



The Robots are Swarming

(Dani Carrillo Zapata, PhD Research, 2015-2020)

[Themes]

Informed Research
Creative Engagement
Responsible Research & Innovation (RRI)

PhD research is enhanced by engagement, which enriches thesis and is the basis for peer-reviewed publications

[Aim & Approach] Dani's research in the [FARSCOPE Centre for Doctoral Training](#) involved programming swarms of tiny robots (kilobots) to explore buildings which are on fire and assist firefighters in locating casualties. Having been involved with various outreach and communication activities, after participating in the RRI-focused [PERFORM project](#) he came to the realisation that having conversations with people most affected by his research was of critical importance.



[Practical Details] Focus group costs (refreshments etc.) were covered by Dani's PhD research grant. A £15K [EPSRC IAA](#) grant funded the *Swarm Escape!* project.

[Key Partnerships] Firefighters from [Avon Fire & Rescue](#) and Murcia, Spain took part in focus groups; [We The Curious](#) hosted public workshops; [Festival of the Future City](#) supported the *Swarm Escape!* events.

[Activity & Outcomes] In 2018 Dani designed and ran three focus groups with firefighters allowing him to share his research and understand their needs and perspectives. By engaging potential users of the swarm technology at this very early stage, he could responsively adjust the development process according to their priorities. Dani also gathered public perspectives on the acceptability of swarm robotics through workshops with adults held at We The Curious. Building on these, towards the end of his PhD, he designed a 'pop-up' escape room [Swarm Escape!](#) in partnership with the [2019 Festival of the Future City](#) to introduce swarm robots in a creative way and spark conversations about the use of robotics in society. During 2019 it appeared in Millennium Square, Bristol; at the [FUTURES](#) & [Future City](#) Festivals, and in 2020 it travelled to the [Kuwait Festival of Robotics & AI](#). Dani is now a freelance 'Scientific Agitator', developing creative experiences and art for science communication and public engagement: www.scientificagitation.com.

[Support] The Public Engagement team facilitated the [PERFORM project](#) and [FUTURES Festival](#); advised on the IAA application and the development of *Swarm Escape!*; and have provided Dani with ongoing support and guidance around engagement and RRI.

[Impact] The *Swarm Escape!* activity has entertained and informed participants as well as contributing to positive changes in attitudes towards swarm robotics. As Dani says however, the more significant impact has been on his research approach: "As researchers we must connect at the outset with those who will be affected by new technologies. We can't just go ahead with solving the problems we think exist, the solutions might not actually be welcomed. Research is a playground where we can get creative and explore, but we should do that based on a genuine understanding of people's needs.". Dani's final chapter in his thesis "What society wants with robot swarms", based on two [published papers](#) about his work in public engagement and RRI, was highly commended by both examiners.

Public Engagement

Strengthening research with conversations that count