

La santé des abeilles

Apport de la recherche
en évaluation
des risques

9 décembre 2019

CONFERENCE INTERNATIONALE
ANSES-EFSA

Espace du Centenaire
Maison de la RATP,
189, rue de Bercy - 75012 Paris



Giving Beekeeping Guidance by cOmputatiOnal-assisted Decision making [B-GOOD]

prof. Dirk de Graaf



HEALTHY & SUSTAINABLE beekeeping



HEALTHY & SUSTAINABLE beekeeping

HEALTHY

medical concept:

“absence of disease”

in evolutionary biology:

*“survival and fitness
(quantitative reproductive
success in a given environment)
of organisms*

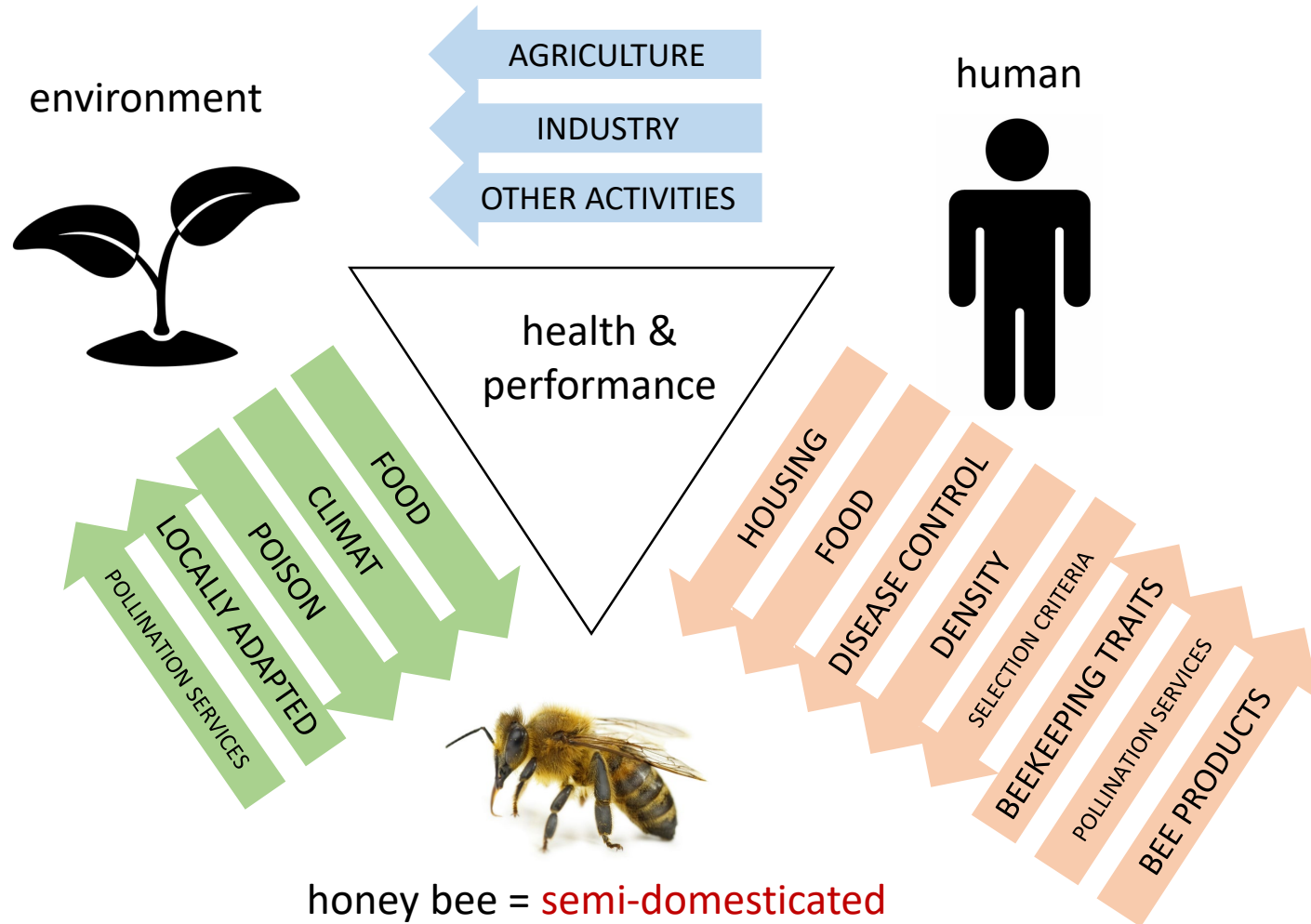
SUSTAINABLE

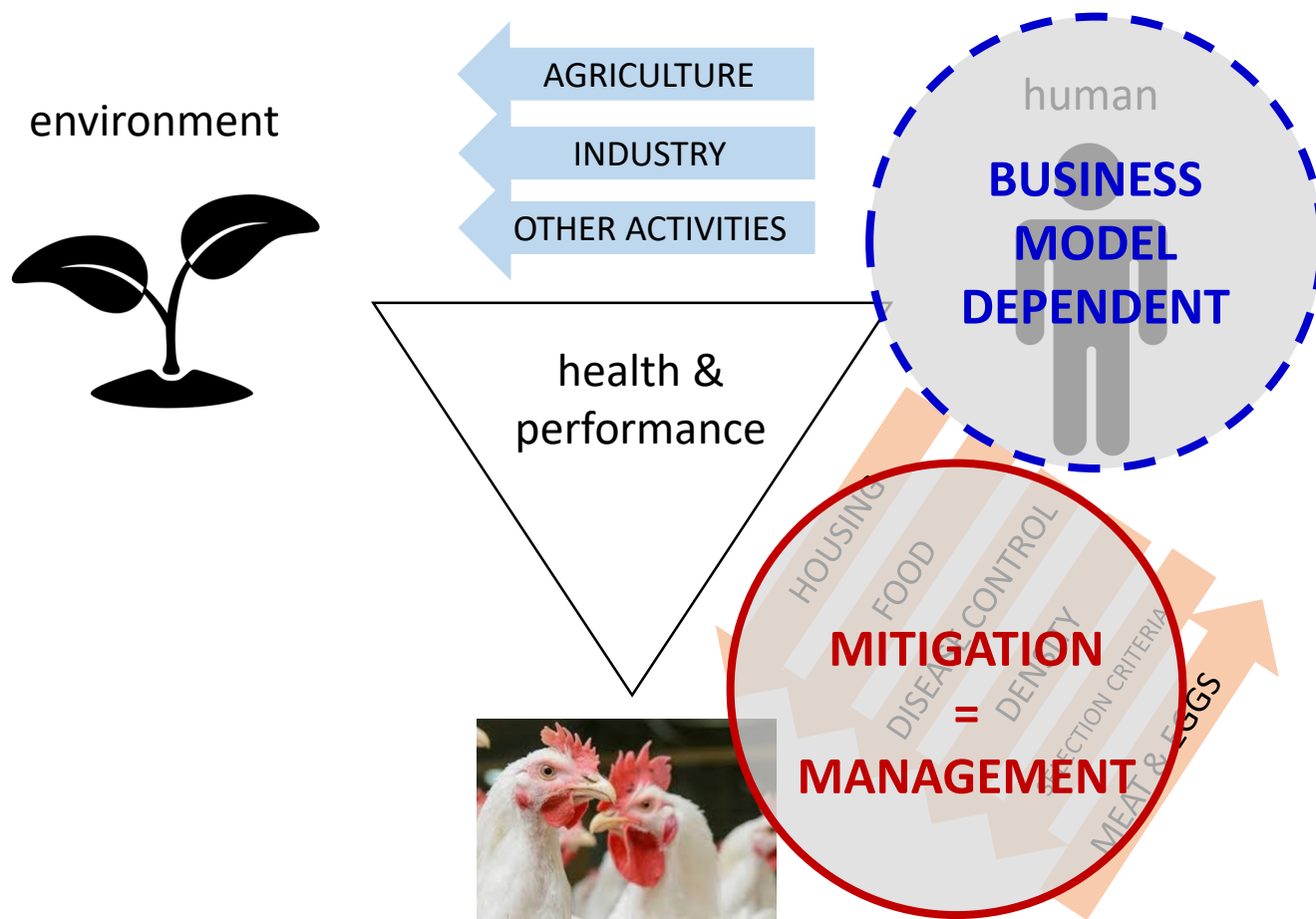
Gro Harlem Brundtland:

*“Sustainable development is
development that meets the
need for the present without
compromising the ability of future
generations to meet their own
needs.”*



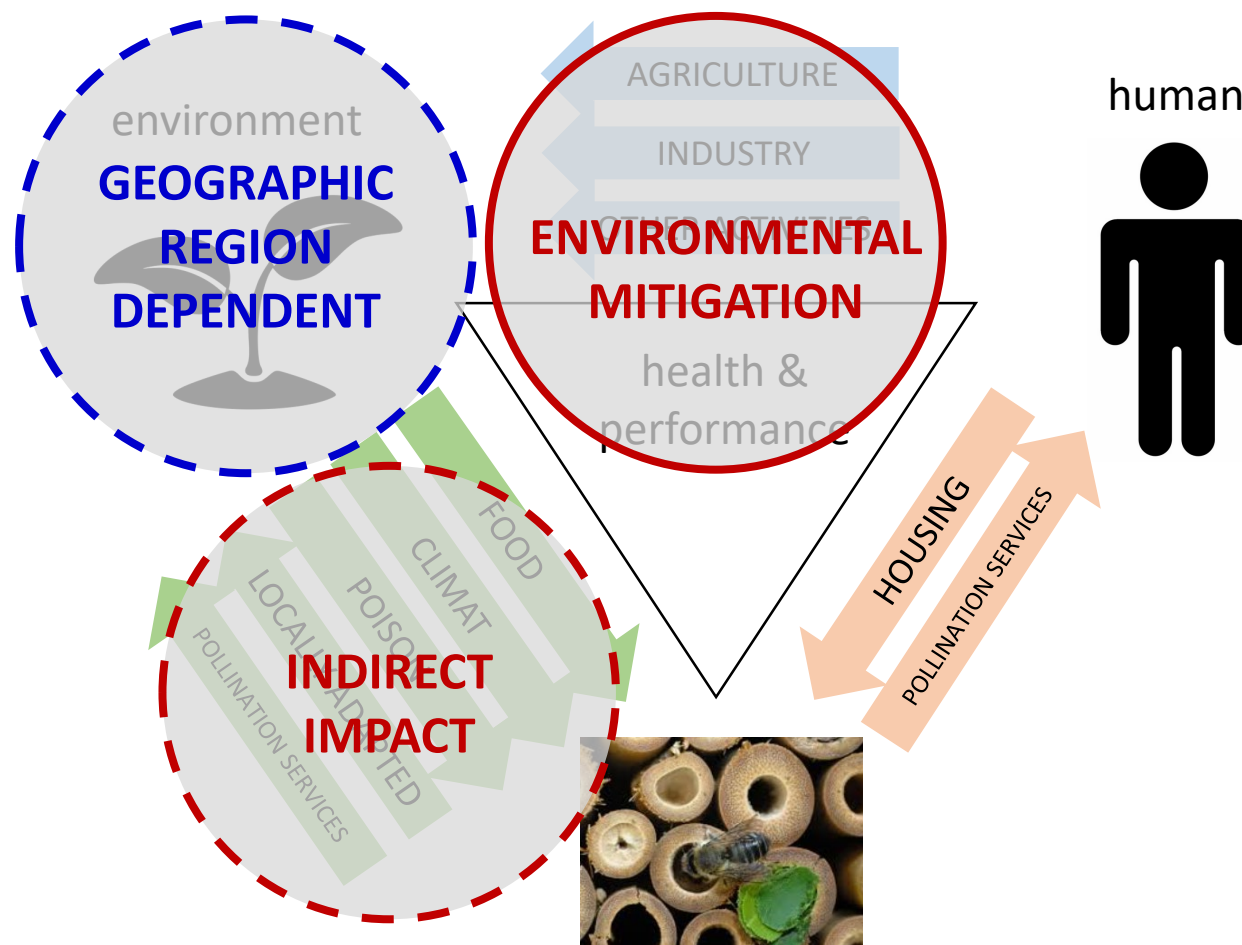
The complexity of beekeeping





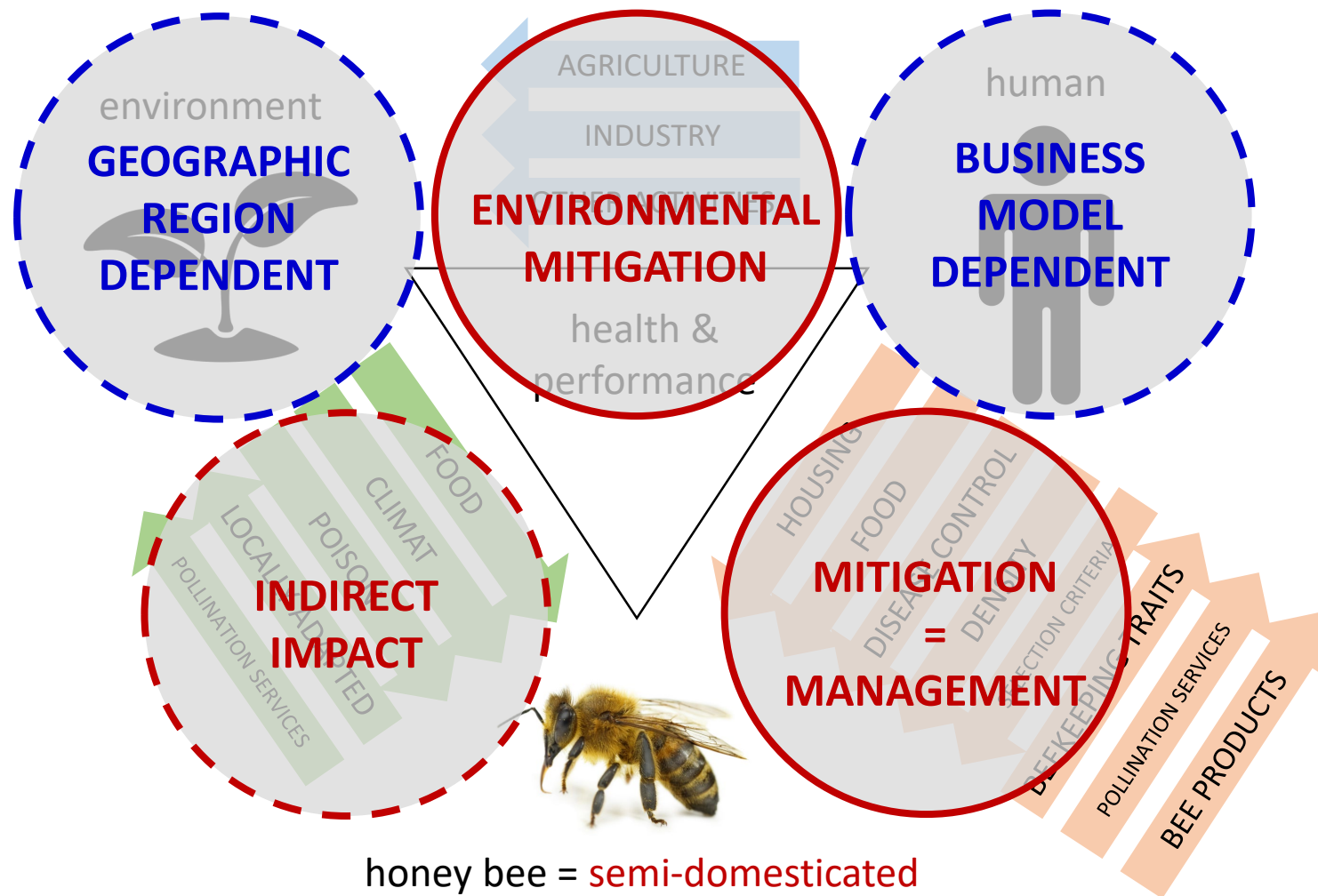
poultry = **domesticated**





wild bees = not domesticated





HEALTHY-B (EFSA) toolbox

- INDICATORS
 - colony attributes
(amount of brood, disease load...)
 - colony outputs
(pollination services, honey harvest...)
- FACTORS
 - external drivers

>> Health Status Index

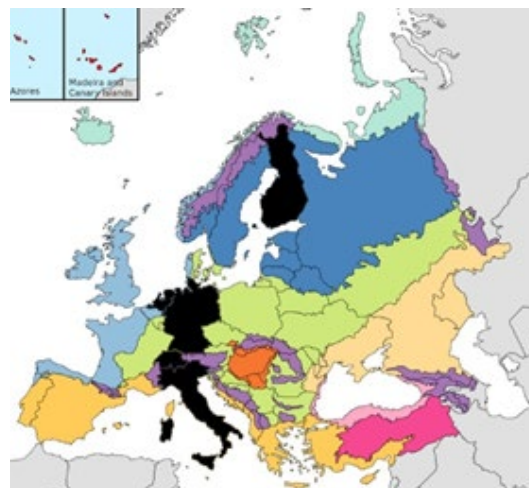
- Make it operational
 - by facilitating a coordinated flow of data from various sources
 - by testing and validating (discarding) each component thoroughly
- GENE POOL = new component



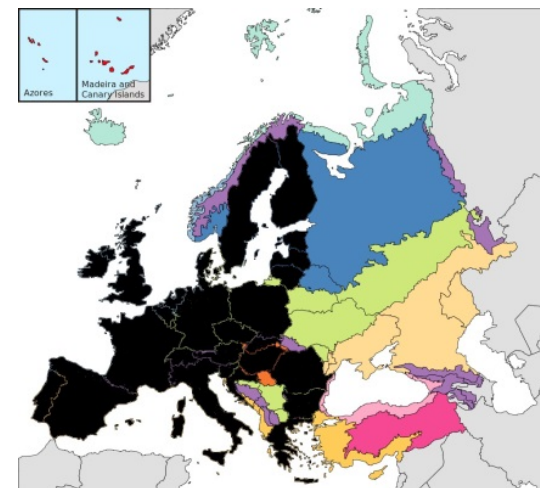
3-tiered approach



8 mini-apiraries
2020/2021/2022



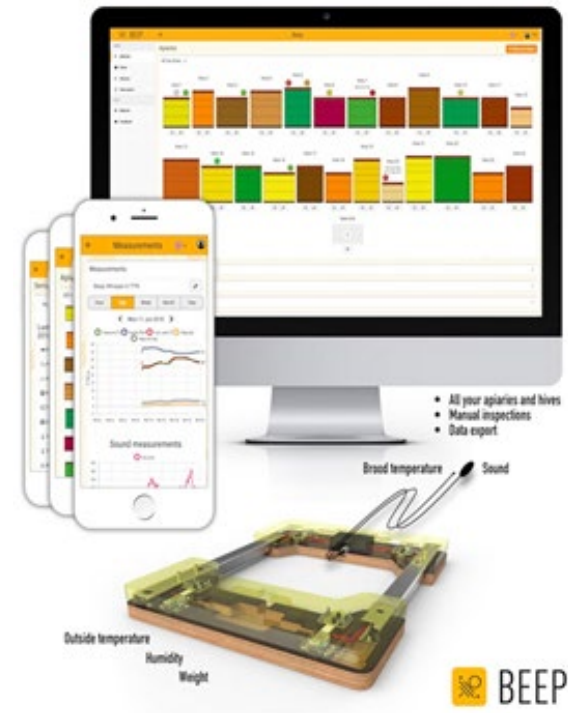
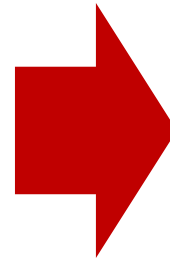
north-south axis
2021/2022



pan-European
2022



- data collection often demands beekeepers' intervention = disturbance of the colony
- >> preferentially (semi)-automated data collection



- sustainable beekeeping
 - = at the same time
 - maintaining bee health
 - understanding ecological balance
 - safeguarding economic viability
- >> merging even more data



- PROBLEM 1: data storage, access and sharing

>> EU-wide data platform

‘old’ and ‘new’ data

COLOSS, Epilobee, ...

Journal of Apicultural Research, 2018
Vol. 57, No. 3, 452–457, <https://doi.org/10.1080/00218839.2018.1460911>



















Taylor & Francis
Taylor & Francis Group

 Check for updates

NOTES AND COMMENTS

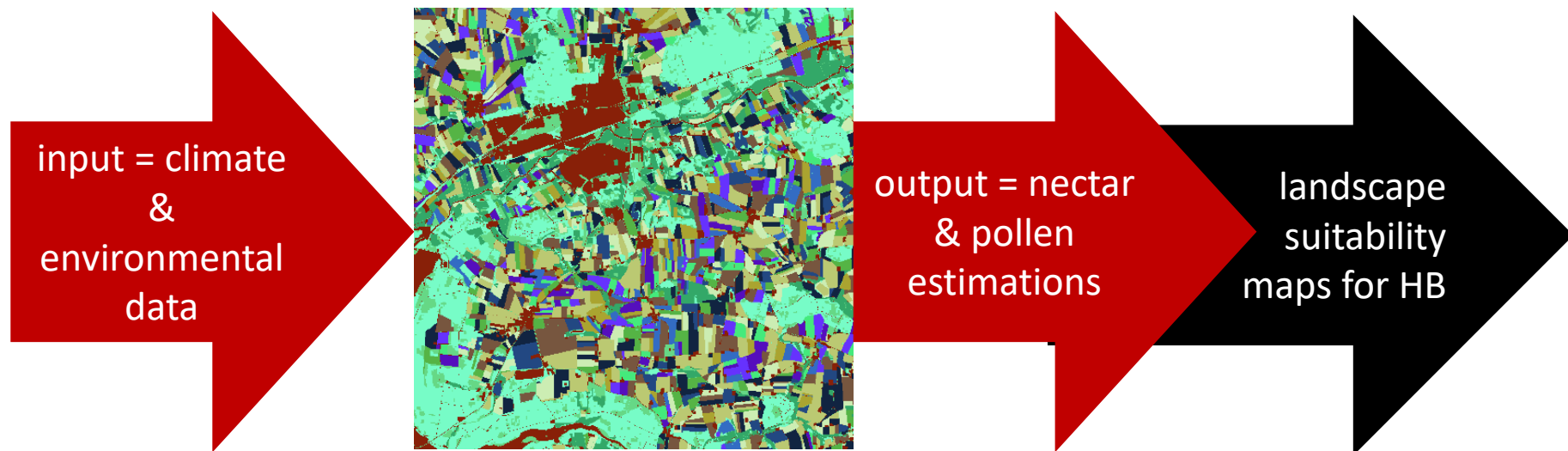
Multi-country loss rates of honey bee colonies during winter 2016/2017 from the COLOSS survey

Robert Brodschneider^{a*,1} , Alison Gray^{b,†} , Nouredine Adjlane^c, Alexis Ballis^d, Valters Brusbardis^e, Jean-Daniel Charrière^f , Robert Chlebo^g , Mary F Coffey^h, Bjørn Dahleⁱ, Dirk C de Graaf^j , Marica Maja Dražić^k, Garth Evans^l, Mariia Fedoriak^m , Ivan Forsytheⁿ , Aleš Gregorc^o, Urszula Grzęda^p, Amots Hetzroni^q , Lassi Kauko^r , Preben Kristiansen^s , Maritta Martikkala^t , Raquel Martín-Hemández^u , Carlos Aurelio Medina-Flores^v , Franco Mutinelli^y , Aivar Raudmets^w, Vladimir A Ryzhikov^x, Noa Simon-Delso^y , Jevrosima Stevanovic^z, Aleksandar Uzunov^{aa}, Flemming Vejsnæs^{bb}, Saskia Wöhl^{cc}, Marion Zammit-Mangion^{dd} , and Jiří Danihlík^{ee}

- PROBLEM 2: data utilization
 - identify correlative relationships among factors impacting HSI
 - assess the risks of multiple stressors
 - give guidance in decision making

>> modelling & data analysis

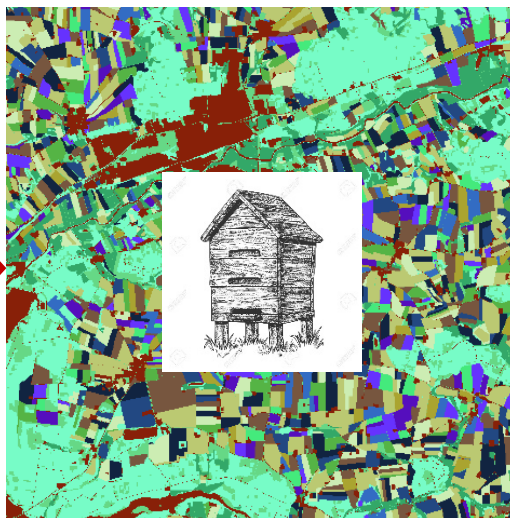
- dynamic landscape model (floral resource model)



- access to EFSA honey bee colony model (risk assessment) that combines:
 - bee colony simulation at individual level
 - landscape simulation model ALMaSS



combination
landscape
model +
ApisRAM

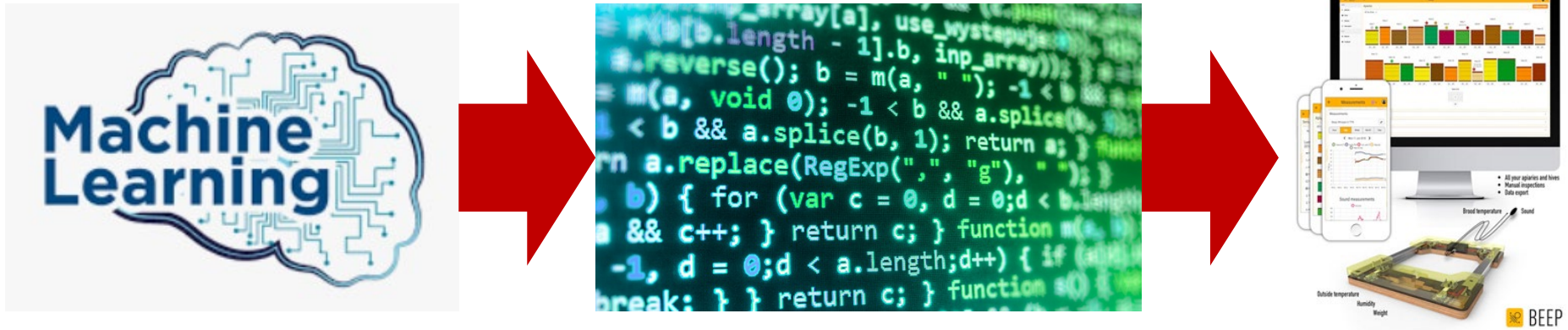


prospective risk assessment
& *in silico* management scenario
evaluation

BOTTOM-UP APPROACH

- machine learning and statistical analysis
 - >> relationships between real world data and **bee health status**

TOP-DOWN APPROACH



GUIDANCE IN DECISION MAKING



○ Multi-Actor Approach



Many of its calls require projects to apply the “multi-actor approach” (MAA). This means that projects must focus on real problems or opportunities that farmers, foresters or others who need a solution (“end-users”) are facing. It also means that partners with complementary types of knowledge - scientific, practical and other - must join forces in the project activities from beginning to end. As a result, MAA projects are able to develop innovative solutions which are more ready to be applied in practice and cover real needs. Moreover, those benefiting directly from the results of the projects will be more motivated to use them, because they were involved in generating them. They helped to build the project, bringing in their ideas and views so they feel a co-ownership of the solutions generated.



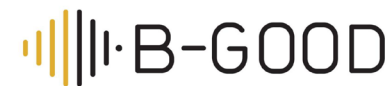
Multidisciplinary consortium (BK associations, consultants,...)
WP devoted to Multi-Actor Co-Development
EU-Bee Partnership = platform run by stakeholders



WP Number ⁹	WP Title	Lead beneficiary ¹⁰	Person-months ¹¹	Start month ¹²	End month ¹³
WP1	Beekeeping and Health Indicators	2 - WR	312.00	1	48
WP2	Beekeeping and Innovation	10 - TNTU	184.70	1	48
WP3	Ecology and Environmental Drivers	9 - UCOI	149.40	1	48
WP4	Socio-Economic Drivers	1 - UGENT	115.20	1	48
WP5	Data Analysis and Decision Making	8 - AU	93.00	1	48
WP6	Operationalization and Application	13 - BEEP	66.80	1	48
WP7	Communication and Exploitation	12 - UBERN	50.00	1	48
WP8	Multi-Actor Co-Development	8 - AU	40.00	1	48
WP9	Coordination and Management	1 - UGENT	43.00	1	48
WP10	Ethics requirements	1 - UGENT	N/A	1	48
Total			1,054.10		



The consortium



Thank you



CONFERENCE INTERNATIONALE ANSES EFSA - 9 DECEMBRE 2019