Simulation of Interactions between Beehives

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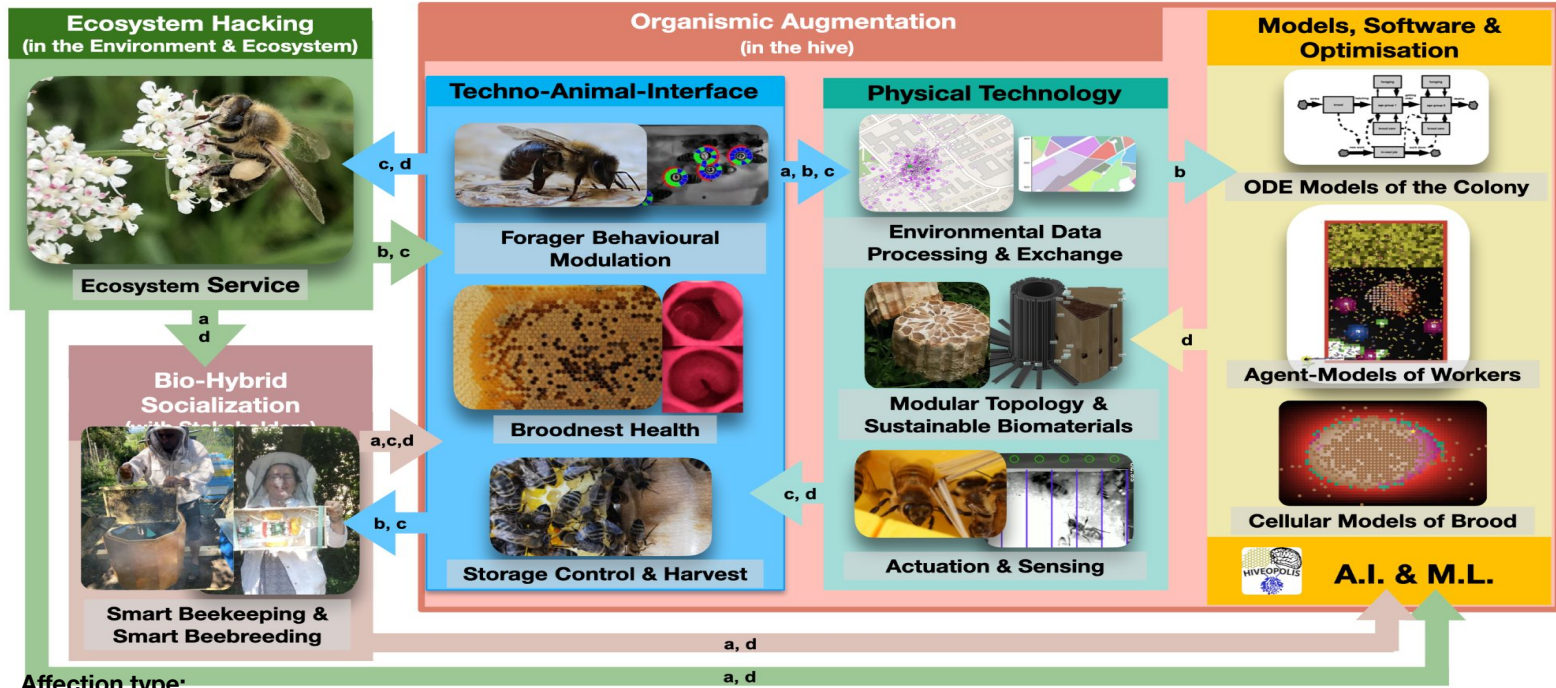
Humboldt University of Berlin, Department of Computer Science, Adaptive Systems Group

Structure of the Hiveopolis Technology

Ecosystem Hacking (in the Environment & Ecosystem)

Ecosystem Service

Bio-Hybrid Socialization (with Stakeholders)

Smart Beekeeping & Smart Beebreeding

Organismic Augmentation (in the hive)

Techno-Animal-Interface

Forager Behavioural Modulation

Broodnest Health

Storage Control & Harvest

Physical Technology

Environmental Data Processing & Exchange

Modular Topology & Sustainable Biomaterials

Actuation & Sensing

Models, Software & Optimisation

ODE Models of the Colony

Agent-Models of Workers

Cellular Models of Brood

HIVEOPOLIS A.I. & M.L.

c, d | b, c | a | d | a,c,d | b, c | a, b, c | c, d | b | d | a, d | a, d

Affection type:
(a) Goal/Constraint   (b) Info Flow   (c) Material Flow   (d) Exert Control

Source: https://direct.mit.edu/isal/proceedings/isal/41/102910

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General Concept

Hive Agent

Bee Agent

Field Agent
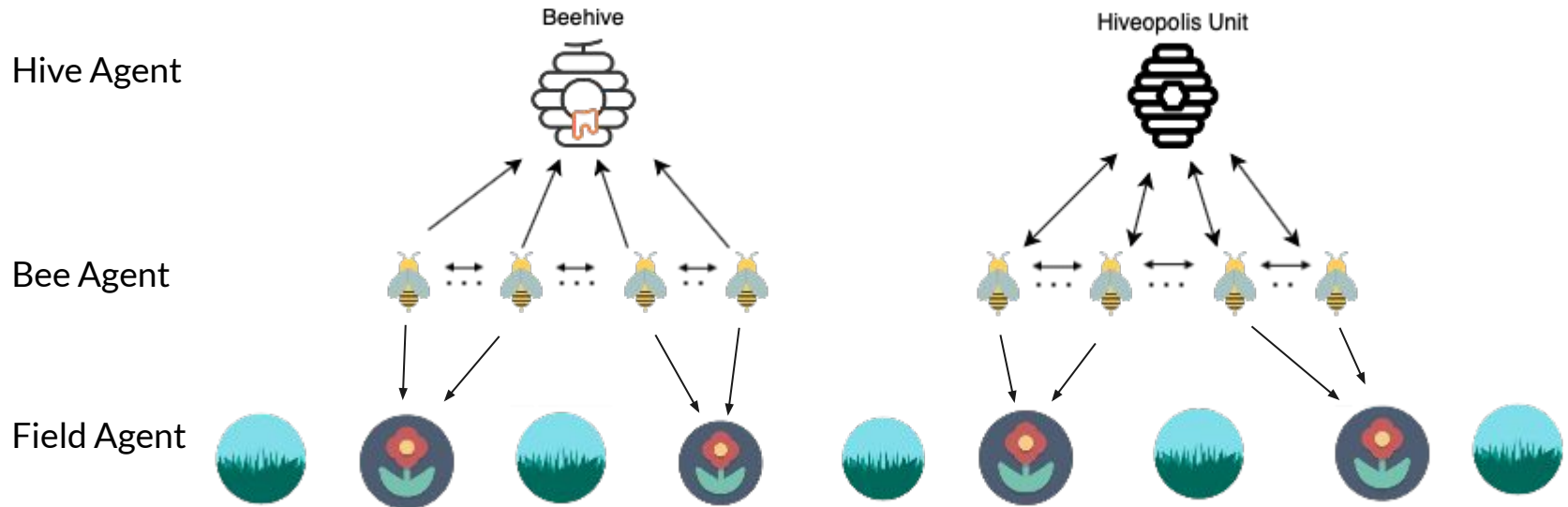
Decision-Making Process in the Hiveopolis Unit

The following parameters are considered:

1. Distance: find all fields which can be reached by bees
2. Flowering period: select fields with the shortest blooming period
3. Abundance of nectar: select the most abundant fields
4. Minimal number of competitors: select fields the smallest number of competitors

Simulation

An Example of a running simulation with 2 Hiveopolis Units with honeybees and 2 Beehives with wild bees.
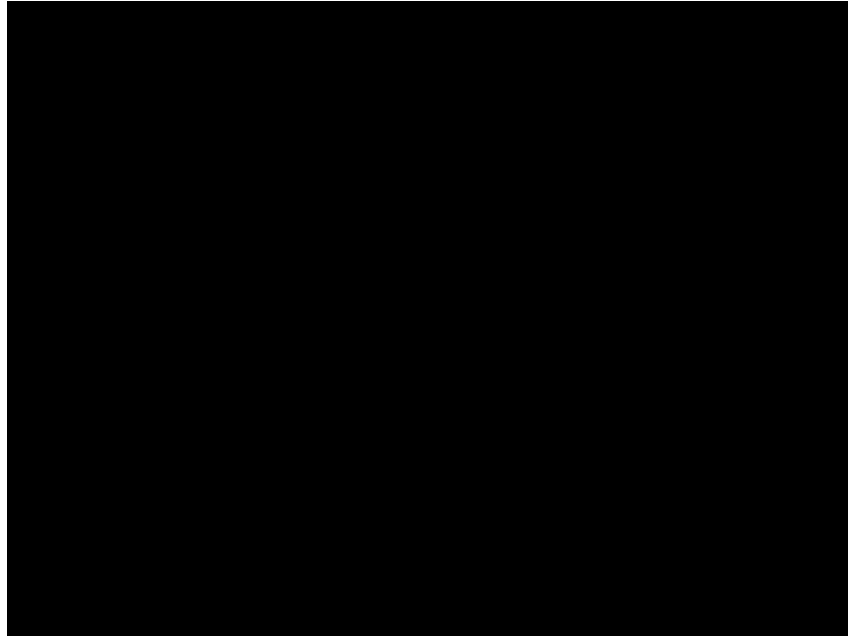
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The Adaptive Systems Group is part of the Department of Computer Science at Humboldt-Universität zu Berlin. The research focus of the group is on sensorimotor learning and prediction in the field of developmental and bio-robotics. The group has long-standing expertise in bio-inspired navigation systems for robotics, adaptive learning strategies, and experience with applications in precision and micro-farming. Within HIVEOPOLIS, we will work on environmental data collection and prediction, sensorimotor learning and active exploration strategies.

Team Members:

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Professor
Verena is Principal Investigator.
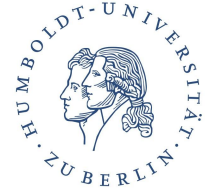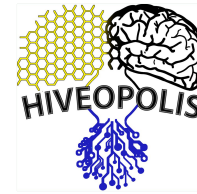
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Source: https://www.hiveopolis.eu/consortium/