Institutional & technical opportunities & challenges for mainstreaming urban rainwater harvesting (RWH) systems – UK perspectives

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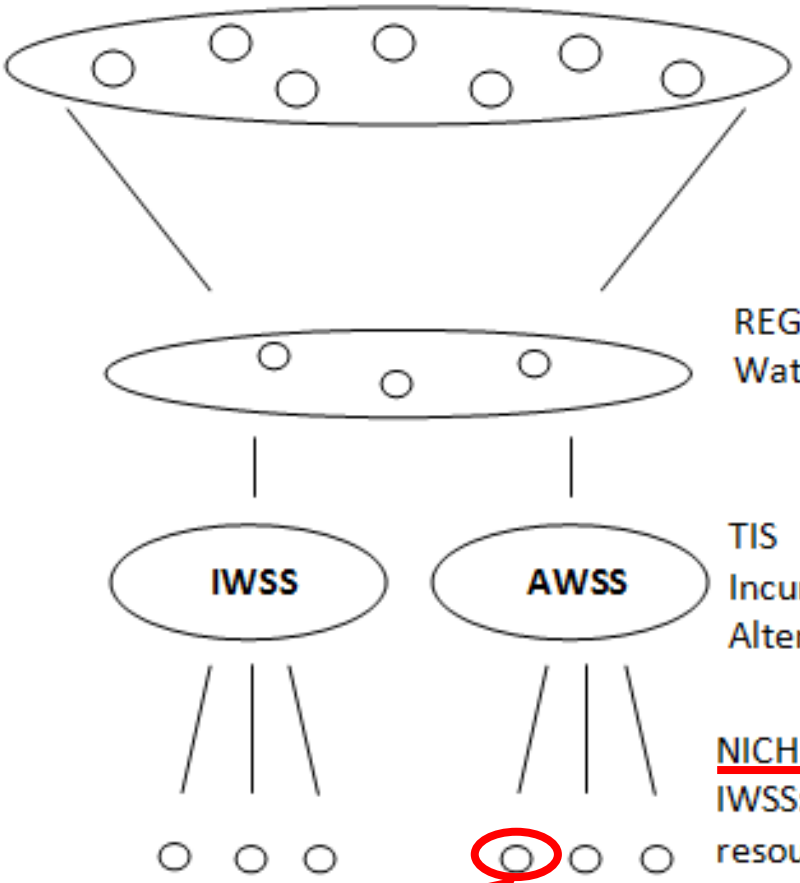
Where RWH fits in the UK water landscape



LANDSCAPE
Water-using practices: showering, toilet flushing, car washing, garden watering, laundry etc

REGIME
Water services: supply, sanitation, drainage

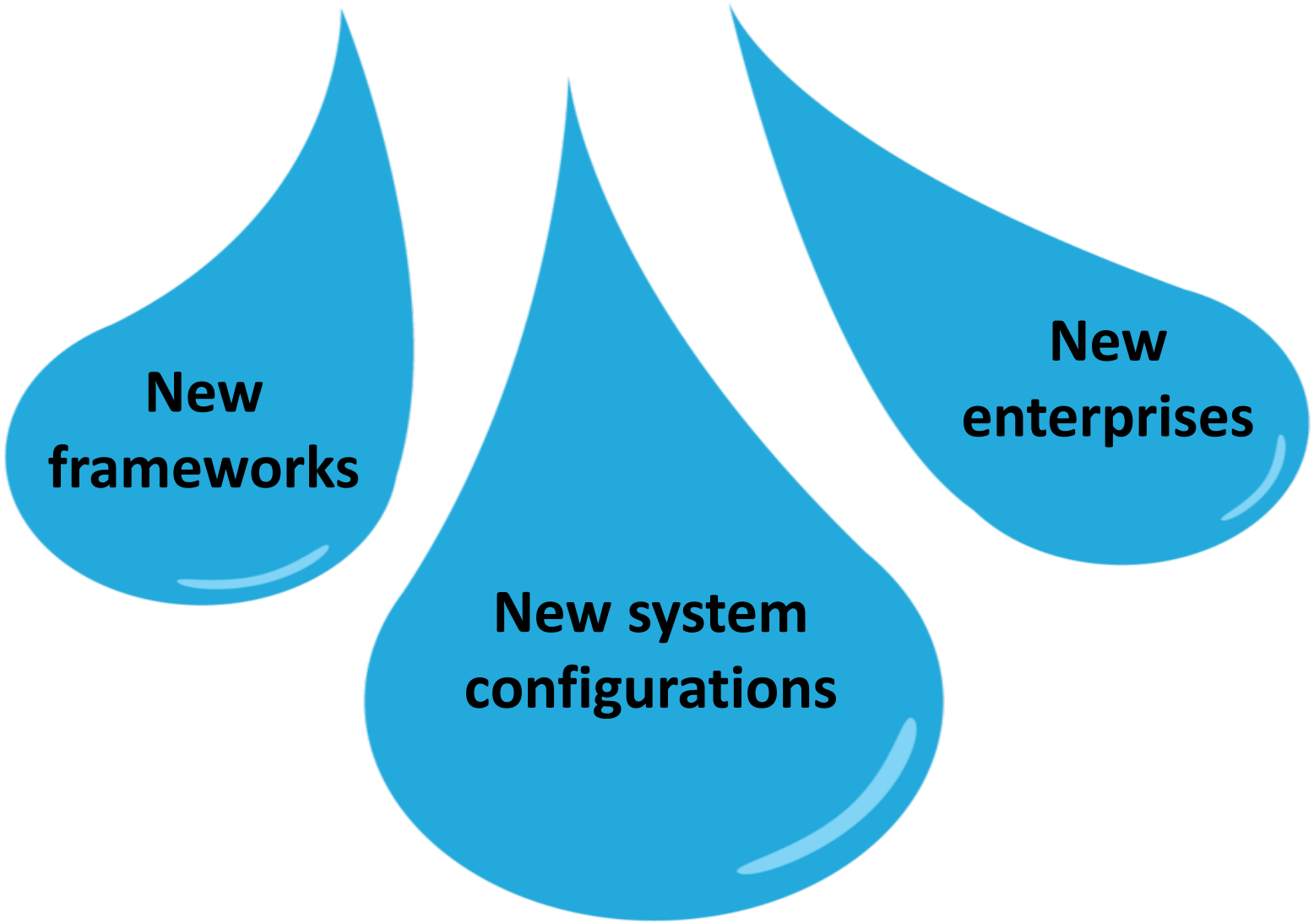
TIS – technological innovation system

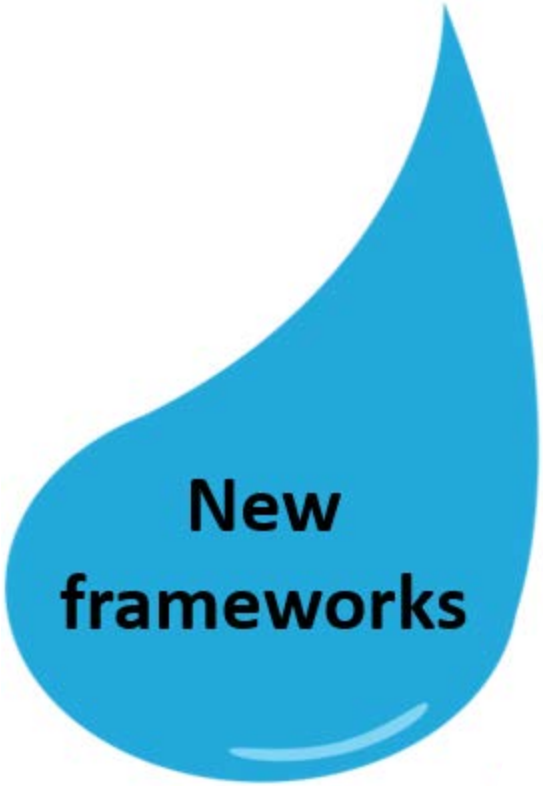
TIS
Incumbent water supply system (IWSS)
Alternative water supply system (AWSS)

NICHE
IWSS: rehabilitation; water efficiency; new resources (reservoirs, abstractions)
AWSS: RWH, greywater reuse, sewer mining

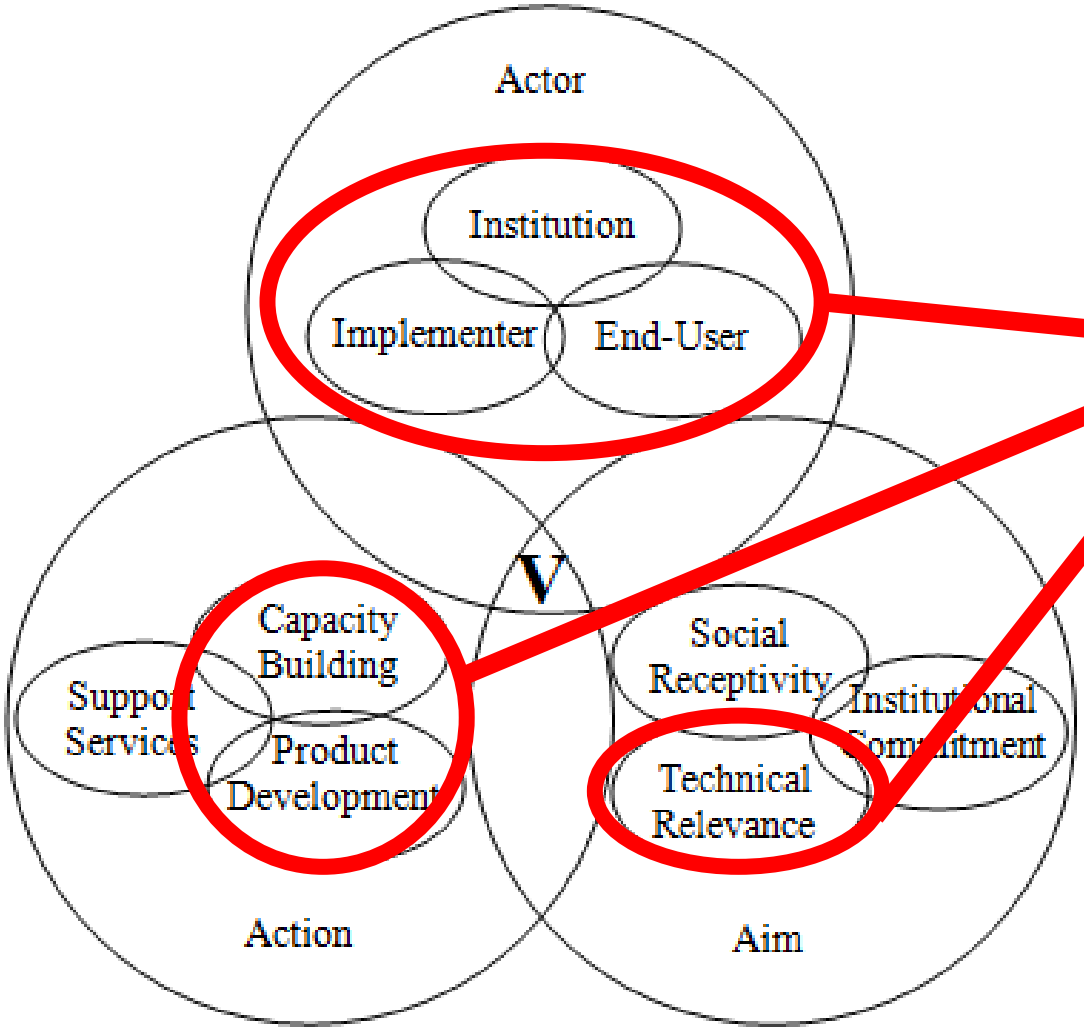
You are here

What's new in UK RWH?




New
frameworks

Vision for mainstreaming RWH



To date we have focused our ongoing on research these aspects

Ward *et al.* (2012)

Ward, S., Barr, S., Butler, D. and Memon, F. A. (2012) Rainwater harvesting in the UK: socio-technical theory and practice. *Technological Forecasting and Social Change*, 79 (7), 1354-1361.

DOI: 10.1016/j.techfore.2012.04.001

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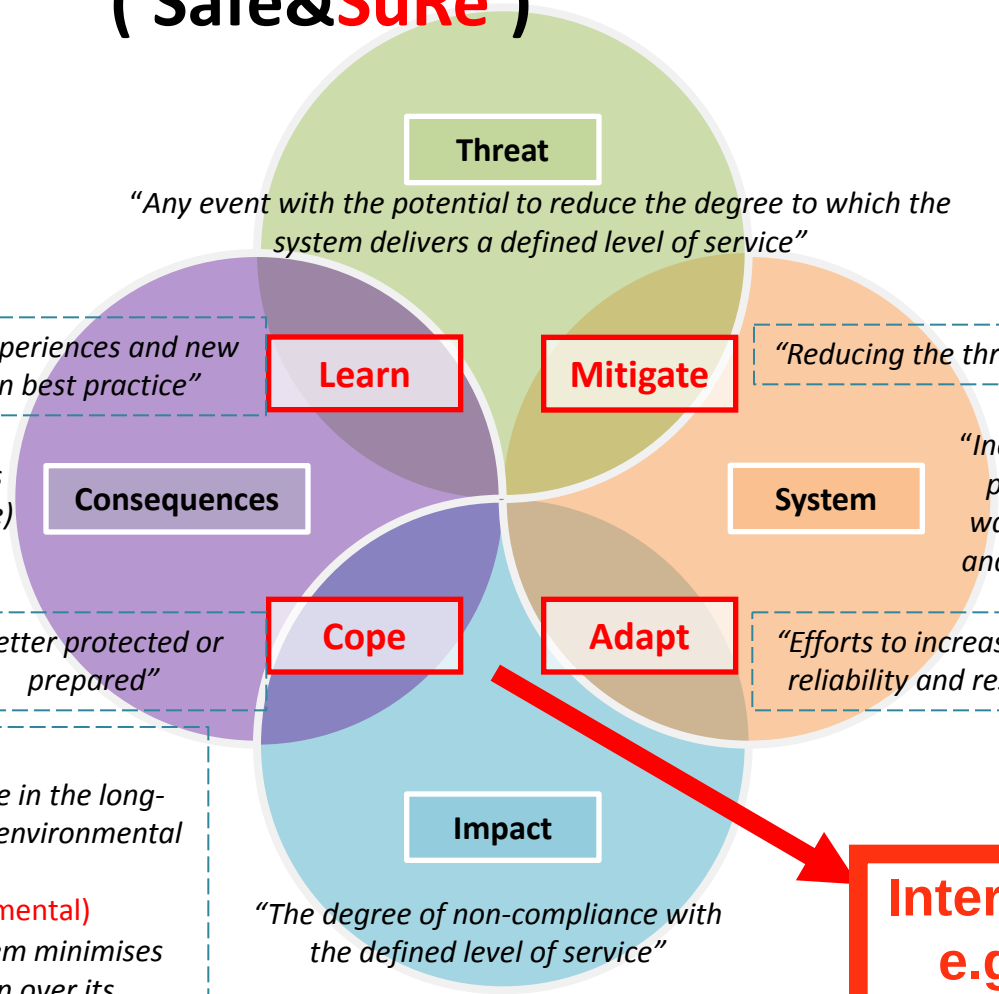
Safe&SuRe Water management

Reliable, Resilient, Sustainable water management ('Safe&SuRe')

Safe ≈ Reliable - *"the degree to which the system minimises level of service failure frequency over its design life when subject to standard loading"*:
Rel = min (**failure**: *probability*)



Interventions e.g. RWH

Sustainable (Su) - *"the degree to which the system maintains levels of service in the long-term whilst maximising social, economic and environmental goals"*:
Sus = max (**capital**: social, economic, environmental)

Resilient (Re) - *"the degree to which the system minimises level of service failure magnitude and duration over its design life when subject to exceptional conditions"*:
Res = min (**failure**: *magnitude, duration*)

Butler D, **Ward** S, Sweetapple C, Astaraie-Imani M, Diao K, Farmani R, Fu G. (2016) Reliable, resilient and sustainable water management: the Safe & SuRe approach, *Global Challenges*, 1, 1, 63-77. DOI:10.1002/gch2.1010

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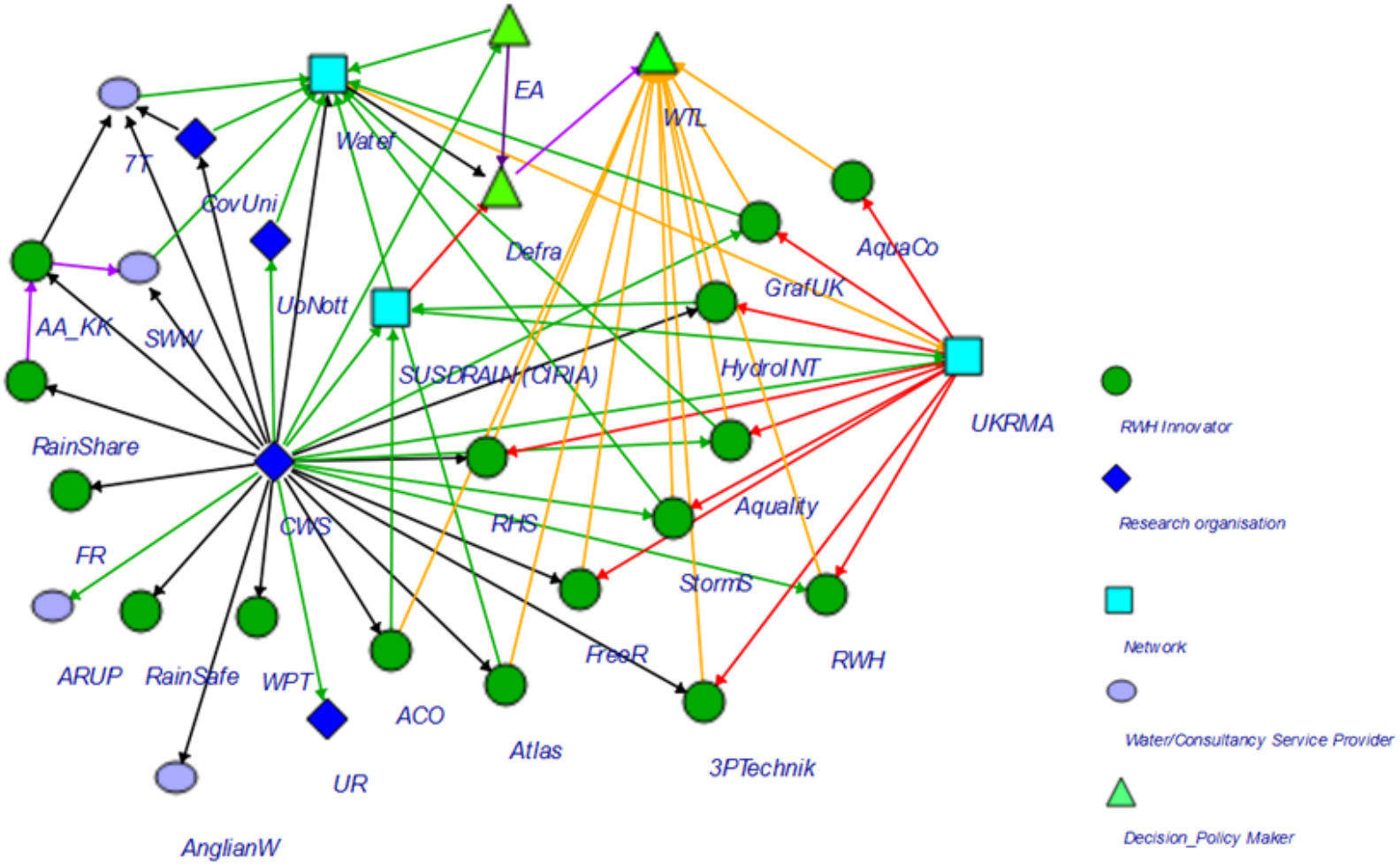
Safe&SuRe Water management

Safe&SuRe RWH Institutions/organisations?



Relationships: Green = knowledge exchange; Black = research; Purple = action; Red = Advocacy/lobbying; Orange = listed by WTL

Ward S and Butler D. (2016) Rainwater Harvesting and Social Networks: Visualising Interactions for Niche Governance, Resilience and Sustainability, *Water*, 8, 11, 526-551. DOI:10.3390/w8110526

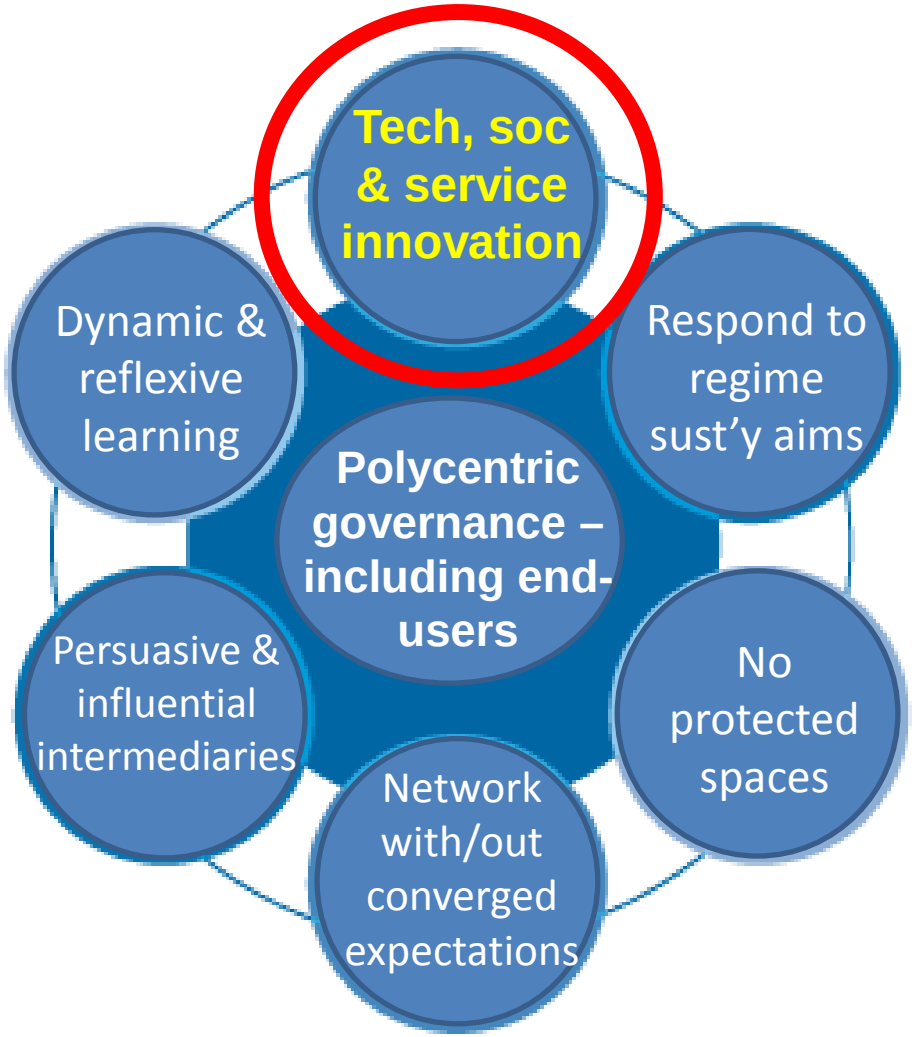
Safe&SuRe Water management

UK RWH niche – strong & weak points?

1. **Strong tech: RWH innovators**
2. Strong networks & forums
3. Plenty of innovation *without* financial incentive
4. Rise to challenge of meeting new drivers

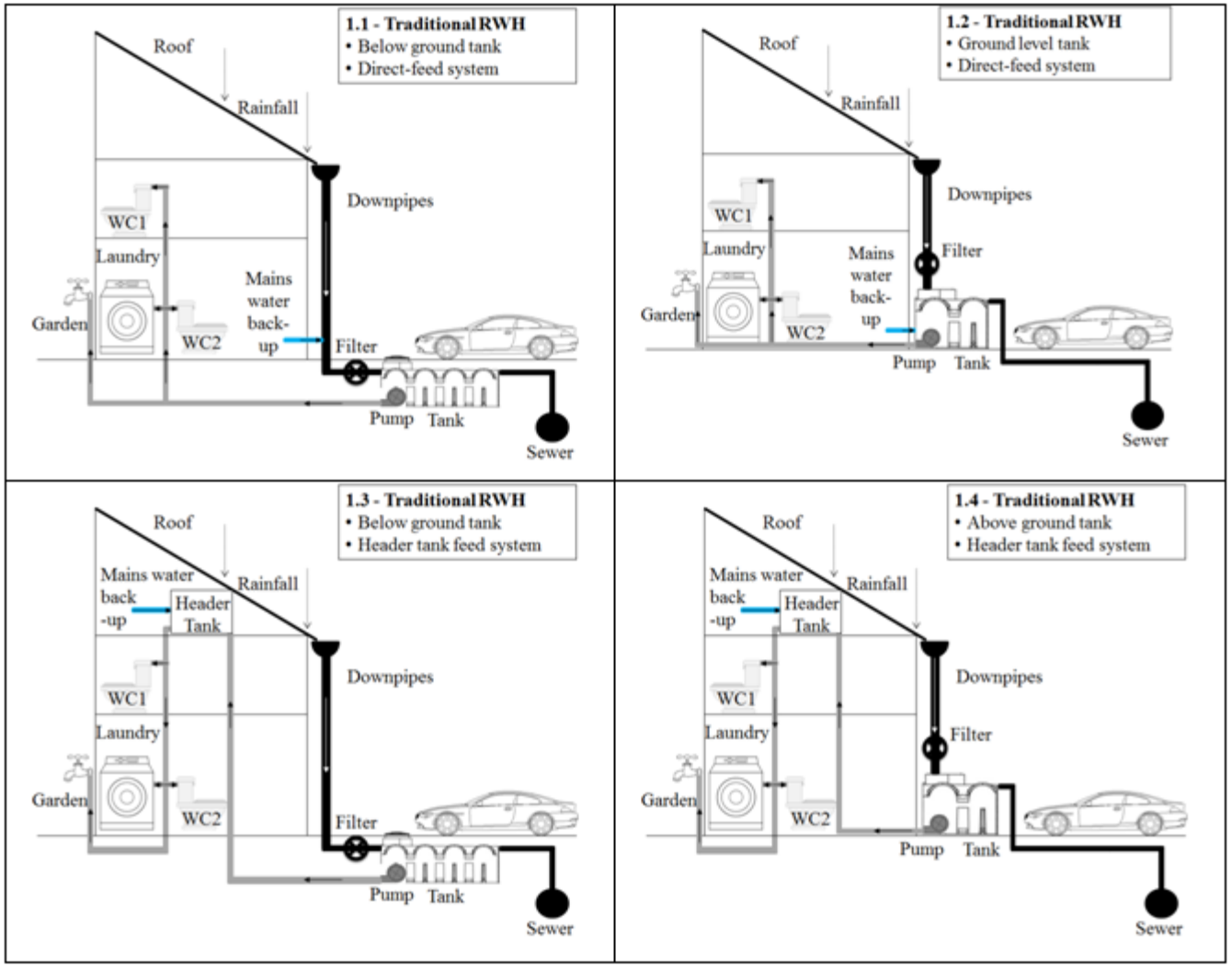
1. Small, dense, disconnected from regime
2. Heavy bias of RWH innovators & overlapping networks
3. Innovation in isolation – ignored by regime
4. Policy/decision makers (regime) are poorly represented
5. Regime focuses on evidence of meeting (undefined) drivers e.g. energy consumption (no target/s)
6. **End-users are not represented**
7. **Few social enterprises**

Safe & SuRe niche *governance* *(i.e. not management)*




New system
configurations

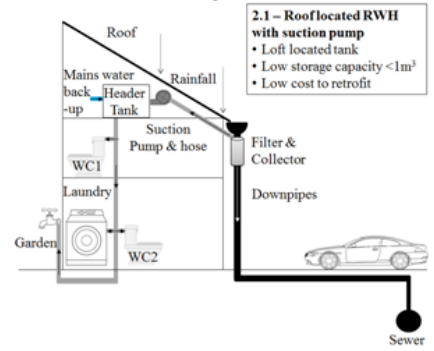
‘Old’ system configurations



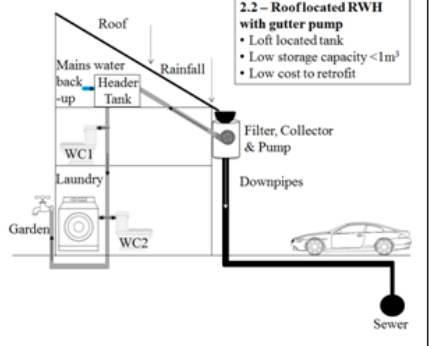
- Mostly German tech – does it really fit the UK?
- Designed to maximise water saving – what about other drivers?

New system configurations

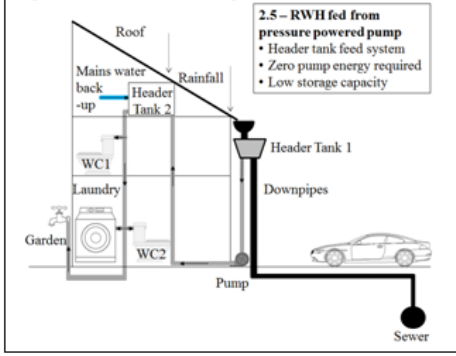
The FlushRain RWH System



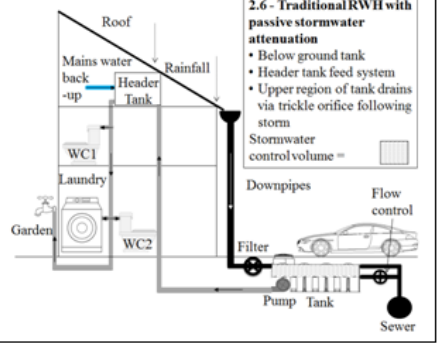
The Aqua Harvest and Save System



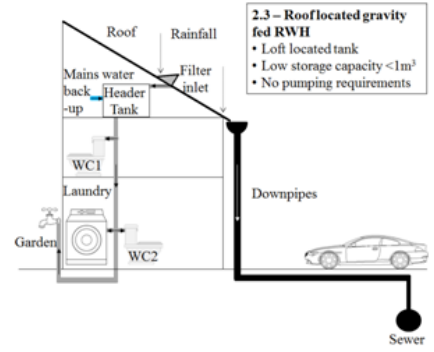
Hydromentum, Passively Powered RWH



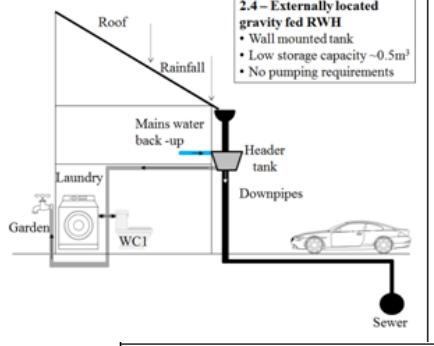
Passive Stormwater Attenuation RWH



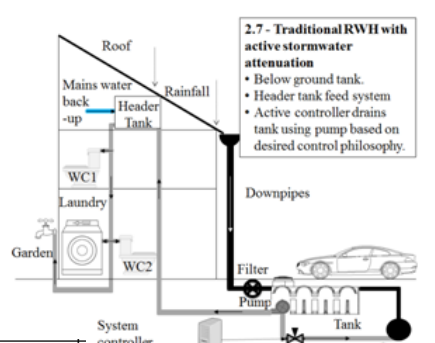
Atlas Water Harvesting



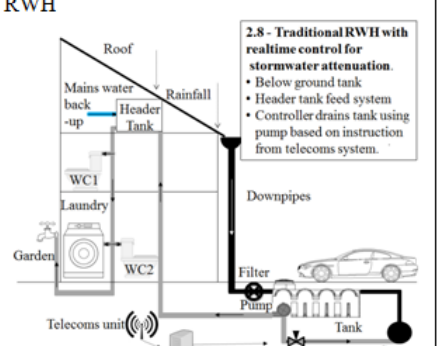
Rainbeetle / Aqualogic Rain Catcher



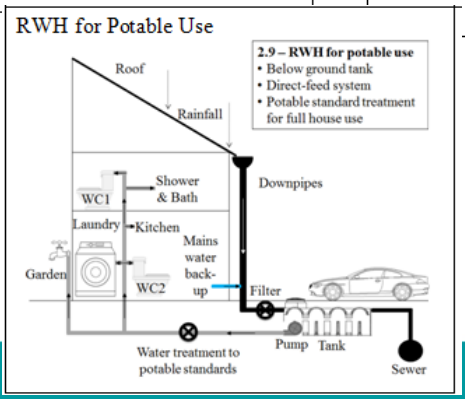
Active Stormwater Attenuation RWH



Real-time Control Stormwater Attenuation RWH



RWH for Potable Use



Melville-Shreeve P, **Ward** S, Butler D. (2016) Rainwater Harvesting Typologies for UK Houses: A Multi Criteria Analysis of System Configurations, *Water*, 8, 4, 129-129, DOI:10.3390/w8040129

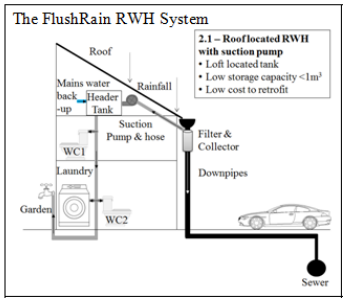
Safe&SuRe Water management

Meeting multiple drivers with new configurations

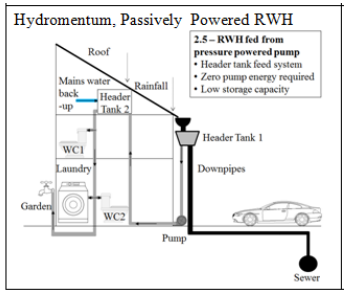
Water efficiency

Reduced stormwater

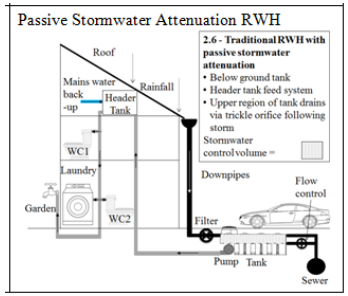
Reduced spills

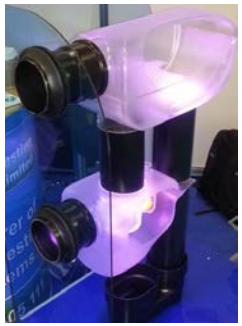


FlushRain



Hydromentum™





Increasing efficacy (technical relevance) for end-users

Table 2. Potential end-use factor

Factors	sh	wb	to	wm	snk	dw	it[4]	et[4]
u.a.rw[1]	0.44	0.56	0.97	0.79	0.88	0.41	0.97	0.97
u.a.gw[1]	0.30	0.37	0.97	0.57	0.73	0.23	0.93	0.90
Consumption[2]	0.21	0.04	0.20	0.17	0.10	0.16	0.06	0.03
p.eu.f.rw[3]	0.39	0.46	0.82	0.67	0.72	0.36	0.79	0.78
p.eu.f.gw[3]	0.32	0.39	0.94	0.59	0.73	0.26	0.90	0.88

Note: [1]u.a.(): user acceptability scaled from 0 to 1 for rainwater (rw) and greywater (gw),based on survey results; [2]indicated as percentage of total household consumption, based on (CRA, 2001); [3] p.eu.f.(): potential end-use factor = [u.a.() * 0.8] + [consumption * 0.2]; [4] (sh) shower, (wb) wash basin, (to) toilet, (wm) washing machine, sink (snk), dish washing (dw), (it) interior tap, (et) external tap (i.e. garden), End uses it and et are for cleaning and irrigation only..

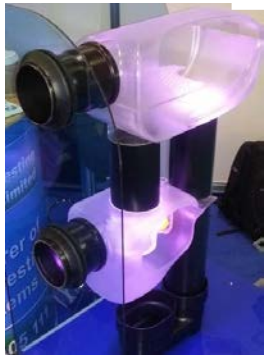
For a residential household in Bucaramanga (Colombia)

Supply-demand balance
Energy consumption

Financial feasibility – overall benefits vs. drainage, energy, construction, operation & maintenance costs

Payback period of ~23 years – considered too high in UK

What happens once we have new configurations?




New
enterprises

Community-based/social enterprise

energyshare

landshare
Connecting growers to people with land to share

NCS
National CarShare

If we can do it for energy & travel, why not water?

RainShare

RainShare in action……

UnLtd Award Winner

swig awards 2015

Wednesday 25th November 2015
24 Greencoat Place, Victoria, London

swig

bre

infocus
WOMEN IN INNOVATION

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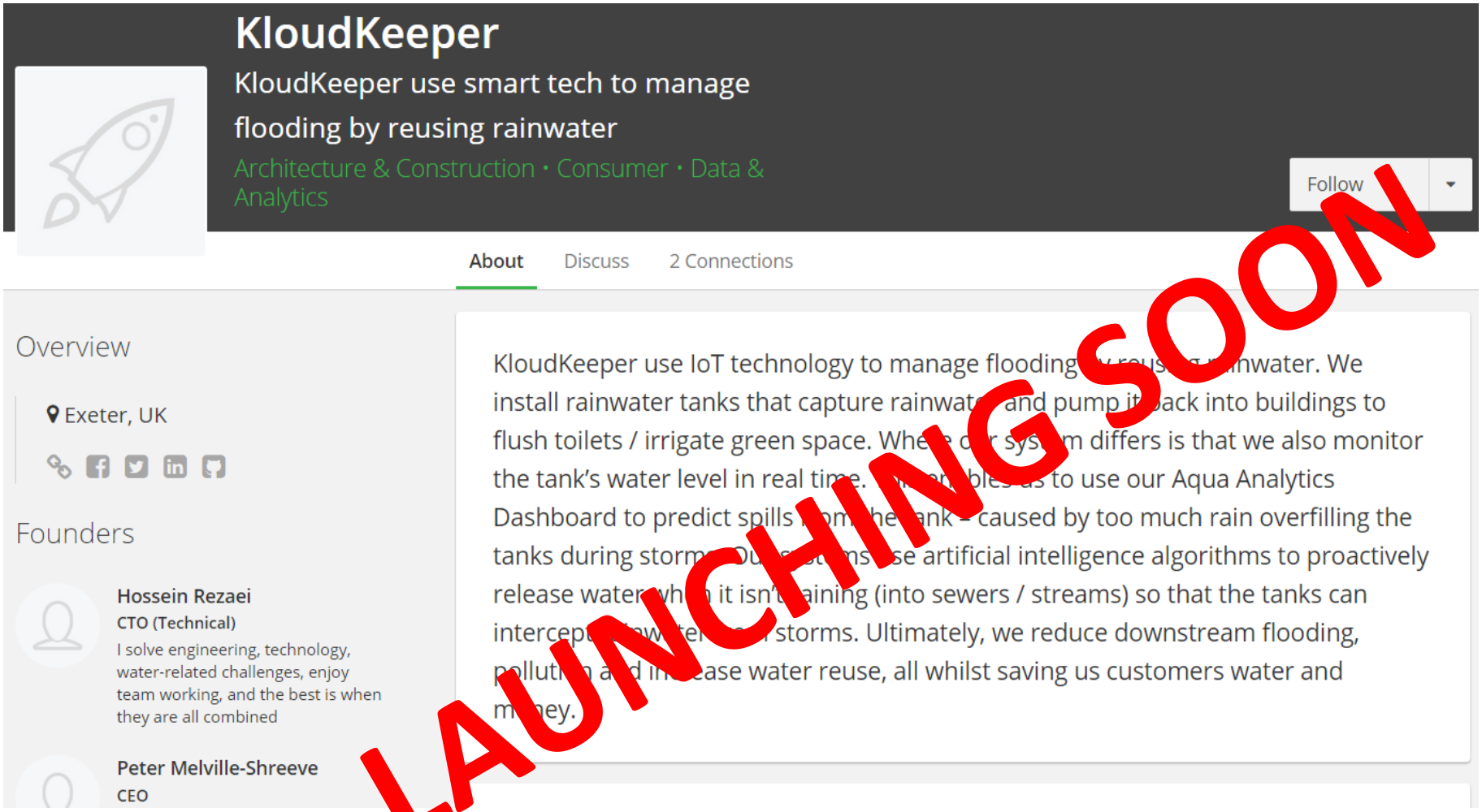
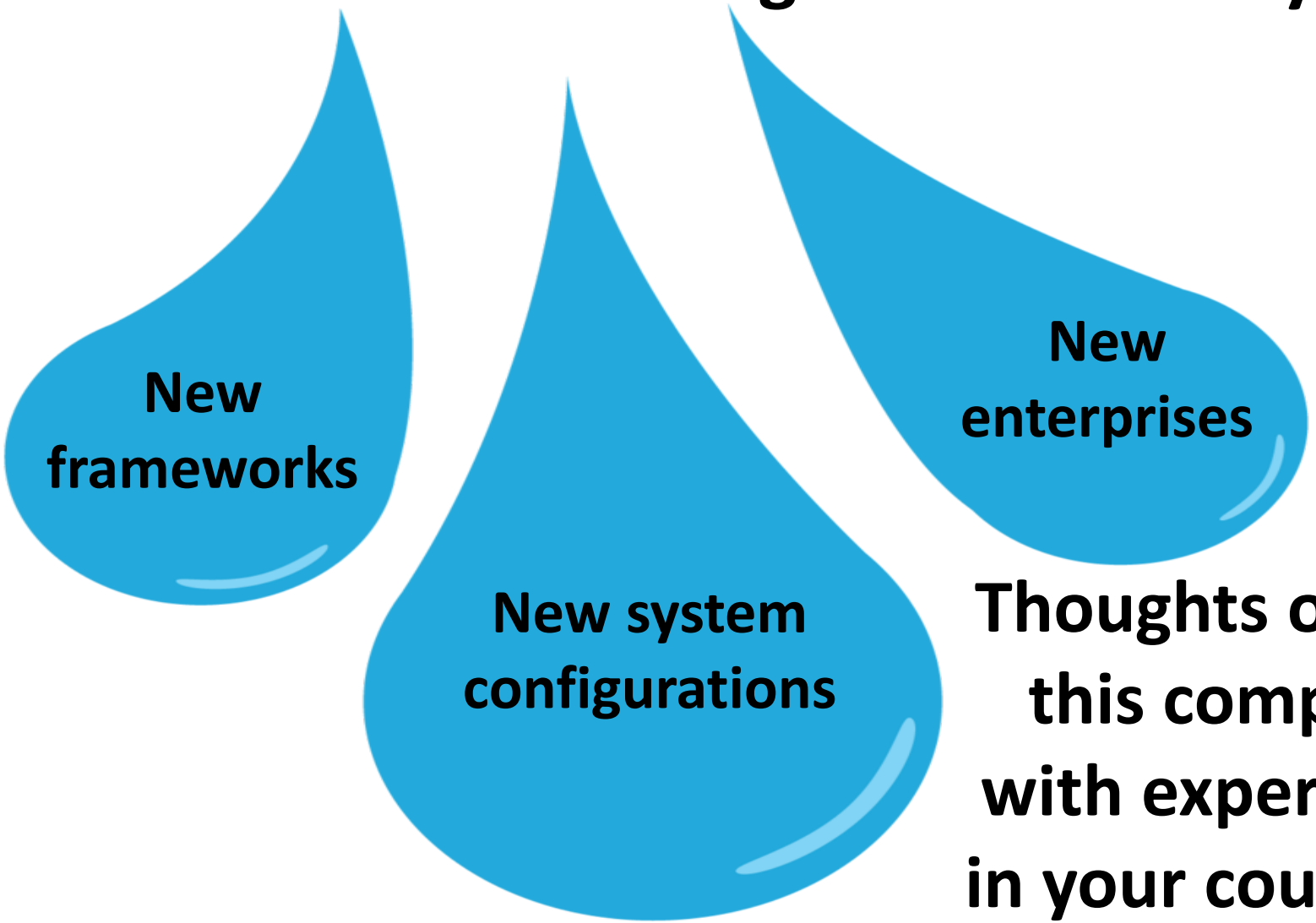
WARD, S. (2016) Co-watering the grassroots: combining community participation and social entrepreneurship to share roof runoff. *Water Efficiency in Buildings Network Conference*, Coventry, 7-9 September.

Commercial/private enterprise



UK RWH is moving forward slowly……



Thoughts on how this compares with experiences in your countries?