



## Role of ISO 30500: integrated toilet & treatment products

Sun Gil Kim – ISO PC 305 chair  
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Reinvented Toilet Expo  
Beijing, China

# OPPORTUNITY FOR CHANGE

# 改变的机会



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# Modern toilets





... but where does it go?





Not so modern



Jeju toilet, Korean Folk Village, Yongin, South Korea



Not so long ago just a few generations ago



Mr. Toilet House, Suwon, South Korea



# Urban poor & rural





# Failures

cesspit in Hawaii



septic tank leach field in King County

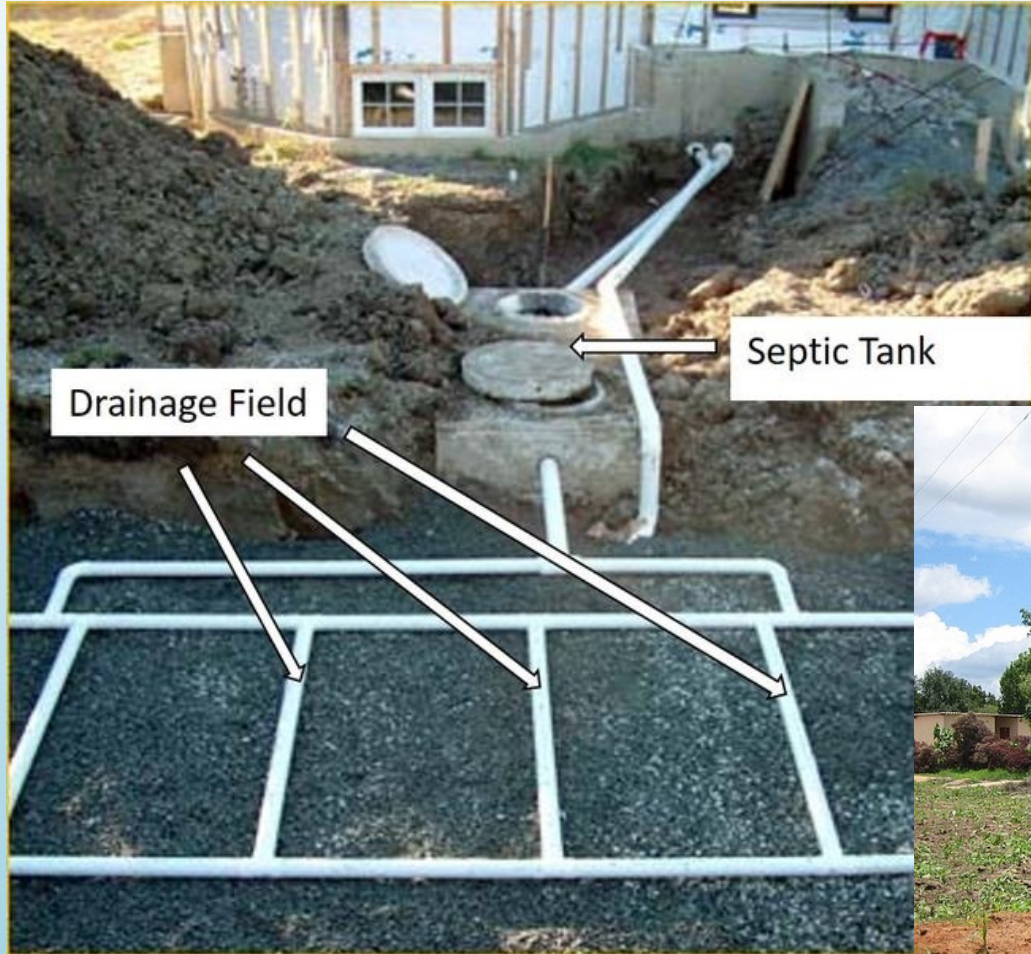


# The gold standard





# Non-sewered sanitation





... and where does it go?



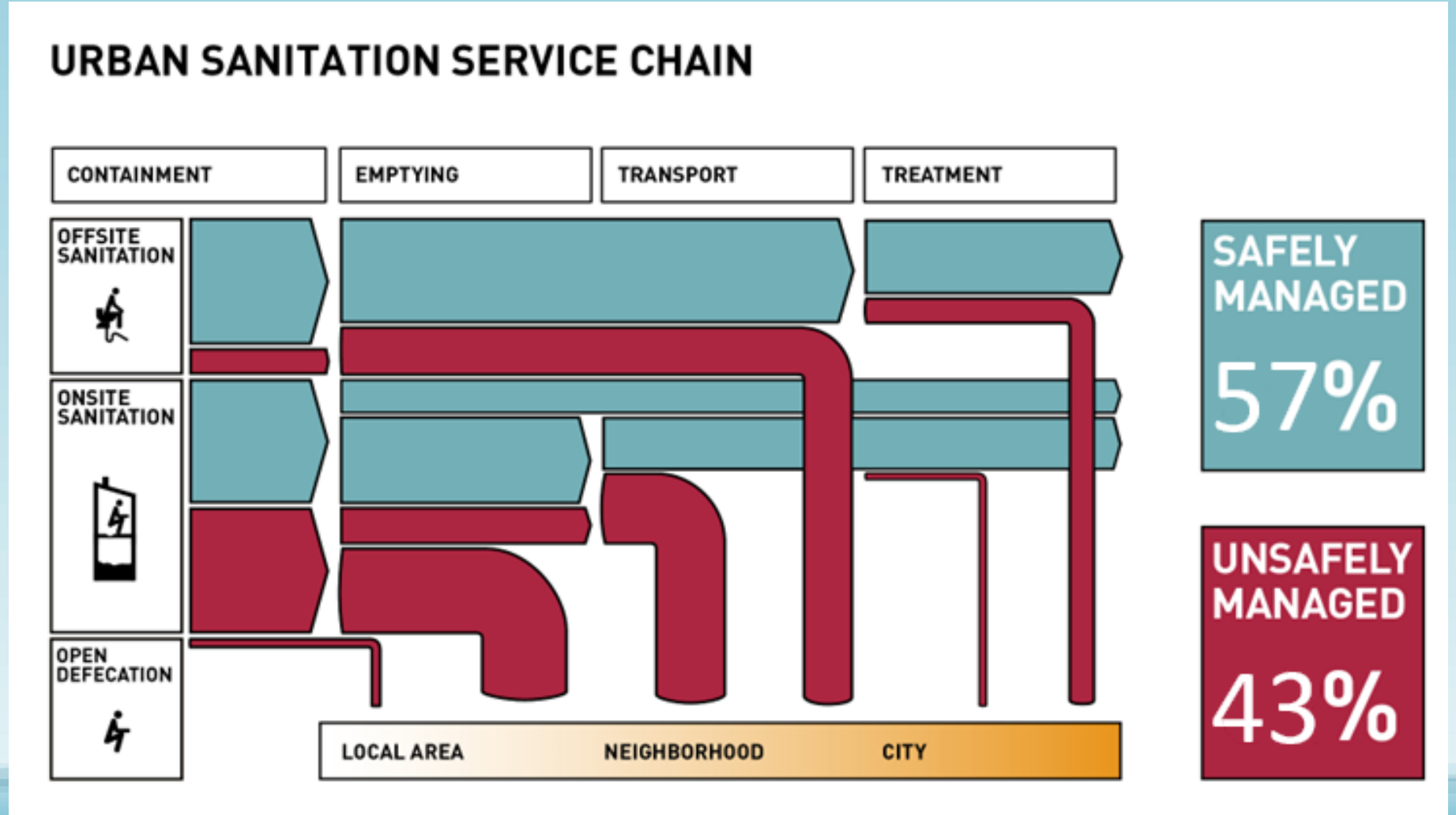




# 3.5B

people globally lack access to safely managed sanitation

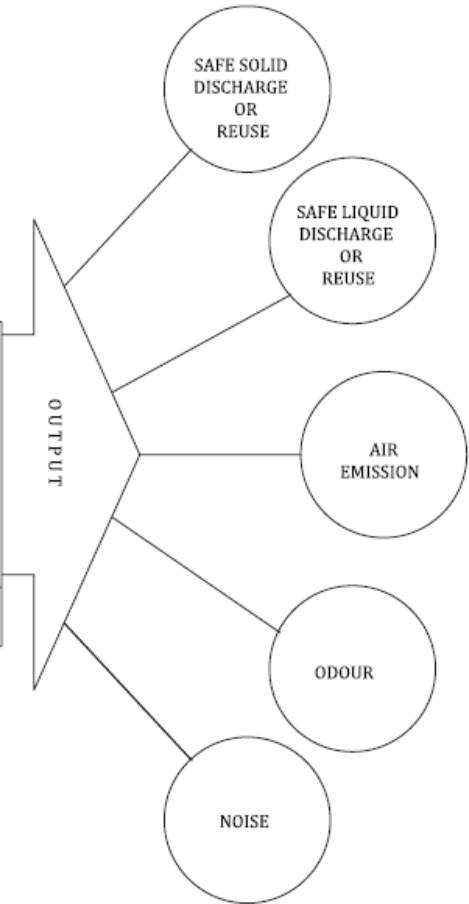
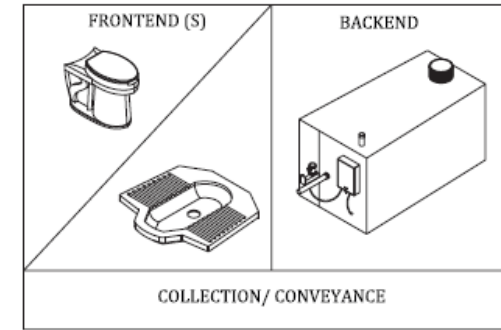
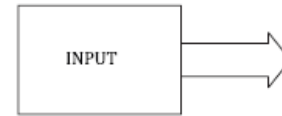
- **At least 35% of people in urban areas**, do not use toilets which provide full sanitation services
- **54% in rural areas** do not have access to safely managed sanitation





**Non-sewered sanitation systems —  
Prefabricated integrated treatment  
units — General safety and  
performance requirements for design  
and testing**

*Systèmes d'assainissement autonomes — Unités de traitement  
intégrées préfabriquées — Exigences générales de performance et de  
sécurité pour la conception et les essais*



**Figure 1 — Concept of a non-sewered sanitation system**



**Summary\* of Requirements: ISO 30500 Non-sewered sanitation systems — Prefabricated integrated treatment units — General safety and performance requirements for design and testing**

Performance requirements		
Environmental Parameters for Effluent	Unrestricted urban uses	Restricted urban uses
COD	≤ 50 mg/l	≤ 150 mg/l
TSS	≤ 10 mg/l	≤ 30 mg/l
Total nitrogen	≥ 70 % reduction	
Total phosphorus	≥ 80 % reduction	
pH	6 to 9	
Human health Parameters for Solid Output dry basis and Effluent ( <i>surrogate</i> )	Maximum	LRV
Bacterial pathogens ( <i>E. coli</i> )	≤ 100 CFU/g or l	≥ 6
Viruses ( <i>MS2 Coliphage</i> )	≤ 10 PFU/g or l	≥ 7
Helminths ( <i>Ascaris suum viable ova</i> )	≤ 1 #/g or l	≥ 4
Protozoa ( <i>viable Clostridium perf. spores</i> )	≤ 1 CFU/g or l	≥ 6



<b>Air emissions</b>	<b>Indoor</b> (time frame: average level)	<b>Stack</b> (time frame: average level)
CO	1 h: 28 ppmv	1 h: 80ppmv
NO <sub>x</sub> (NO + NO <sub>2</sub> )	1 h: 99 ppbv	1 h: 195 ppmv
SO <sub>2</sub>	1 h: 6.8 ppbv	1 h: 68ppmv
CO <sub>2</sub>	1 h: 1 000 ppmv	-
VOC	1 h: 187 ppbv	1 h: 12 ppmv
H <sub>2</sub> S	30 min: 4.6 ppbv	1 h: 1.9 ppmv
PAH	-	1 h: 0.001 ppmv
PM <sub>2.5</sub>	1 h: 25 µg/m <sup>3</sup>	1 h: 10 mg/m <sup>3</sup>
NH <sub>3</sub>	1h: 25 ppmv	1 h: 50 ppmv
<b>Noise</b>	<b>Indoor</b>	<b>Outdoor</b>
Max. at any time (L <sub>pA,max</sub> )	≤ 85 dBA	≤ 85 dBA
Max. average 24 hours (L <sub>EX,24h</sub> )	≤ 60 dBA	≤ 60 dBA
<b>Odour</b>	<b>Indoor</b>	<b>Outdoor</b>
Observation per test day	180	180
Number of panelists	2	2
Number of test days	4	4
Total number of observations	1440	1440
Max. % observations reported as “unpleasant”	≤ 10 %	≤ 10 %
Max. % observations reported as “unacceptable”	≤ 2 %	≤ 2 %



Safety and other general requirements			
<b>Design</b>	Operation conditions	Usage interval	Fire and explosion protection
	Cultural requirements	Risk assessment	Design lifetime
	Marking & labelling	Intended capacity	
<b>Mechanical</b>	Evacuation performance	Water seal	Slip, trip & falling safety
	Tightness and leakage	Structural integrity	Moving & rotating parts safety
	Underground systems	External impacts	Ease of cleaning & operations
	Pressure & vacuum equipment	Backflow prevention	Material durability & fire resistance
	Cleanability of surface	High and low temperature surfaces safety	
<b>Electrical</b>	Control system sequence	Energy discharge	Electrical & electronic equipment

\* Summary only, please see ISO 30500 for complete requirements



# Technology & Commercial Demonstrations - Community

## India

- USF (through Elefo Biotech) I-CRT at East Delhi Municipal Corporation, Delhi
- USF (through Eram Scientific) Newgenerator I-CRT at Kotivakkam Beach, Chennai
- SCG (through Swachh) I-CRT at Rabindra Sarobar (bio-diversity park), Kolkata
- SCG (through Banka Biolo) I-CRT at Kovalan Nagar, Chennai

## China

- 1 Clear b-CRT unit in a rural village (DaHuaShan Village)
- 9 EcoSan b-CRT units in rural villages (outside Beijing; and Sichuan, Liaoning, and Gansu provinces)

## South Africa

- 1 EnviroOptions b-CRT unit in an informal settlement (Slovoville Informal Settlement, City of Johannesburg) – *Clear technology*
- 1 WEC Projects I-CRT unit in an informal settlement – *USF technology*
- 4 EnviroOptions b-CRT units in public schools (started 08/2020) – *Clear technology*
- 1 WEC Projects I-CRT unit in public schools – *USF technology*
- 1 Prana I-CRT unit in an industrial building – *SCG technology*

## Other

- 5 SCG I-CRT units in industrial settings in Thailand (DOS factory, policy flats, tourist site, etc.)
- 1 SCG I-CRT unit in a school (Minburi Muslim School), Bangkok, Thailand
- 1 SCG b-CRT unit, Bangchak Gas Station, Chiang Mai, Thailand (started 10/2020)





The NEWgenerator system is a promising alternative to dangerous pit and chemical toilets





# Technology & Commercial Demonstrations - Household

## India

- G2RT

## China

- 4 EcoSan gb-HRT in Jiangsu Province as septic tank replacement for families of 3-5

## South Africa

- 10 Prana I-HRT units in an informal settlement (Durban, 20 additional units to be commissioned) – *SCG technology*
- 1 Prana I-HRT unit in a private residential household in Johannesburg – *SCG technology*
- G2RT

## Other:

- SCG I-HRT in Bandung, Indonesia
- Cranfield Circular Toilet in Marysville, WA









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Edition 4

**SOUTH AFRICAN NATIONAL STANDARD**

**The application of the National Building  
Regulations**

**Part Q: Non-water-borne means of sanitary  
disposal**

**WARNING**  
This document references other  
documents normatively.

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In addition to chemical toilets and ventilated improved  
pit latrines,

paragraph 4.5 identifies SANS 30500 compliant toilets as  
acceptable alternative

<https://store.sabs.co.za/catalog/product/view/id/2145147/s/sans-10400-q-ed-4-00/>



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## Households Reinvented Toilets Products/Technologies

All systems use combustion for solids processing, recycle water for flushing, and can fit indoor bathroom, or configured to have the treatment systems outside, in cold or dry climate.



Designed by Georgia Tech  
Tech transfer/licensing in  
process



Designed by Cranfield University,  
licensed by Huatie and JOMOO



Designed by Samsung / tech  
transfer/licensing in process



Learn more....

[ISO 30500:2018 – Non-sewered sanitation systems – Prefabricated integrated treatment units – General safety and performance requirements for design and testing](#)

[Georgia Tech - G2RT video](#)

[Samsung videos](#)

[Sustainable Sanitation Services](#)

[Why the world deserves a better toilet](#)

**Thank You!**