

RoboRoyale, SensorBees: ECOSYSTEM HACKING via robot-insect interaction



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On behalf of the RoboRoyale and Sensorbees teams,
Tomas Krajnik, CTU



This project has received funding from the European Union's H2020 Research and Innovation Fund under grant agreement no. 964492



Ongoing ecological decline

- farmland overexploitation
- monocrop and pesticide abuse
- habitat reduction and fragmentation
- 75% decline in flying insects' biomass over the last 25 years
- 84% of crop production in EU directly depends on pollination





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Honeybees as pollinators

- honeybees (*apis mellifera*) are the most frequent single species of pollinator for crops
- some crops are pollinated exclusively by honeybees
- honeybee population and genetic diversity is on continuous decline
- **What is going on and how to prevent it ?**



Understanding environment dynamics

- long term operation autonomous robots
- robot - environment interactions
- models of environ. dynamics from sparse and noisy data

NSF (GAČR) Spatio-Temporal Representations for Lifelong Navigation



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FP7 STRANDS



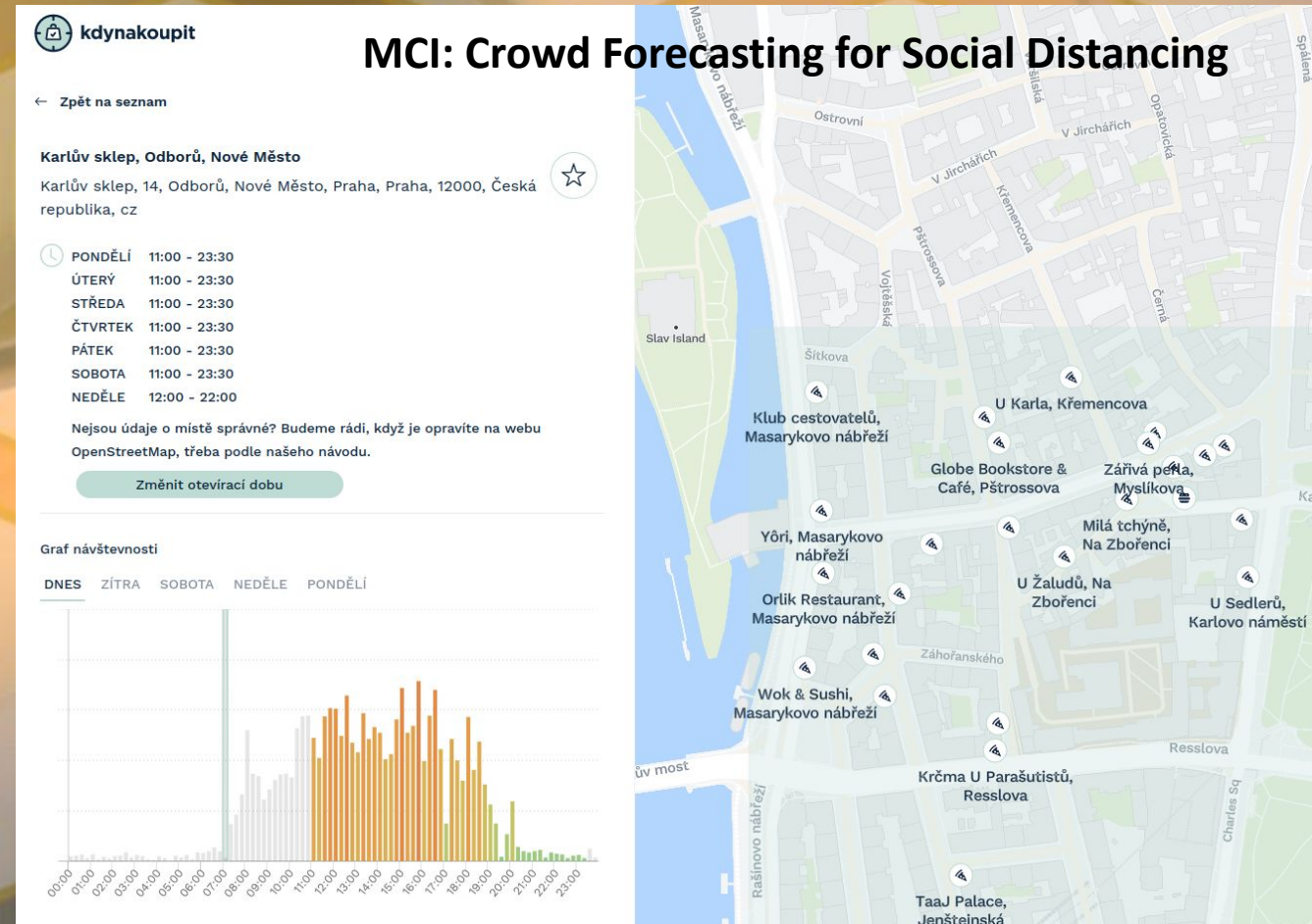
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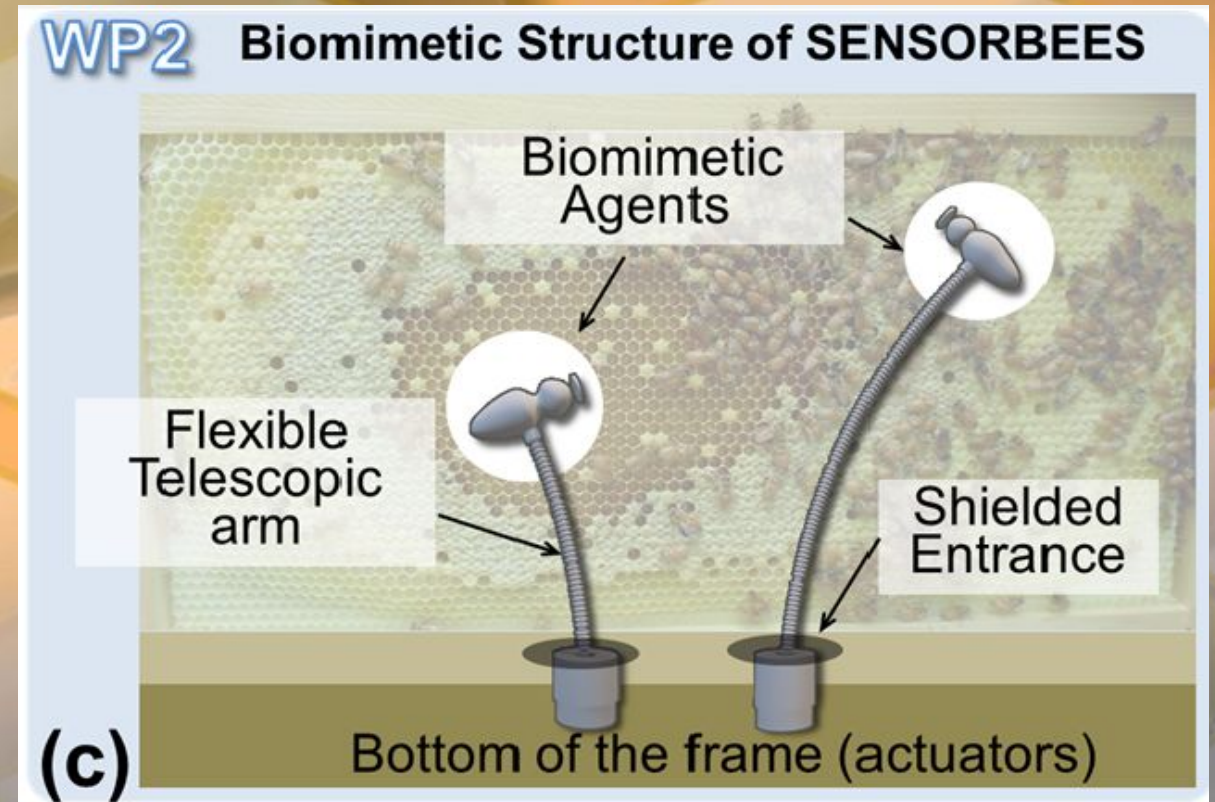
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SENSORBEES: Use Honeybee Colonies to Monitor Environment Dynamics

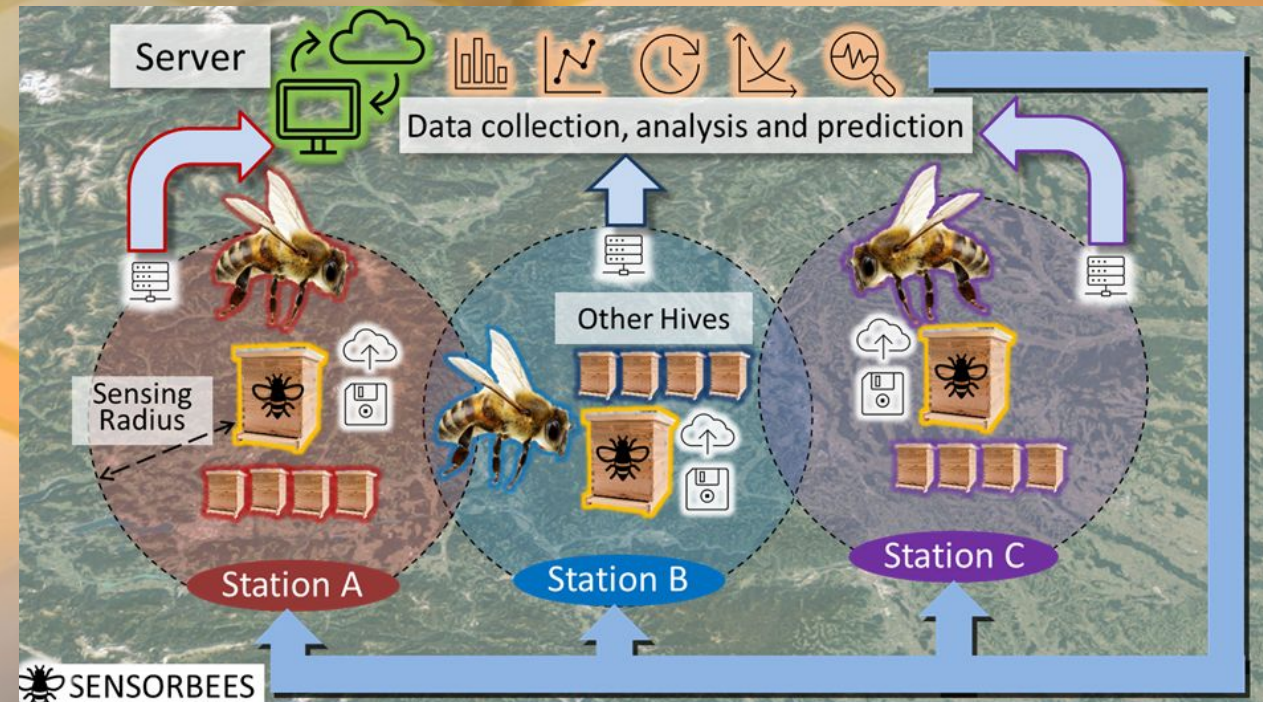
- comb cells contents reflect env. history
- deploy robots to survey combs & brood
- infer the state of the surroundings
- more hives -> finer and larger maps



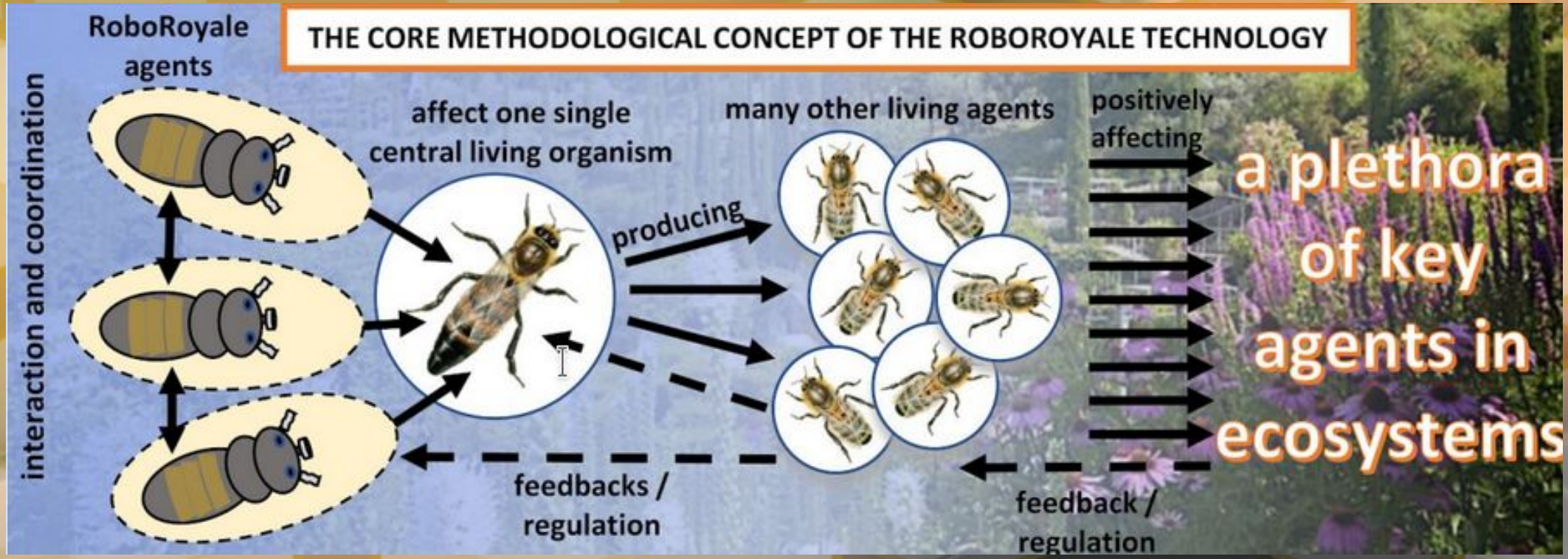
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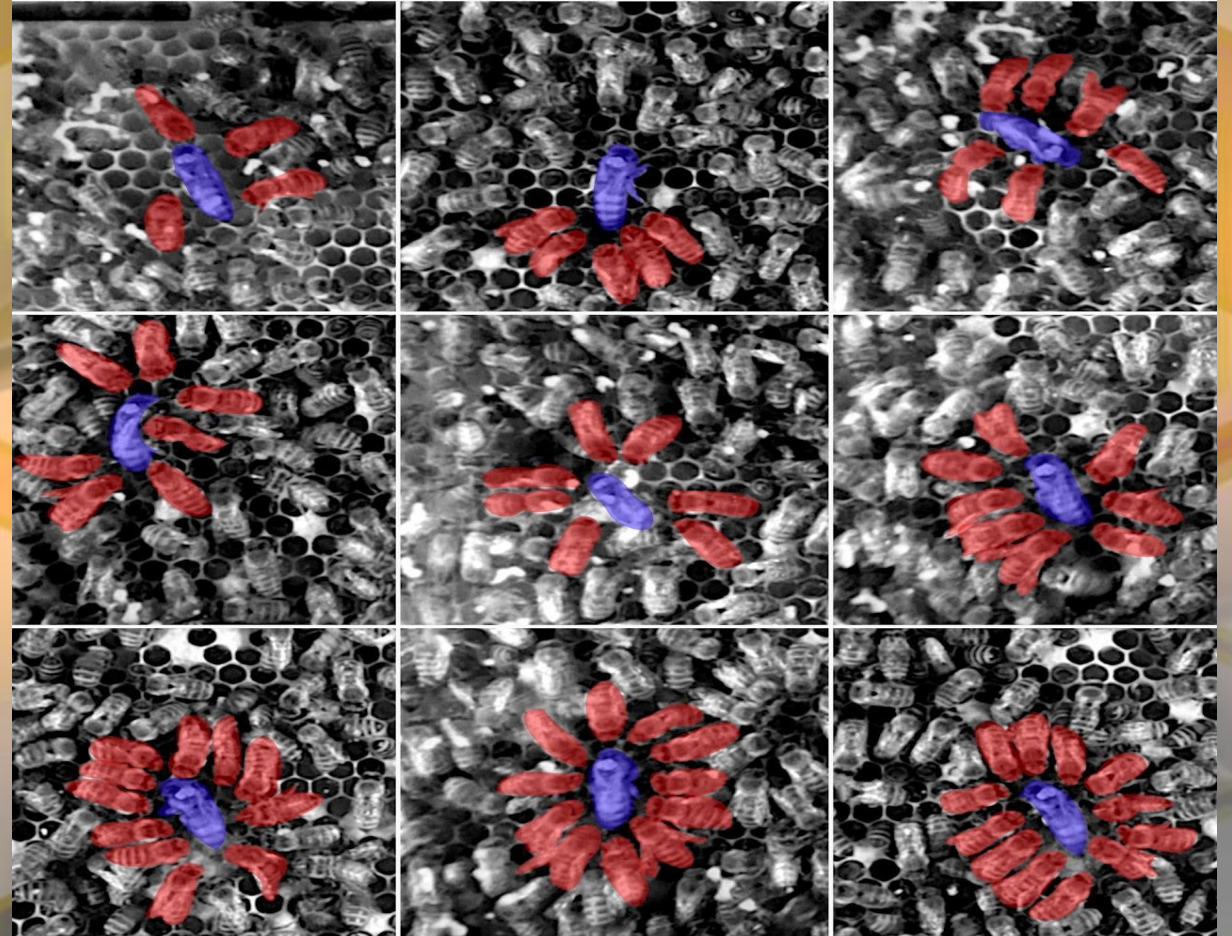
RoboRoyale: Use Honeybee Colonies to Affect Environment Dynamics





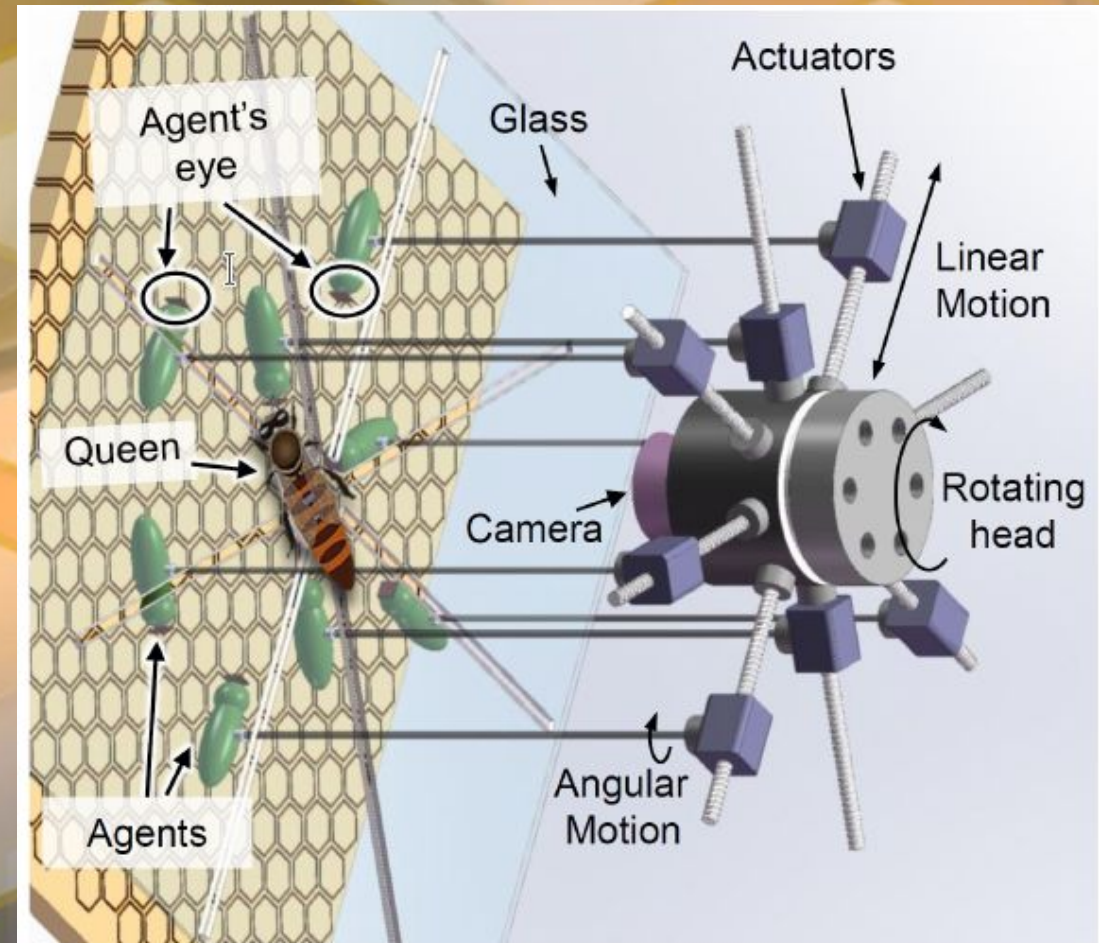
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- **investigate the role of court bees**
- **replace some of them by robots**
- **affect the queen, control her colony**
- **improve pollination**



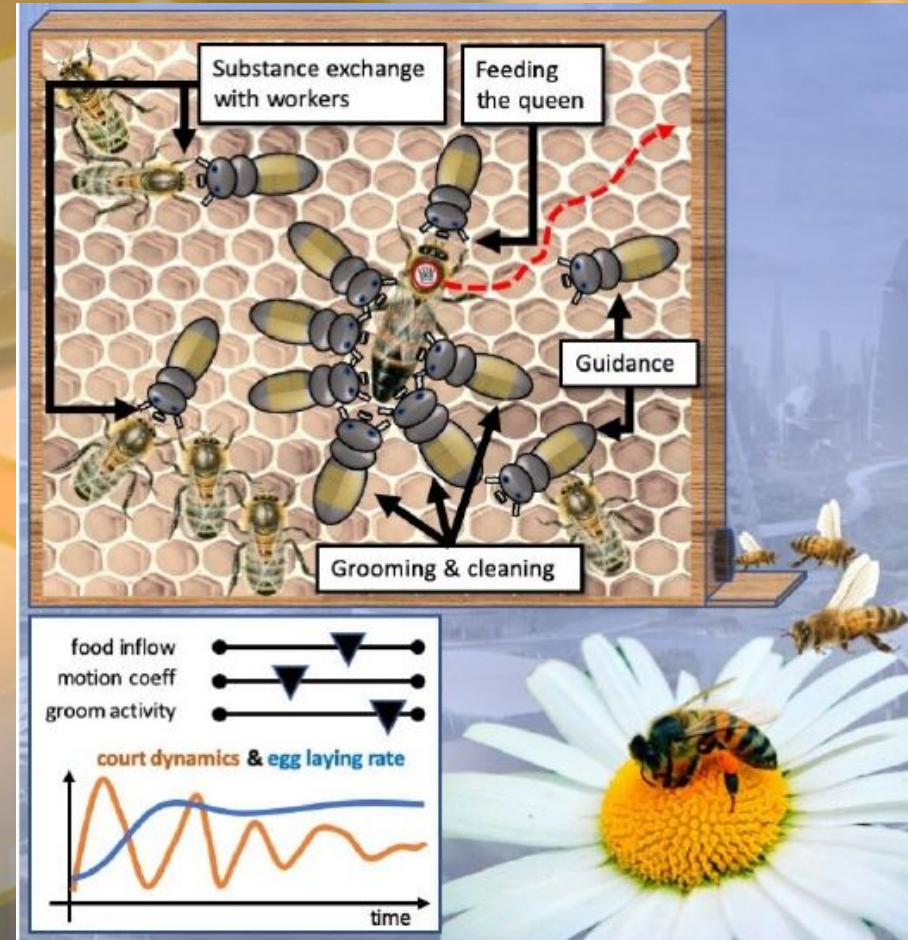
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Lessons learned from applying

- relate to nowadays challenges - climate change, poverty, digital feudalism
- interdisciplinarity is a must
- don't give up (RoboRoyale & Sensorbees ~10x)
- read the call, read the challenge guide
- tailor the proposal to the call
- focus on the call criteria



H2020 FET Open RoboRoyale and SensorBees

Thank you for your attention

Tom Krajník,
Czech Technical University



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