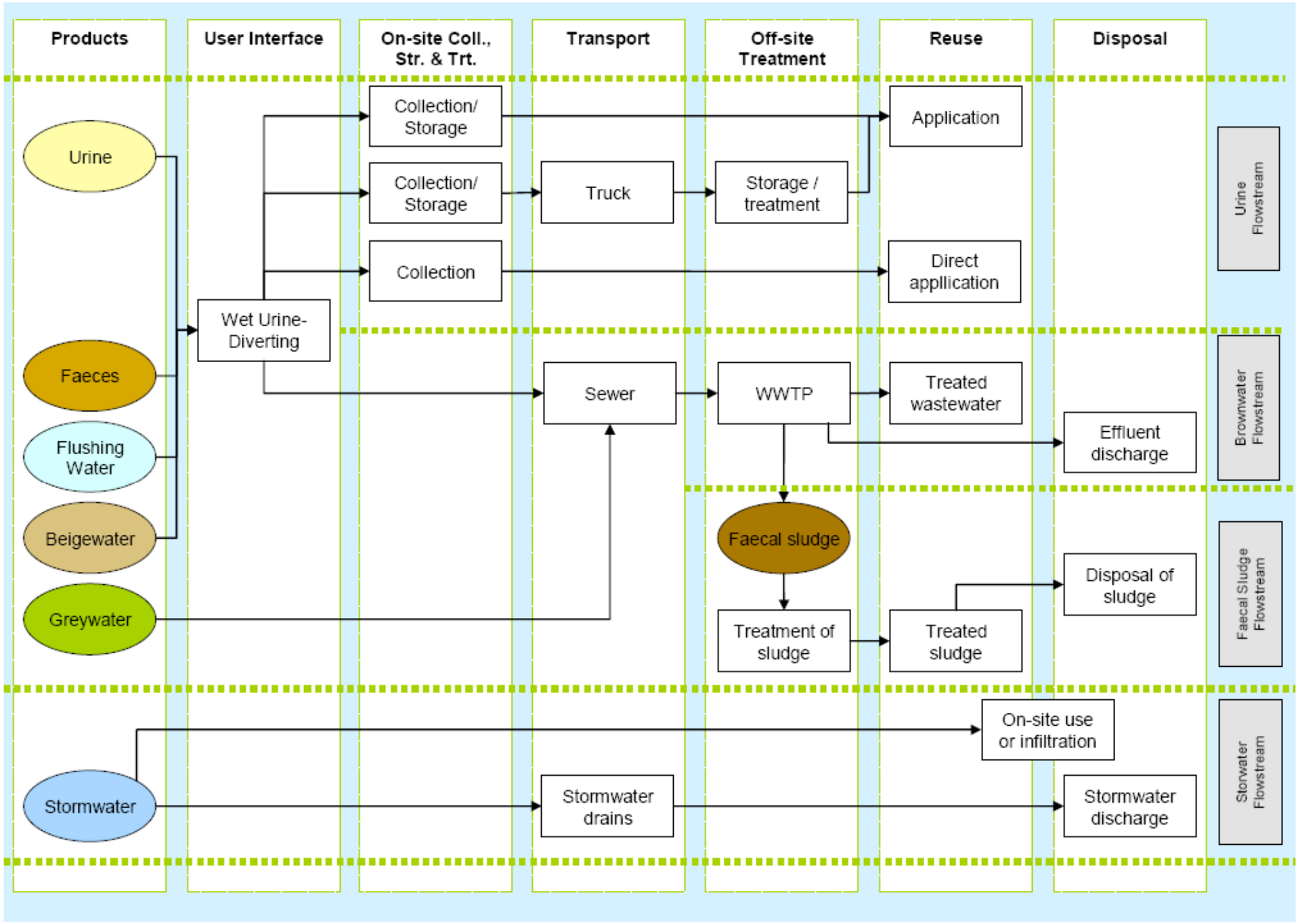


Figure 4: Wet urine diversion system where urine and brownwater (with greywater) are managed separately

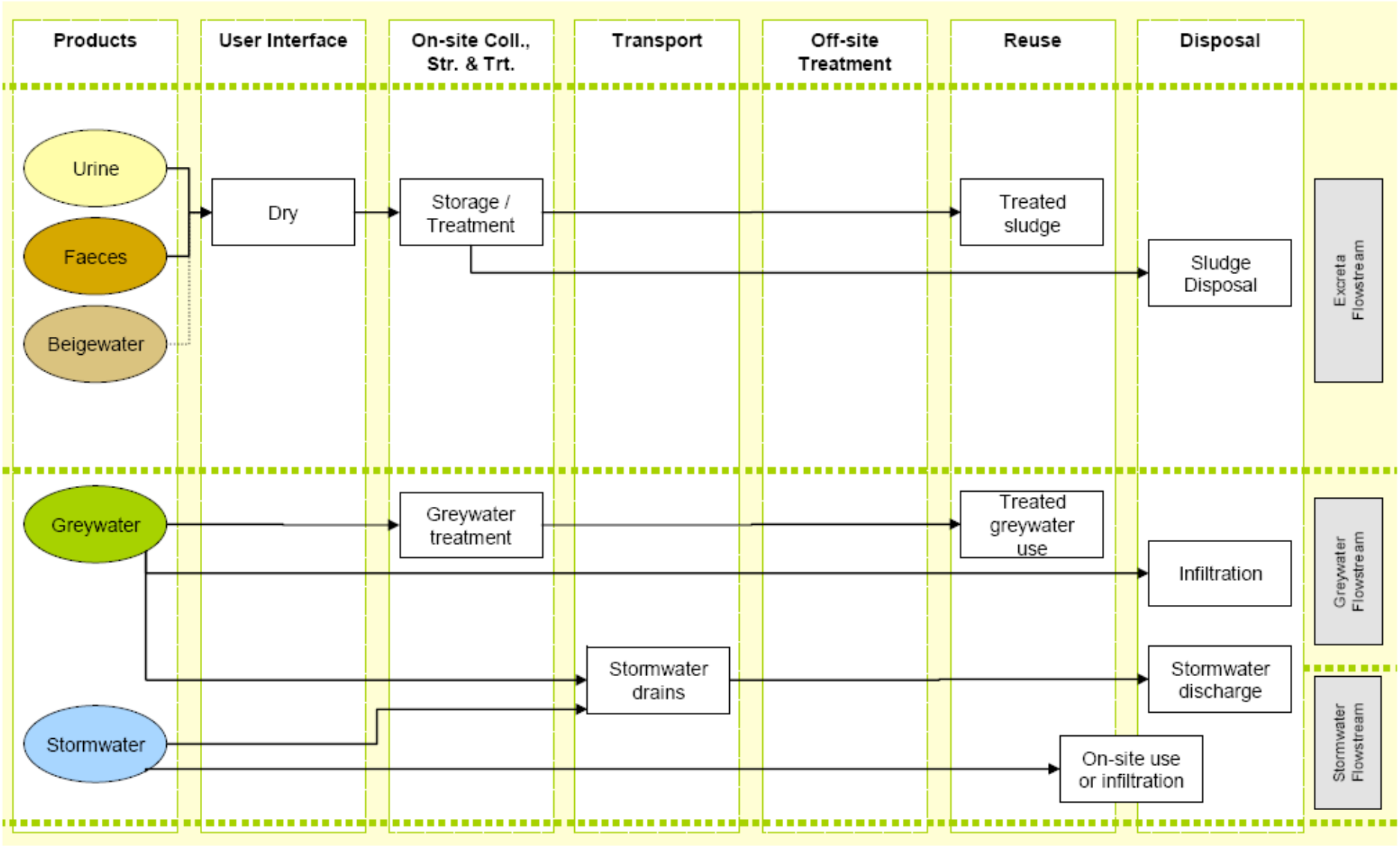
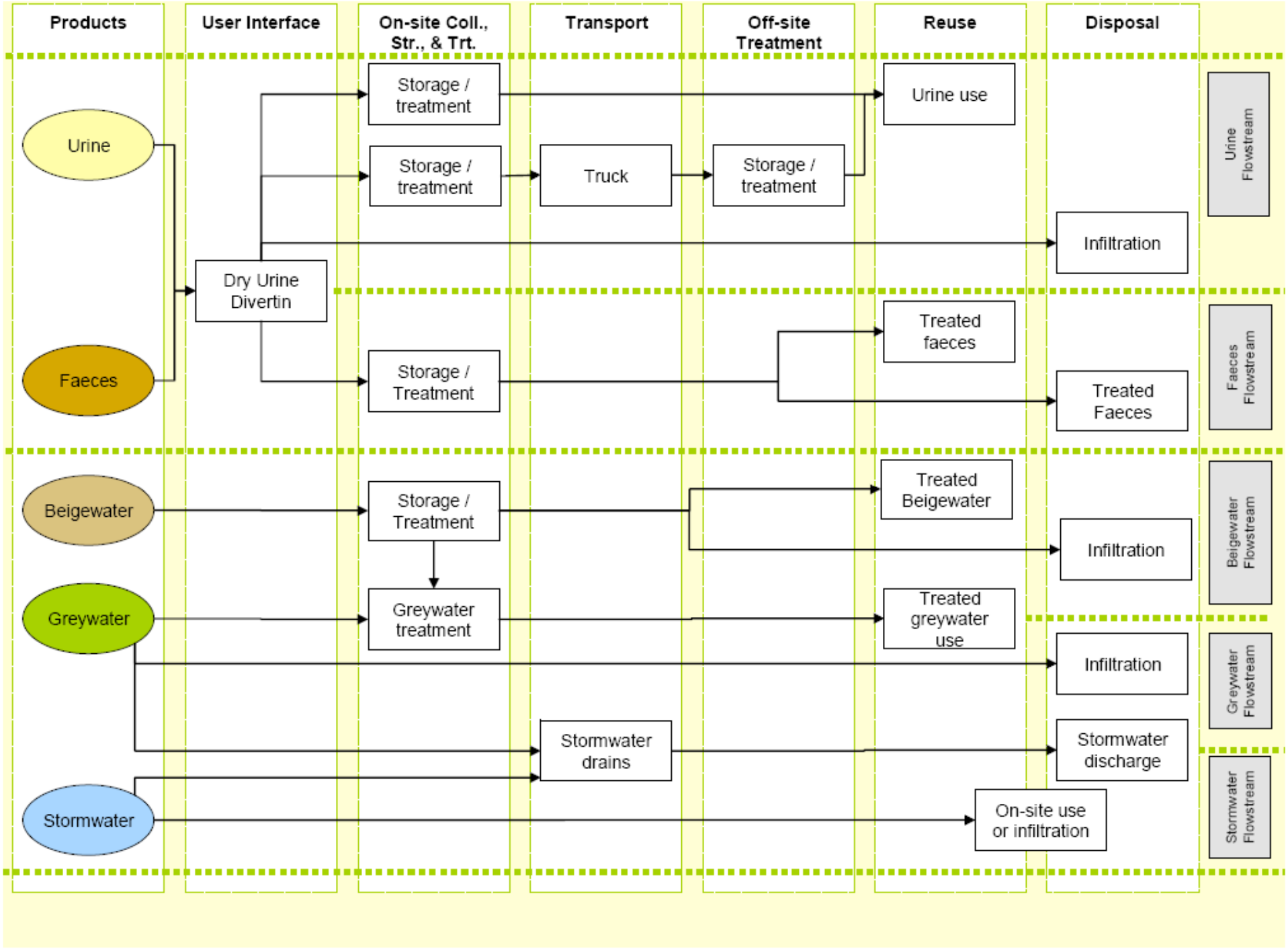


Figure 5: Dry onsite excreta storage with greywater diversion system


Products
User Interface
On-site Coll., Str., & Trt.
Transport
Off-site Treatment
Reuse
Disposal
Urine
Faeces
Beigewater
Greywater
Stormwater
Dry Urine Divertin
Storage / treatment
Storage / treatment
Truck
Storage / treatment
Urine use
Infiltration
Urine Flowstream
Storage / Treatment
Treated faeces
Treated Faeces
Faeces Flowstream
Storage / Treatment
Treated Beigewater
Infiltration
Beigewater Flowstream
Greywater treatment
Treated greywater use
Infiltration
Greywater Flowstream
Stormwater drains
Stormwater discharge
On-site use or infiltration
Stormwater Flowstream

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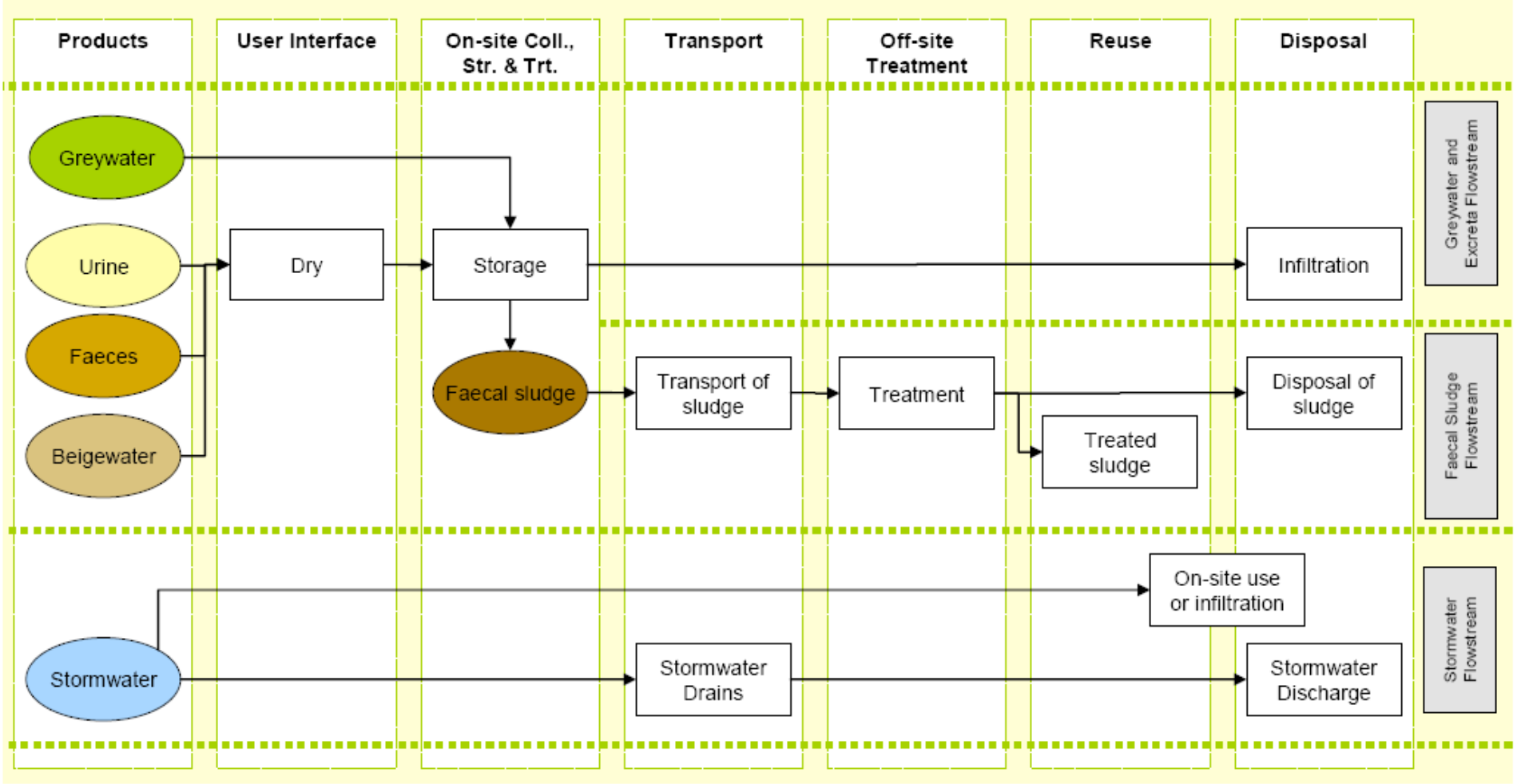

Figure 7. Dry excreta and greywater mixed system

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Think of Processes

User Interface → How the user accesses the sanitation system

On-site Storage and Treatment → Where the products collected and stored)

Conveyance → How the products move between the point of collection to the point of treatment, reuse or disposal

Treatment → How the pathogens, nutrients and/or properties of the products are transformed

Resource Application and Disposal → How the transformed produc

Involves spatial and functional issues

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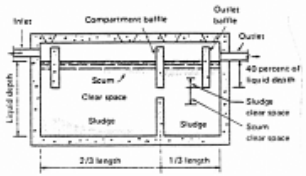
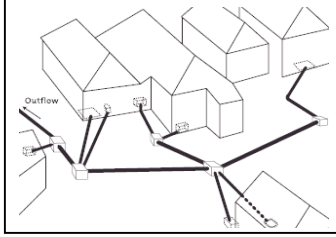
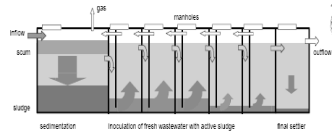
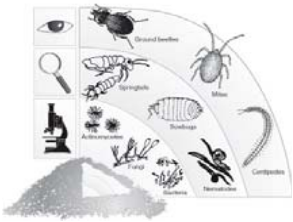
Designing a sanitation system

User Interface	Onsite Storage and Treatment	Conveyance	Centralized Treatment	Resource Application and Disposal
				
-Dry Toilet -Urine Diverting Dry Toilet -Urinal -Pour Flush Toilet -Flush Toilet	-Single Pit -Single Pit VIP -Alternating Dry Double Pit -Alternating Wet Double Pit -Double Dehydr. Vaults -Aquaprivy -Septic Tank -Composting Chamber	-Manual Emptying -Mechanical Emptying -Simplified Sewers -Small-Bore Sewer -Conventional Gravity Sewer -Jerry can/tank	-Imhoff Tank -Anaerobic Baffled Reactor -Anaerobic Filter -Trickling Filter -Waste Stabilization Ponds -Finishing Pond -Constructed Wetland -Co-composting Etc.	-Application of Urine -Application of Dehydrated Faeces -Compost -Irrigation with Wastewater -Aquaculture Ponds -Soak Pit -Leach Field -Incineration -Land application -Surface Disposal

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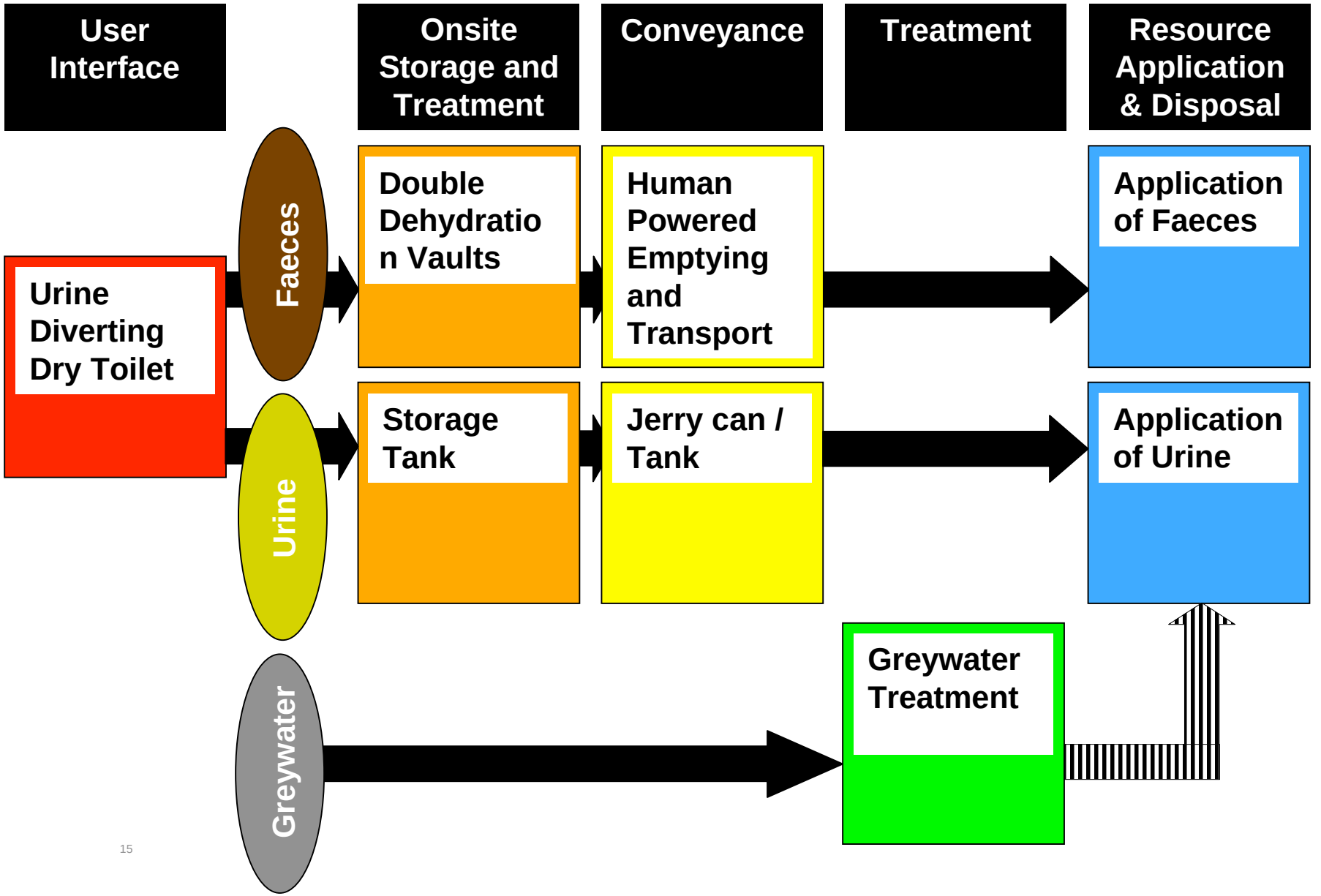
Example: Dry with Urine Separation and Disposal



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- Technical appropriateness
- Economic viability
- Institutional appropriateness
- Socially acceptability
- Environmental impact
- Resource use and potential for resource reuse
- Function of health risk reduction

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Logistics of the working group

Lead: Eawag/Sandec, seconded by SEI (T.A. Stenström)

- Include sub-item on health / health risk in the same group
- Core group (5 persons) will work on the various sub-items
- Comments on the TORs by extended group
- Timeframe is defined by next SuSanA meeting in February
- Outputs are defined as factsheets as well as recommendations for “way forward”
    - need for system view
    - exposure/health risk of typical system and technology configuration
- Cross-communication occurs between this and other groups, sp. 2 (costs), 5 (food security),7 (community sanitation), 13 (O&M)