Risk: So much innovation, and yet so risk averse: How is Risk perceived as a barrier to innovation in the Water Sector, and What might be done about it?

Jeanette Garwood D.Phil.
SUMS & TWENTY65

TWENTY65: Theme 7 Innovation by Collaboration

* Background: Thinking about "Perceived Risk" and Innovation in the Water Utilities Sector (WUS)
* Whether all stakeholder groups can give examples of innovation
* Then
* What we found to be "Perceived Risk" to and within WUS Innovations for the Stakeholder Groups
* Communalities and Differences across Stakeholder Groups
* What we might do to reduce the feelings of "Perceived Risk" using findings from the published literature

“Risk Perception” in WUS

* Fitting into the wider scheme
* Different stakeholders interviewed
* Asking them about their experiences of innovation
* Thinking about Porter’s and Birdi’s (2018) systematic review and what “Low risk, or willingness to experiment” might mean.
* What emerges from our interviews, rather than asking specific questions about different kinds of innovation

“Risk Perception” in WUS: “Risk” “Risky” “Risk Averse”

* Everyday meaning of risk makes work complex
* We use **Risk** as the ***hazard*** itself that will cause some unpleasant, or unwanted outcome.
* We use **Risk** as the ***event*** that is the unpleasant, or unwanted outcome.
* We use **Risk** as the use ***Technical Risk*** the probability of some unpleasant, or unwanted outcome
* We use **Risk** as the ***threat that a project will not go as planned,*** that is fail to reach an intended outcome

“Risk Perception” in WUS

* “Risk Perception” = the function of the general properties of a hazard
* Your hazards and my hazards (both as professionals) will not be the same, necessarily.
* Dobbie and Brown (2014) WUS professionals realised that different WUS professionals show different “Risk Perception” patterns to the same innovations.
* When professionals are not experts in a domain they tend to have “Risk Perception” capacities more of a general scientist, than of a specialist (Silvia & Jenkins-Smith, 2007) – they are sensitive to scientific data, and use numerical information, but more conservative (Fischoff, et al, 1978; Peters et al, 2008).

"Risk Perception" in WUS: Dobbie and Brown (2014)

* Suggest that there are "objects at risk" and "risk objects"
* Objects at Risk = safe drinking water; rivers; wider environment; reputation (own, company)
* Risk Objects = water innovations: urban water collection systems; new pipeline materials; water treatment systems
* They propose that different stakeholders, and even different experts inside different stakeholder groups, will show different "Risk Perception" patterns, and that these could influence how innovations were taken up or gained traction – they found this for Australian WUS (Dobbie et al 2016).

"Risk Perception" in WUS: Innovations…

* Using transcripts from our interviews was asked
* 1) Do all contributing stakeholders report experience of innovation in WUS?
* 2) Do "risk perceptions" of an innovation vary according to the stakeholder informant group?
* 3) How are the "perceived risk" (or hazards) characterized: that is as threats to public health, environment, or regulatory, financial or operational failings?
* Then, what can we do to help increase testing, implementation and traction?

‘Risk Perception’ in The Water Utilities Sector and Innovation

* ***All interviewees*** also gave at least one example of an ***innovation through collaboration*** that they had directly experienced
* ***All of our interviewees*** either spontaneously mentioned, or agreed with the idea that the Sector is ***‘Risk averse’***
* ***Everyone*** mentioned ***not*** doing things which might ***threaten drinking water*** or ***rivers***
* Can we reconcile this conundrum with our data?
* Yes… I think we can

Innovations by collaboration

* What kinds do innovation did people share?
* Bill and debt management (Water Co)
  * Working with debt charities,
  * sharing new skills with call-centre staff
* Water flow sensors (Water Co; Supply Ch; Academics)
  * Software house
  * Sensor manufacture
* Community Action to protect catchment areas (Reg.)

Innovations by collaboration

* Energy recovery (Water Co; Supply Ch; Academics)
* Pipeline valves (Water Co; Supply Ch; Academics)

* Machine Learning (Supply Ch)
* Oil and metals trapping material (Trade Body)
* Satellite modelling (Trade Body)

* So – there are innovations – but as Thomas and Ford (2005) suggest – not as many as there might be…

What makes a "Risk Perception" for an "Object at Risk"

* If an innovation ***might*** be perceived to place at risk any of the following all Stakeholder Groups showed "risk perception":
* ***Public health – drinking water***
* ***Environment – rivers***
* ***Violation of standards – reputation***
* ***Violation of standards – fines***
* ***Impact failure – innovation failed to do what was intended***

What makes a "Risk Perception" for an "Object at Risk"

* Innovations with drinking water supply, and moving potable water, that might affect public health
* Innovations with wastewater that might pollute, or interfere with the wider environmental quality
* Innovations which might not pay for themselves within 3 or 5 years (ROI)
* Innovations which might not do what was intended as well as intended

What was called ‘Risky’

* Innovations not tested on own sites, but accepted elsewhere
* Innovations which could go above budget in financially uncertain times
* Innovations perceived to affect customers
  * Innovations which might cause a loss of service
  * Innovations which might miss other service targets
* Projects which can’t or don’t scale-up

Does "Risk Perception" Vary Across Stakeholders

* Yes
* Academics are more concerned about the wider environment being affected by innovations
* Water Companies are concerned about not reaching strategic organizational goals, and innovations not fitting with compliance frameworks,
* and supply chains about risks to staying solvent - some SMEs stay outside Innovation in WUS because of the AMP Cycles….

Acceptable Hazards?

* “Low risk” appears to be found above ground, less likely to affect potable water
* Wastewater processes which recapture energy or resources, but are not perceived to affect the environment in any negative way.
* This can mean that some innovations and some opportunities to make better, more effective services will not occur.
* Pipe technology in particular might be at ruled out because it could affect water quality – give experience with pipeline linings and plastics in the past, this is not unreasonable.

What makes a "Risk Perception" for an "Object at Risk"

* Water purity for drinking, and the environment…
* ***Responsible stagnation*** - should not change until something much better comes along (Gutson, 2015) (innovation more troublesome than beneficial)
* ***Precautionary Principle*** *when specialists are very cautious about innovation* (Silva and Jenkins-Smith, 2007)
* Laudable…. But we have BIG challenges to meet

What can be done to reduce "Perceived Risk" with Innovations

* Factual reassurance
  * ***Few public health events*** over last 75 years & they tend to be from ***private wells and springs*** (Galbraith, Barrett, & Stanwell-Smith, 1992; Said, Wright, Nichols Reacher, & Rutter, 2003; Smith, Reacher, Smerdon, Adak, Nichols, & Chalmers, 2006).
  * American cases after recent flooding in Austin, Texas, ***recovery positive*** after a Need-to-Boil notice (Mulki, 2018).

What can be done to reduce "Perceived Risk" with Innovations

* People will prefer their own biases to data based reasoning, however good the data (Sloman & Lagnado, 2015).
* ***Reframing the problem*** (Kahneman, 2011), where reliable findings permit: ***emphasising*** the ***positive*** side of any technical risk level, and ***reducing*** the less ***positive***, using 'risk-as-feeling' to advantage.
* ***Objective knowledge*** about water processes will aid water professionals in ***accepting innovations***, the greater their own knowledge, the easier making a good case for innovation will be (Washburn & Skitka, 2018).

What can be done to reduce "Perceived Risk" with Innovations

* Point out ***hazards currently known and managed*** earlier in the water cycle from agriculture, peat lands; surface run off from roads, and so on (Munro et al 2019; Wilkinsin et al 2018)
* Give information on the current ***management*** of surface water and motorway run off, for example (e.g. Pointer, Williams & May 2004; Maltby et al 1995; Robson, Spence, & Beech, 2006).
* Indicate that these ***are managed***, and that people are likely to ***place*** their ***own benefits*** above the "perceived risk" of professionals.

What can be done to reduce "Perceived Risk" with Innovations

* ***Real Hazards***, currently not registering, or not regulated (yet) so not yet perceived
* E.g. endocrine disrupters, pharmacy drugs, and toiletry products. (e.g Magi, Di Carro, Mirasole, & Benedetti 2018; Vilela Bassin, & Peixoto, 2018).
* Place more ***emphasis*** on the possible hazards associated with ***not removing substances*** from water, and influences of climate change (Fleming, Leonardi, White, Medlock, Alcock, Macintyre,... & Taylor,.2018).

What can be done to reduce "Perceived Risk" with Finance

* Financial reassurance is more difficult, because of the rules (Ofwat…)
* Prior research suggests that ***financial targets*** may provide a ***block*** to new methods (Beatham, Anumba, Thorpe, & Hedges 2004).
* Giving water managers ***specific information*** about both ***water quality*** maintenance, and ***financial impact*** of water transfers can change the acceptability of this kind of in innovation (Mozenter, Yates, Schnier, Hughes, & Characklis., 2018; see also Wehn, & Montalvo, 2018).
* Issues with ROI over time remain

What can be done to reduce "Perceived Risk" - Reputation

* For Dobbie et al (2014 and 2016) ***young professionals*** were often concerned about their ***own personal professional reputation***, our respondents cared about the ***public's view of the water company*** (all groups).
* New developments, and any actual system failures, or even 'hiccups', should be ***shared*** on social media as ***quickly as possible***
* ***Community experts*** are especially ***important*** to this process (Jagiello & Hills 2018; Hills 2018).
* ***Company experts*** on fast acting sites, e.g. ***Twitter*** (Fellernor, et al 2018), and the ability to ***direct blogging*** is also helpful
* But do not forget ***older methods*** such as writing, newspapers and radio communication, and emailing, where addresses are held– when a situation is ***solved say so***, too! (Mulki, 2018)

What can be done to reduce "Perceived Risk"- Failed Outcome

* "Low risk, or willingness to experiment"….
* The fact that all our Stakeholder Groups saw failure as a "Perceived Risk" is a wake-up call.
* Not all innovations can work, that's why they are trialed…
* Several companies do note failed trials in their annual reports – the goal here is to ***learn*** from what doesn't work – **they did learn**
* Our informants ***did learn*** from their ***'failed'*** trials.
* ***Scaling up*** was a real problem – ***an innovation bank,*** and more ***help*** finding ***larger manufacturing companies*** to work together would help with this.

Questions

* Thank you

* J.E.Garwood@Sheffield.ac.uk

References

* *Beatham, S., Anumba, C., Thorpe, T., & Hedges, I. (2004). KPIs: a critical appraisal of their use in construction. Benchmarking: an international journal, 11(1), 93-117.*
* *Dobbie, M. F., & Brown, R. R. (2014). A framework for understanding risk perception, explored from the perspective of the water practitioner. Risk analysis, 34(2), 294-308.*
* *Dobbie, M. F., Brown, R. R., & Farrelly, M. A. (2016). Risk governance in the water sensitive city: Practitioner perspectives on ownership, management and trust. Environmental Science & Policy, 55, 218-227*
* *Fellenor, J., Barnett, J., Potter, C., Urquhart, J., Mumford, J. D., & Quine, C. P. (2018). The social amplification of risk on Twitter: The case of ash dieback disease in the United Kingdom. Journal of Risk Research, 21(10), 1163-1183..*
* *Fischhoff B, Slovic P, Lichten*stein S, Read S, Combs B. How safe is safe enough? A psychometric study of attitudes towards technological risks and benefits. *Policy Sciences*, 1978; 9(2):127–152
* Galbraith, N. S., Barrett, N. J., & Stanwell-Smith, R. (1992). Water and disease after Croydon: A review of water-borne and water-associated disease in the UK 1937-86..*Water and Environment Journal*, *1*(1), 7-21.

References

* Gutson DH (2015). "Responsible innovation: who could be against that?." The Journal for Responsible Innovation, 2 (1) 1- 4
* Hills, T. T. (2018). The Dark Side of Information Proliferation. *Perspectives on Psychological Science*, 1745691618803647.
* Jagiello, R. D., & Hills, T. T. (2018). Bad news has wings: Dread risk mediates social amplification in risk communication. *Risk Analysis*, *38*(10), 2193-2207.
* Kahneman, D. (2011). *Thinking, Fast and Slow*. London: Macmillan.
* Peters, E., Dieckmann, N. F., Västfjäll, D., Mertz, C. K., Slovic, P., & Hibbard, J. H. (2009). Bringing meaning to numbers: The impact of evaluative categories on decisions. *Journal of experimental psychology: applied*, *15*(3), 213
* Maltby, L., Forrow, D. M., Boxall, A. B., Calow, P., & Betton, C. I. (1995). The effects of motorway runoff on freshwater ecosystems: 1. Field study. *Environmental Toxicology and Chemistry: An International Journal*, *14*(6), 1079-1092.
* Mozenter, Z. D., Yates, A. J., Schnier, K. E., Hughes, J. A., & Characklis, G. W. (2018). Understanding Water Utility Attitudes toward Water Transfers and Risk: Pretest Results. *Journal of Water Resources Planning and Management*, *144*(4), 06018002

References

* Mulki, S (2018) To Boil or Not to Boil?: A Case of Austin's Boil Water Notice.
* https://watersavvysolutions.com/to-boil-or-not-to-boil-a-case-of-austins-boil-water-notice/
* Munro, K., Martins, C. P., Loewenthal, M., Comber, S., Cowan, D. A., Pereira, L., & Barron, L. P. (2019). Evaluation of combined sewer overflow impacts on short-term pharmaceutical and illicit drug occurrence in a heavily urbanised tidal river catchment (London, UK). *Science of The Total Environment*, *657*, 1099-1111.
* Pontier, H., Williams, J. B., & May, E. (2004). Progressive changes in water and sediment quality in a wetland system for control of highway runoff. *Science of the Total Environment*, *319*(1-3), 215-224.
* Porter, J. J., & Birdi, K. (2018). 22 reasons why collaborations fail: Lessons from water innovation research. *Environmental science & policy*, *89*, 100-108.
* Robson, M., Spence, K., & Beech, L. (2006). Stream quality in a small urbanised catchment. *Science of the Total Environment*, *357*(1-3), 194-207.

References

* Said, B., Wright, F., Nichols, G. L., Reacher, M., & Rutter, M. (2003). Outbreaks of infectious disease associated with private drinking water supplies in England and Wales 1970–2000. *Epidemiology & Infection*, *130*(3), 469-479.
* Silva, C. L., & Jenkins-Smith, H. C. (2007). The precautionary principle in context: US and EU scientists' prescriptions for policy in the face of uncertainty. *Social Science Quarterly*, *88*(3), 640-664.
* Sloman, S. A., & Lagnado, D. (2015). Causality in thought. *Annual review of psychology*, *66*, 223-247.
* Smith, A., Reacher, M., Smerdon, W., Adak, G. K., Nichols, G., & Chalmers, R. M. (2006). Outbreaks of waterborne infectious intestinal disease in England and Wales, 1992–2003. *Epidemiology & Infection*, *134*(6), 1141-1149.
* Thomas, D. A., & Ford, R. R. (2005). *The crisis of innovation in water and wastewater*. Edward Elgar Publishing.

References

* Washburn, A. N., & Skitka, L. J. (2018). Science denial across the political divide: Liberals and conservatives are similarly motivated to deny attitude-inconsistent science. *Social Psychological and Personality Science*, 9(8), 972-980.
* Wehn, U., & Montalvo, C. (2018). Knowledge transfer dynamics and innovation: behaviour, interactions and aggregated outcomes. *Journal of Cleaner Production*, *171*, S56-S68.
* Wilkinson, J. L., Hooda, P. S., Swinden, J., Barker, J., & Barton, S. (2018). Spatial (bio) accumulation of pharmaceuticals, illicit drugs, plasticisers, perfluorinated compounds and metabolites in river sediment, aquatic plants and benthic organisms. *Environmental Pollution*, *234*, 864-875.