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A drone delivery network for UK health services?

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E-Drone: Transforming the energy demand of supply chains through integrated UAV-to-land logistics for 2030

How would more routine drone flights be safely integrated into air space?



Can drones help save energy and resources?



How should we model risk?

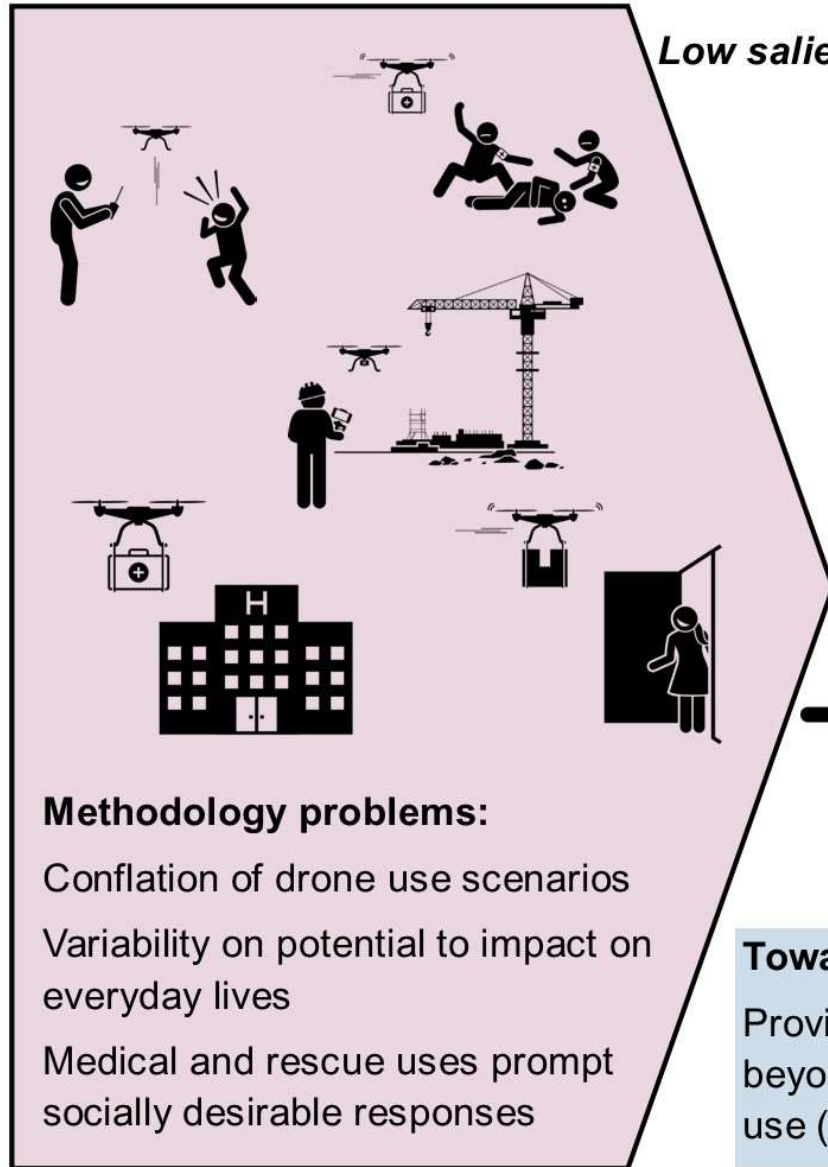


What form should future regulation take?

What are the implications for society?



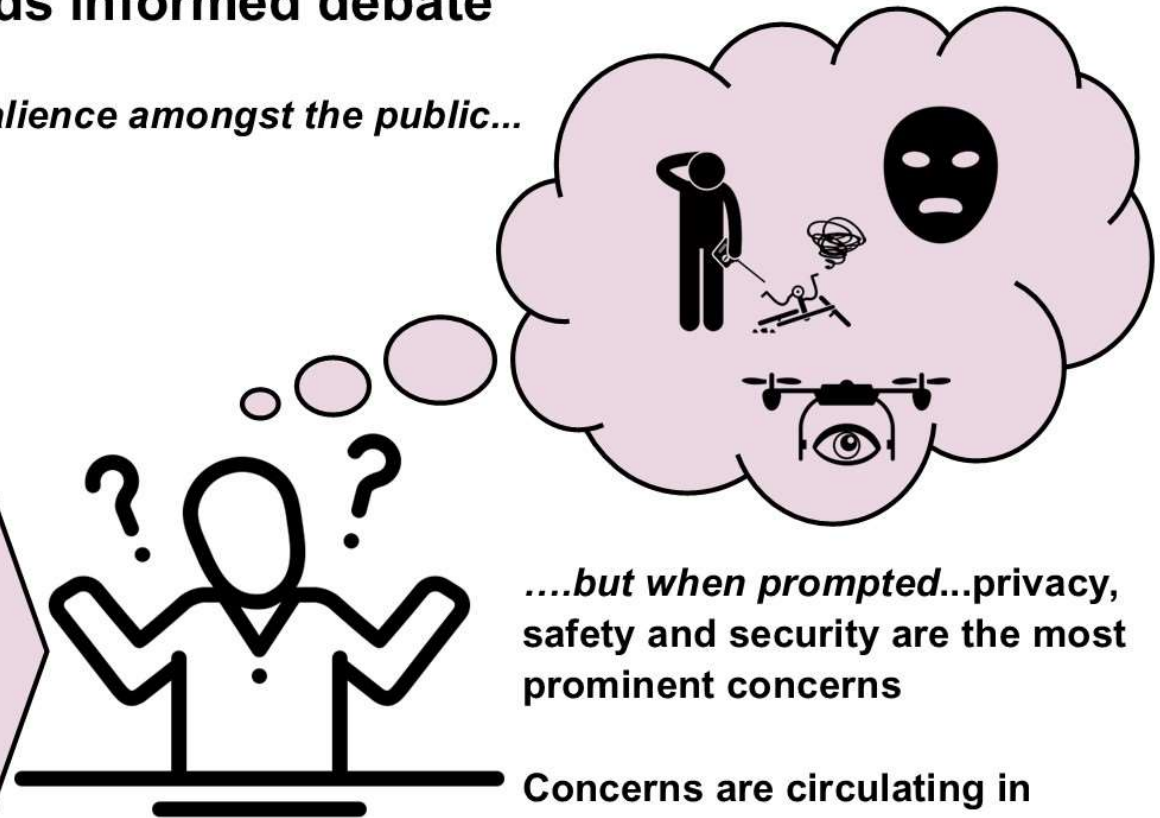
Public acceptance of the use of drones in logistics: The state of play and moving towards informed debate



Methodology problems:

- Conflation of drone use scenarios
- Variability on potential to impact on everyday lives
- Medical and rescue uses prompt socially desirable responses

Low salience amongst the public...



....but when prompted...privacy, safety and security are the most prominent concerns

Concerns are circulating in response to drones in general. No clear position in relation to logistics

Towards informed debate:
Providing for focused engagement which extends understanding beyond superficial knowledge. Presenting parameters for drone use (Where? How often? Who? Risks? Benefits?)

Delivery Drones – A quick overview



Drones used by Wing for delivering small packages to homes – trials taking place in Australia, Finland and the United States. Carries up to 1.2kg, can travel up to 65mph.

Image of a Wing Drone – removed

See: <https://wing.com/australia/canberra/>

Delivery Drones – A quick overview



A V50 fixed wing drone used in trials between Portsmouth and the Isle of Wight, UK – can carry up to 20kg, travels up to 40mph

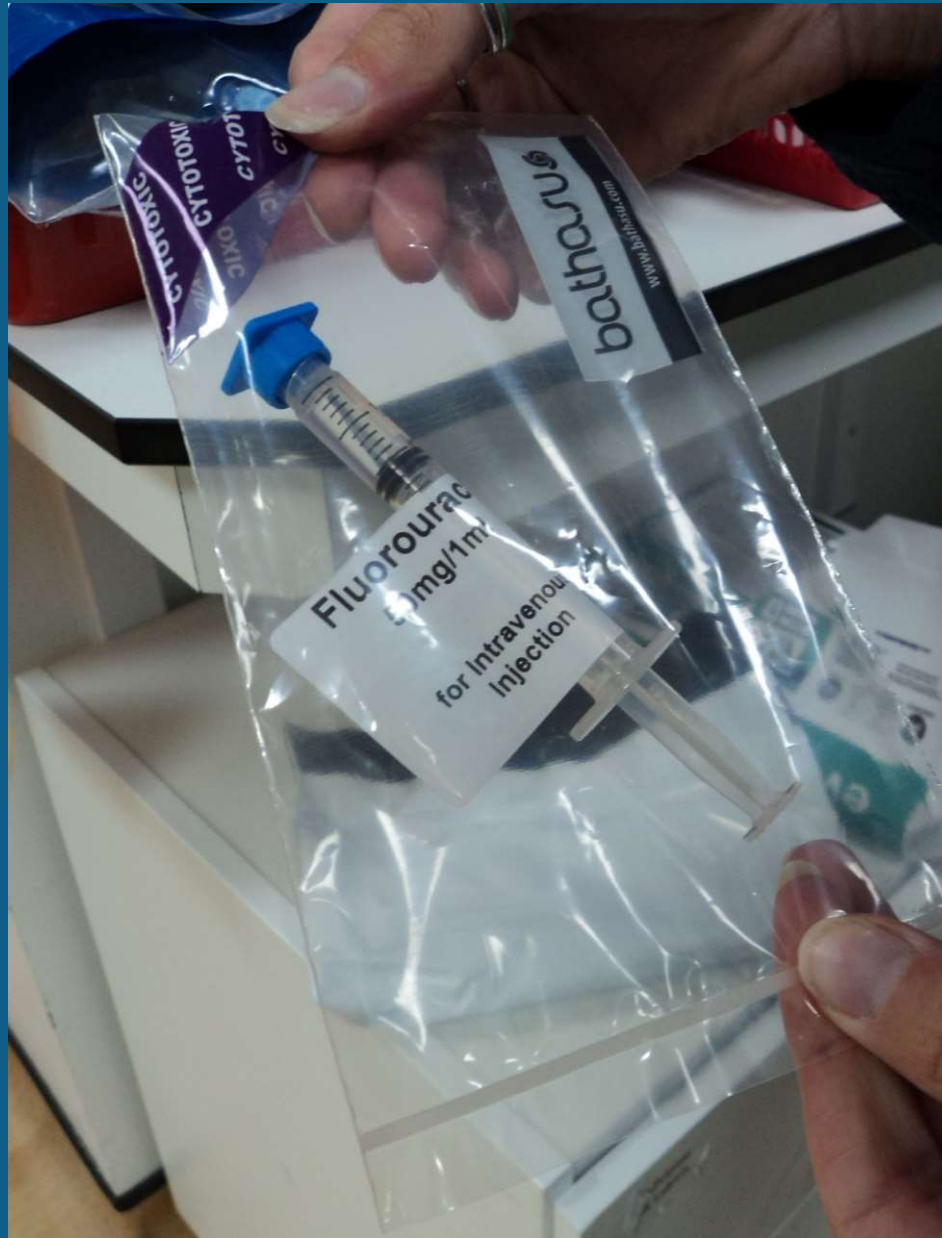


The UKRI's 'Future Flight Vision and Road Map' envisages drones providing distribution and delivery services alongside support for emergency services by 2030. Within this vision, drones are positioned alongside air taxis and regional air mobility

Image showing front cover of UKRI Future Flight Vision – removed

Medical deliveries by drone - the tip of the Urban Air Mobility iceberg?

Methodology



21 short interviews (typically 30 minutes each) with NHS practitioners (aseptic pharmacy, pathology, blood sciences, clinical research, procurement and distribution)

Four site visits (pharmacy distribution centre, pharmacy manufacturing unit, aseptic pharmacy, pathology laboratory)

Observations of pathology van rounds over two days

Findings – drone potential

Aseptic Pharmacy

- Chemotherapy is pre-planned and has scope for tapping into scheduled transport services
- Likely to be very limited demand given the existing configuration of cancer services, but drones may offer the chance to explore different models of delivering cancer care
- Drone trials can have the effect of distorting understandings of the role of drones

Pathology

- Drones may be better placed to separate and fast-track more urgent samples coming from doctor's surgeries
- Drones could provide for a steadier flow of samples coming in from doctor's surgeries
- Drones could provide a more responsive service accommodating changes in circumstances or sample volumes

Findings – drone potential

“let's just say...you live in [small village] and you didn't drive. In order to get to [large town], you would have to take two buses. So, if you were coming in for a fasting blood test, you would probably have to catch a bus about six o'clock in the morning. Change again, to get to the hospital for half past seven.”

Blood Scientist

Findings – drone potential

Ad-hoc demand

- When combined, these ad-hoc uses add up but there is a need for more data alongside help interpreting the reasoning behind the choice to use this transport – could they have done something differently?
- Existing approaches for dealing with ad hoc needs are potentially very costly and not as responsive and reliable as may be desired. Drones may be able to provide an on-demand, door-to-door, transport service, however, the distances of some ad-hoc services may not be viable for drones.

Findings – drone potential

“Obviously, they need to know that once they pick it up, it's their only focus and they must take it straight to where it's got to go. They can't stop. They shouldn't even stop for fuel on the way they should ensure that fuelled up before they get to us and that they must hand it to somebody.”

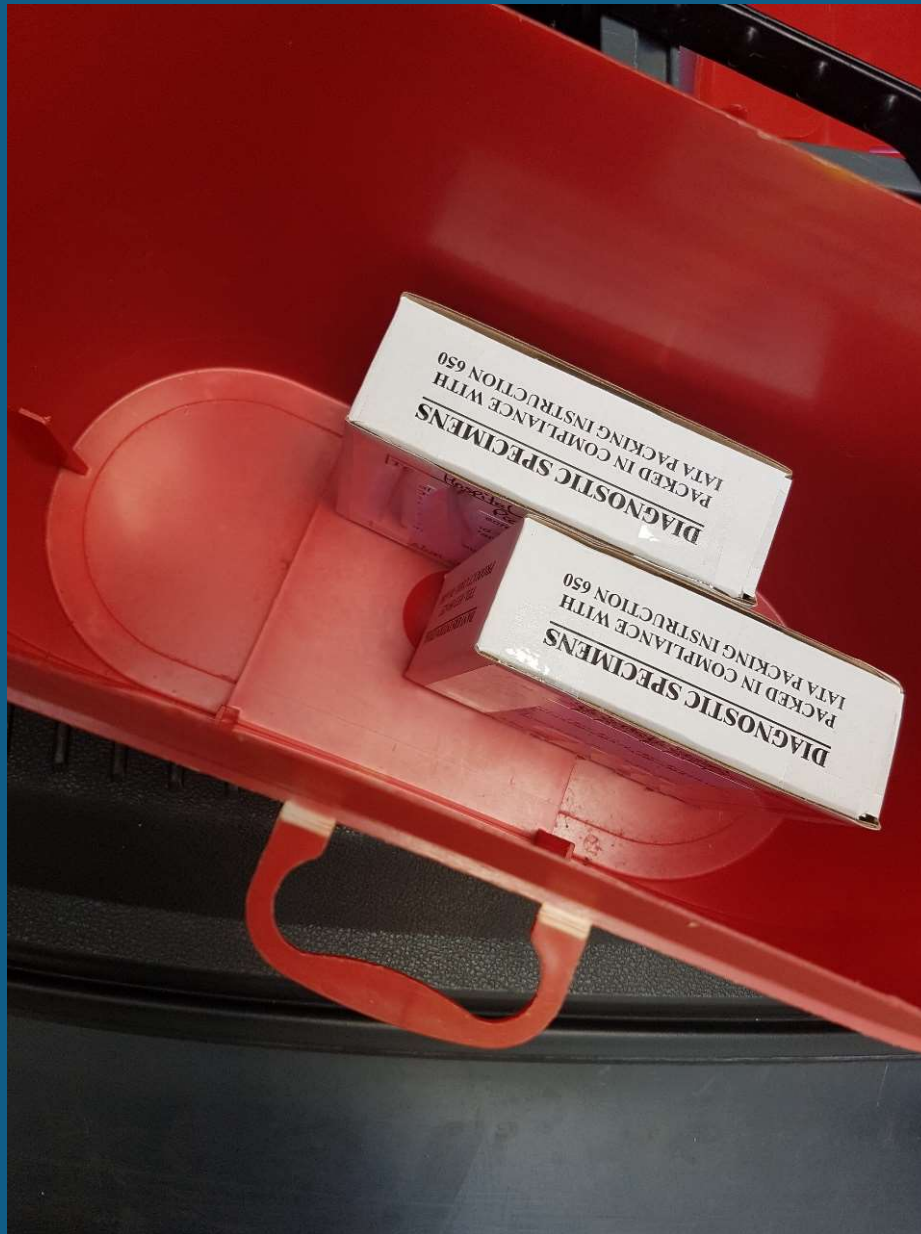
Blood Scientist

The best tool for the job

Image showing a man taking a small bottle of milk from a pick up truck – removed - see reference below

<https://www.cyclescheme.co.uk/community/featured/disc-over-the-best-tool-for-the-job>

The best tool for the job?



Very low weight and volume items moved by van – for example these two samples with a total weight of 65g

The best tool for the job

Can the existing system be managed more effectively?



Resolve organisation issues
e.g. communication



Maximise use of existing vehicles
e.g. scheduled deliveries, staff travel, non-medical services (post office/public transport?)

When to integrate drones



Is the package time-sensitive? How time sensitive?



Is the package a suitable size?

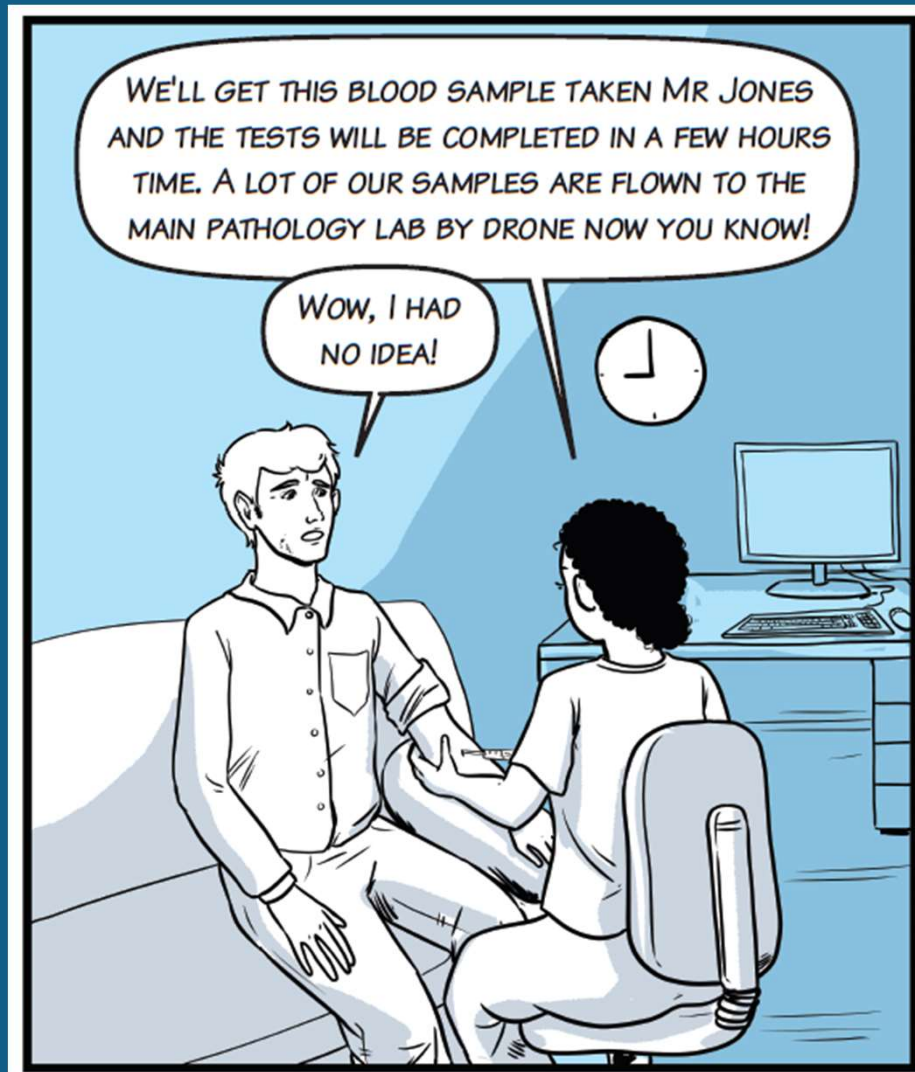


Are there other transport modes already on the network that you can tap into?



Are there significant energy savings that can be made compared to other modes? E.g. overcoming distance or physical barriers

Envisioning a future drone network



- Full exploitation of necessary scheduled delivery services
- Fixed drone corridors between healthcare sites
- A largely automated system operated by NHS practitioners on-demand to respond to their needs

Conclusion

- The use of drones in logistics may seem irrelevant and of limited interest but it is a step towards urban air mobility and we need to pay attention to how this might play out
- Drones may have a niche role within medical logistics but it is unlikely to result in a very significant shift in transport use and claims about congestion and carbon reduction need to be scrutinised
- Trials of new transport modes rarely reflect reality and there is a need to develop and share visions of potential futures
- For drones there seems to be an innovation-application gap, we need to work backwards and decide what we want drones to do for transport rather than overlay them onto existing systems.

References

Bike is Best 2021 <https://www.cyclescheme.co.uk/community/featured/discover-the-best-tool-for-the-job>

Smith, A., Dickinson, J., Marsden, G. et al. 2022. Public acceptance of the use of drones for logistics: The state of play and moving towards more informed debate, *Technology in Society*, Volume 68, 2022, 101883 <https://doi.org/10.1016/j.techsoc.2022.101883>

UKRI (2021) Future Flight Vision and Roadmap. Available from: <https://www.ukri.org/publications/future-flight-vision-and-roadmap/> [Accessed 21 December 2021]

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