

Theme: Improving Robotic Teleoperation through Human-Robot Interaction and Robotic Autonomy

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Industry Partner:
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Figure 1. A BROKK robot controlled by a human operator at Sellafield, UK [1]

A PhD on ways of improving the autonomous and operational capacities in robotics and remote solutions deployed in hazardous environments unsafe for human operation, e.g., nuclear decommissioning.

UK's Nuclear decommissioning estimated cost: £3Bn/yr., £121Bn over 120 years [2].

Improved autonomy & teleoperation → improved efficiency, safety, operator assistance, etc. → increase decommissioning rate [3].



About Me

- BEng (Yola) and MSc (Nottingham) in Electrical and Electronics Engineering
- MSc project - CAV prototype capable of automatic lane-keeping and other practical scenarios
- Relevant background in robotics and control
- Interest in human-robot interaction



About Industry Partner [4]

- RACE – Remote Applications in Challenging Environments Centre of the UKAEA
- Innovating safe and cost-efficient robotics and remote solutions for challenging environments
- R&D in autonomous and intelligent systems
- Projects: JET, LongOps, 'DRIVEN', etc.



About PhD Topic

- Studies on teleoperation, improved autonomy, shared control and impacts on/caused by operators
- Fully autonomous systems are currently considered not safe or cost-effective for nuclear applications [5]
- Few robotic solutions deployed with low autonomy and poor proprioception [1]

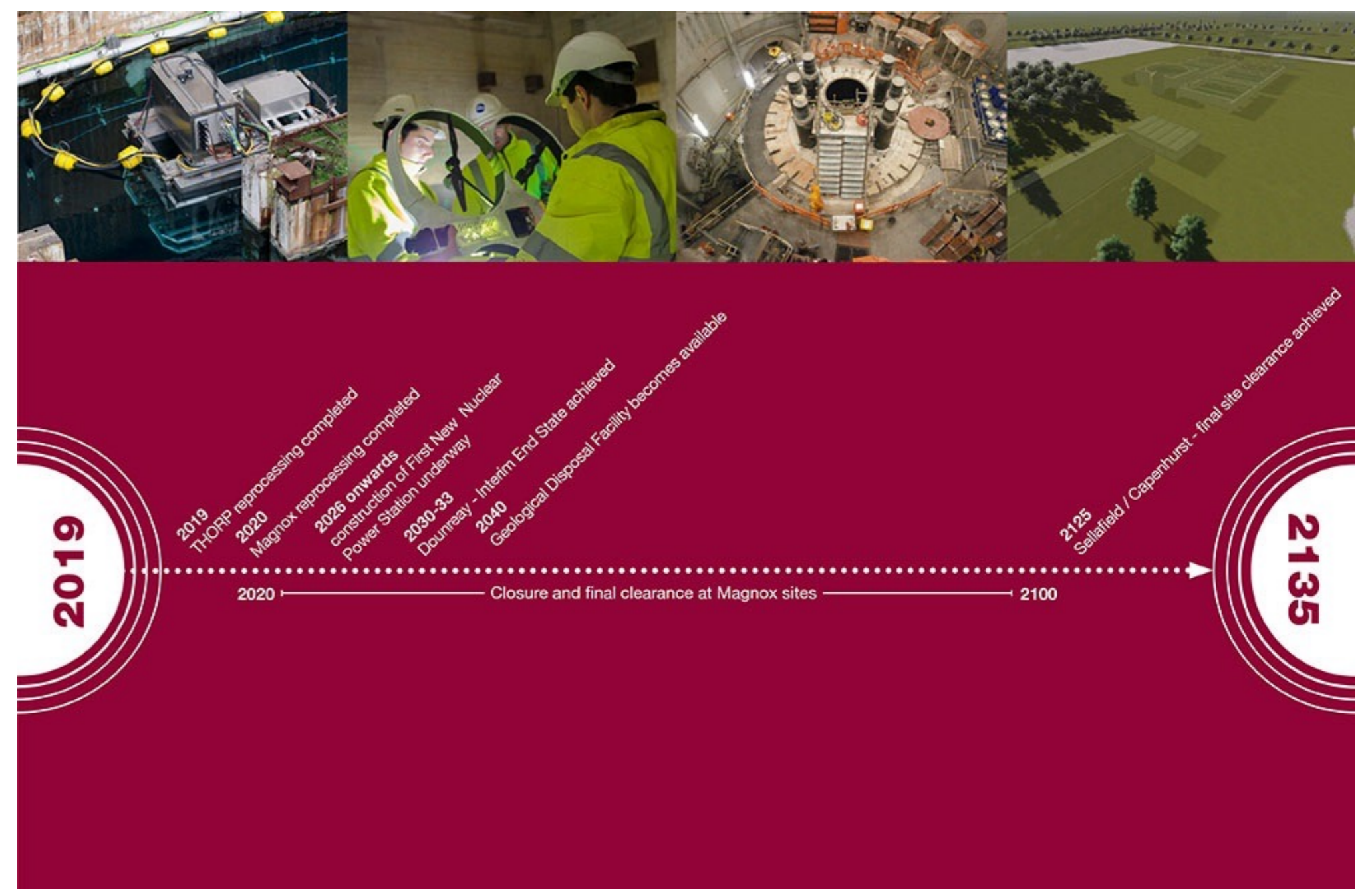


Figure 2. UK's future decommissioning timeline [2]

References

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- [2] "Nuclear Provision: the cost of cleaning up Britain's historic nuclear sites - GOV.UK." <https://www.gov.uk/government/publications/nuclear-provision-explaining-the-cost-of-cleaning-up-britains-nuclear-legacy/nuclear-provision-explaining-the-cost-of-cleaning-up-britains-nuclear-legacy> (accessed Oct. 01, 2022).
- [3] M. Bandala, C. West, S. Monk, A. Montazeri, and C. J. Taylor, "Vision-Based Assisted Tele-Operation of a Dual-Arm Hydraulically Actuated Robot for Pipe Cutting and Grasping in Nuclear Environments," *Robotics 2019*, Vol. 8, no. 2, p. 42, Jun. 2019, doi: 10.3390/ROBOTICS8020042.
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- [5] I. Tsitsimpelis, C. J. Taylor, B. Lennox, and M. J. Joyce, "A review of ground-based robotic systems for the characterization of nuclear environments," *Progress in Nuclear Energy*, vol. 111, pp. 109–124, Mar. 2019, doi: 10.1016/j.pnucene.2018.10.023.