Report on the knowledge exchange and impact strategy for PoshBee

Deliverable 10.1

16 May 2019

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PoshBee

Pan-European assessment, monitoring, and mitigation of stressors on the health of bees

Prepared under contract from the European Commission

Grant agreement No. 773921
EU Horizon 2020 Research and Innovation action

Project acronym:	**PoshBee**
Project full title:	**Pan-european assessment, monitoring, and mitigation of stressors on the health of bee**
Start of the project:	June 2018
Duration:	60 months
Project coordinator:	Professor Mark Brown Royal Holloway and Bedford New College www.poshbee.eu
Deliverable title:	Report on the knowledge exchange and impact strategy for PoshBee
Deliverable n°:	10.1
Nature of the deliverable:	Report
Dissemination level:	Public
WP responsible:	WP10
Lead beneficiary:	UREAD
Citation:	Potts S.G., Breeze T., Cini E., Senapathi D. (2019). *Report on the knowledge exchange and impact strategy for PoshBee.* Deliverable D10.1 EU Horizon 2020 PoshBee Project, Grant agreement No. 773921.
Due date of deliverable:	Month 12
Actual submission date:	Month 12

Deliverable status:

Version	Status	Date	Author(s)
1.0	Final	16 May 2019	Potts S.G., Breeze T., Cini E., Senapathi D. UREAD

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Summary

PoshBee will produce a wide range of new knowledge, protocols and tools and it is therefore essential to have a clear knowledge exchange and impact strategy in order to ensure maximum impact is achieved both within and beyond the lifetime of the project. Here we adopt a "what" (expected output), "who" (key stakeholders), "how" (form of interaction), and "when" (timely interaction) approach. The overall knowledge exchange plan is supported by a number of key activities: stakeholder mapping (Task 10.1), assessing stakeholder incentives and barrier to adoption (Task 10.2), knowledge synthesis (Task 10.3), coordination of tool development (Task 10.5), science-policy engagement (Task 10.6), and inputs form the Stakeholder Advisory Committee. Initial focus is on two flagship outputs ("what") of PoshBee: standardised protocols for regulatory testing schemes, and the Bee Health Card. Stakeholder mapping revealed for the standardised protocols the priority stakeholders ("who") are: ANSES, agrochemical industry, EC, ECPA, EFSA, national ministries of agriculture, and researchers; and for the Bee Health Card: ANSES, agrochemical industry, businesses (e.g. bee medicine suppliers, queen honeybee breeders), EC, EFSA, national beekeeping associations, media, national farmer organisations, and national ministries of agriculture and for bee health. Other stakeholders will be engaged, but the main efforts will be around those listed here. This framework provides the necessary input for work package 11 Task 11.2 'Communication and dissemination strategy' and 'Exploitation Plans', which will be delivered through Task 11.3 'Dissemination, communication and outreach'. Knowledge exchange plans will be periodically updated as outputs develop (e.g. air sensor tool) and engagement with stakeholders progresses.

1. Introduction and context

PoshBee will produce a wide range of new knowledge, protocols and tools and it is therefore essential to have a clear knowledge exchange and impact strategy in order to ensure maximum impact is achieved both within and beyond the lifetime of the project. A key element of the strategy is to start early with engagement with stakeholder as solid platform to build upon as the expected outputs are being developed. Here, we adopt a what-who-how-when approach:

- What: What are the expected outputs of PoshBee;
- Who: Who are the end-users directly affected by the outputs, and who are the important influencers. Advocates and communicators for the outputs;
- When: When is the best time to engage with stakeholders; are there particular entry points in decision making we should be targeting;
- How: How should knowledge and outputs be communicated; what are the most effective and trusted channels and what formats are most useful.

This strategy provides an initial roadmap, based on activities during the first year of the PoshBee project, and will be updated periodically as output development progresses and interaction with stakeholders strengthens. The strategy provides specific plans for each main output of PoshBee (Task 10.1) and draws upon several other important Tasks including:

- Those in WP11, which is ultimately responsible for Dissemination, Communication and Knowledge Transfer, specifically Tasks 11.2 Plans for exploitation and dissemination of results, and Task 11.3 Dissemination, communication and outreach;
- Task 10.2, which will analyse the incentives for and barriers to the adoption of PoshBee outputs;
- Task 10.3, which will synthesise the project findings and external knowledge;

- Task 10.4, which will identify appropriate response options for multiple stressors on bee health;
- Task 10.5, which coordinates the development of tools and guides for practitioners;
- Task 10.6, which oversees the development of policy briefings and engagement with policymakers;
- Task 10.7, which will use horizon scanning to identify future opportunities and threats;
- The Stakeholder Advisory Committee, who will provide guidance and help in developing impact.

2. Expected outputs

The PoshBee expected outputs can be summarised under five broad headings (Table 1) and constitute the "what".

Table 1. Summary of the main expected outputs from PoshBee.

Output Type	Specific outputs
Knowledge	Chronic and sub-lethal effects of chemicals and combinations
	Effects of chemical x pathogen and chemical x nutrition
	Field level effects of stressors
Protocols for bee regulatory testing schemes	Testing chemicals on life-stages and castes/sexes of model species
	Ground nesting model for solitary bees
	Chemical x pathogen and chemical x nutrition interactions
	Field testing
Proteomics tools for health monitoring	'Health card' for bees to monitor stressors and impacts
	Proteomics database for wider use
Air sensor tool	Measuring atmospheric agrochemicals exposure inside and outside hives
Toolkits	Multi-media knowledge exchange to enhance tool uptake and use

Knowledge will be generated throughout the project and primarily captured initially in peer-reviewed publications (Tasks 10.3 and 11.3), and used to underpin the flagship outputs of PoshBee namely Standardised Protocols and the Bee Health Card. The current knowledge exchange strategy focuses on these two outputs initially, and will bring in additional outputs, such as the air sensor tool and toolkits, as work begins on these later in the project.

The key Deliverables, Tasks and responsible beneficiaries, underpinning these broad outputs are summarised in Appendix A.

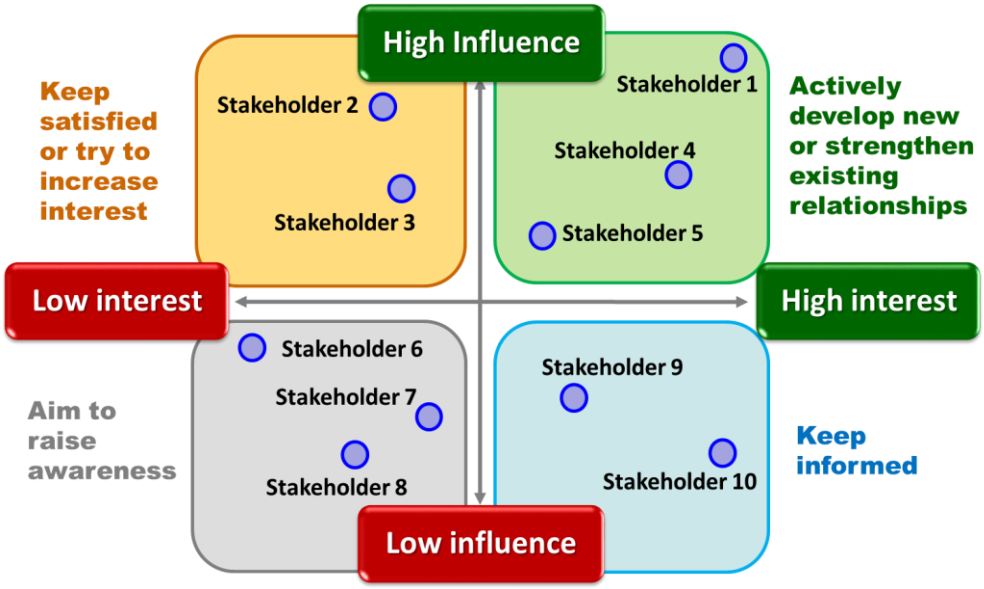
3. Stakeholder mapping

3.1 General approach to stakeholder mapping

The "who" were identified using a series of stakeholder mapping exercises to ensure the most important stakeholders relevant to PoshBee are known, and their levels of 'interest' and 'influence' assessed. Stakeholders vary in their degree of influence (i.e. whether they are direct users of outputs or can strongly effect uptake/use of an output) and interest (i.e. whether they consider the output important to their organisation). The Standardised Protocols and Bee Health Card project outputs have been mapped onto these stakeholders to provide a clear basis on how to engage with them

throughout the life of the project. For instance, strong partnerships and active dialogues will be developed/strengthened with those stakeholders with the greatest interest and influence, while other stakeholders will be kept well informed of developments. Stakeholders can be mapped out based on their influence and interest in a given PoshBee output. Building on this, different knowledge exchange strategies will be adopted (Fig. 1).

Figure 1. An example illustrating the different influence and interest stakeholders might have, and the different engagement strategies PoshBee will employ.



Following the mapping exercise and accordance with each group's defined interests, Task 11.3 will adopt one of the four following general approaches to communicating and engaging with a particular section of stakeholders:

- High influence and High interest ("Promotors"): Actively develop new and strengthen existing relationships.
- High influence and Low interest ("Latents"): Keep satisfied and try to increase interest.
- Low influence and High interest ("Defenders"): Keep informed.
- Low influence and Low interest ("Apethetics"): Aim to raise awareness.

Stakeholder mapping exercises were undertaken with the aim to identify the most important stakeholders who will use PoshBee outputs, with particular and focus on ***Standardised protocols*** and the ***Bee Health Card.*** Mapping looked at two scales: the whole of ***Europe*** and the individual country (***Member State***) level. Two exercises were run, the first, for stakeholder beneficiaries in PoshBee (beekeepers, growers and suppliers of pollination services) was run as a workshop at the 2019 PoshBee AGM, and the second, for lead research experts within the PoshBee consortium, was conducted online.

3.2 Stakeholder mapping by PoshBee stakeholders

The workshop was run on 10 January 2019 at the PoshBee AGM in Murcia. The 14 attendees included PoshBee partners representing growers, beekeepers and suppliers of pollinations services and some members of the SAC and SSC. Michael Gaffney, Kjell Ivarsson, Chris Hartfield, Robin Dean, Sam Page, Marcus Rothbart, Jonny Ulvtorp, Annalisa Saccardo, Norman Thuermer, Rainer Maffert, Paulo Mielgo,

Felix Wäckers, Cynthia Scott-Dupree, and Ed Pilling. The following countries were represented: BE, DE, FR, IT, SE, UK, CH. The facilitators were Simon Potts and Tom Breeze. Each person was asked to write the names of stakeholders, whether they were EU or Member State, on stickers and add them to a chart of influence vs. interest; this was done for Standardised Protocols and the Bee Health Card separately (see Figure 2).

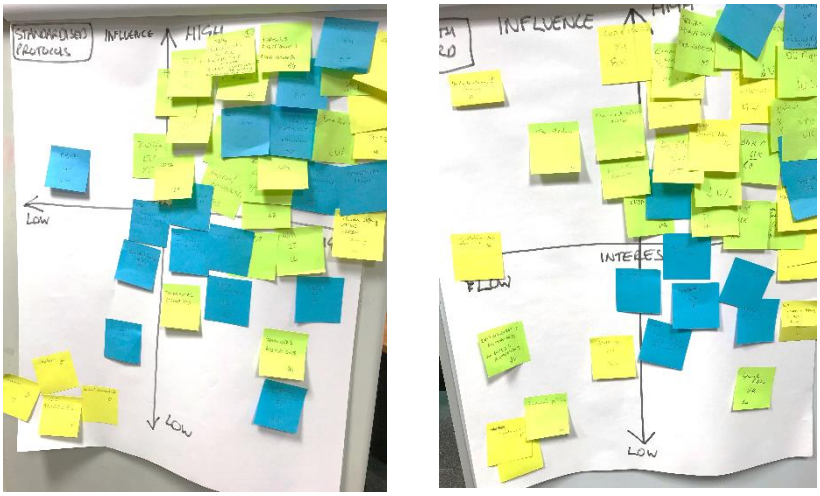


Figure 2. Outputs of the stakeholder mapping workshop at the PoshBee AGM

These maps were then digitised and analysed to assign stakeholders to broad categories and prioritise them on the basis of influence and interest. Broad categories were ***Beekeepers*** (beekeeper associations/organisations), ***Business*** (private companies, industry, SMEs), ***European Commission (***EC, DG's and agencies), ***Farmers*** (farmer associations/organisations), ***Government*** (national government agencies or ministries), ***Media***, ***NGO*** (non-governmental organisation), ***Public***, ***Researchers*** (university, government or private research organisation).

3.2.1 Results for Standardised Protocols

43 stakeholders were mapped with 38 unique names and the findings are summarised in Table 2. The top 5 stakeholders, based on the highest influence and interest, identified by the workshop participants were: EFSA, ECPA, agrochemical industry, national Ministries of Agriculture, and research scientists.

Table 2. *Standardised Protocols*. Summary of stakeholder mapping exercise conducted by PoshBee stakeholder partners for Standardised Protocols. Numbers in parentheses indicate the number of times a stakeholder was mapped, along with an indication of whether the stakeholder is national (country name or MS for Member States in general) or European (EU). Note some stakeholders were mapped onto different areas of the map by participants, which reflects individual views, attitudes and experiences. Stakeholders in **bold** were in the top most important identified.

Sector	Category	Stakeholder name
High influence & High interest	Beekeeper	**ECPA** (EU, 3); Beekeeper Associations (MS, 1)
	Business	**Agrochemical industry** (EU/MS, 2)
	EC	**EFSA** (EU, 1); DG Agri (EU, 2)
	Farmers	Farmer Organisations (MS, 2); COPA-COGECA (EU, 1)
	Government	**Board of Agriculture** (MS, 1); Country Regulatory Authorities (MS, 1); ANSES (FR, 1); Agriculture Minister, Institute of Health, ISPRA - Environment Agency, Minister of Health (IT, 1); Bundesministerium fur Umwelt, Naturschutz, nukleare Sicherheit (Federal Ministry for Environment) (DE, 1)
	NGO	PAN (EU, 1); Aurelia Stiftung (DE, 1); BUND (DE, 1); NABU (DE, 1)
	Researchers	**Scientists** (MS, 1); Universities (MS, 1); ITSAP (National Technical Institute) (FR, 1)
High influence & Low interest	Beekeepers	BBKA (UK, 1)
	EC	EFSA (EU, 1)

	NGO	Birdlife (EU, 1)
	Researchers	Agricultural Universities (MS, 1)
Low influence & High interest	Beekeepers	Beekeeper Associations (MS, 1); Imkerverband Sachsen-Anhalt e.V. (DE, 1); UNAF, SNA, SPMF (IT, 1)
	Business	Bee Material Suppliers (MS, 1)
	Farmers	Farmer Organisations (MS, 1)
	Government	National governments (MS, 1)
	NGO	Deutche Imbe Bund (DE, 1)
	Public	Public (EU/MS, 1)
Low influence & Low interest	Business	Consumer Associations (MS, 1); Food Industry (MS, 1); Sanitary Laboratories (MS, 1)
	EC	EFSA (EU, 1)
	Government	ARPA (IT, 1); National Federation of Sanitary local associations (FR, 1)
	NGO	BBCT (UK, 1); Environmental Associations (MS, 1)
	Researchers	Contract Research Organisations (MS, 1)

3.2.2 Results for the Bee Health Card

43 stakeholders were mapped with 36 unique names and the findings are summarised in Table 2. The top 5 stakeholders, based on the highest influence and interest, identified by the workshop participants were: ANSES, Beekeeper Associations, DG AGRI, national Ministries of Agriculture, and PAN.

Table 3. ***Bee Health Card*****.** Summary of stakeholder mapping exercise conducted by PoshBee stakeholder partners for the Bee Health Card. Numbers in parentheses indicate the number of times a stakeholder was mapped, along with an indication of whether the stakeholder is national (country name or MS for Member States in general) or European (EU). Note some stakeholders were mapped onto different areas of the map by participants, which reflects individual views, attitudes and experiences.

Sector	Category	Stakeholder name
High influence & High interest	Beekeeper	**Beekeeper Associations** (MS, 4); UNAAPI (IT, 1); British Bee Keepers Association (UK, 1)
	Business	Bee medicine providers (MS, 1); Agrochemical industry (MS, 1); Supermarkets (MS, 1); Queen honeybee breeders (MS, 1)
	EC	**DG AGRI** (EU, 1); DG SANTE (EU, 1); COPA COGECA (EU, 1)
	Farmers	National Farmers Union (UK, 2)
	Government	**Ministry of Agriculture** (MS, 3); **ANSES** (FR, 1); Defra (UK, 1)
	NGO	**PAN** (EU, 1); Buglife (UK, 1); Deutche Imbe Bund (DE, 1); Bumble Bee Conservation Trust (UK, 1); Campaigning NGOs (e.g. Avazz, 38 degrees, Greenpeace) (MS, 1)
	Researchers	ITSAP (National Technical Institute) (FR, 1)
High influence & Low interest	EC	EFSA (EU, 1)
	Farmers	COPA COGECA (EU, 2)
	Government	Ministry for Veterinary (MS, 1)
	Media	Media (MS, 1)
	Public	One-click-activist public (EU/MS, 1)
Low influence & High interest	Business	Bee material suppliers (MS, 1)
	Farmers	Bauernverband Sachsen-Anhalt e.V. (DE, 1)
	NGO	Environmental/Consumer associations (MS, 1)
	Public	Public (EU/MS, 1); Schools (MS, 2)
Low influence & Low interest	Beekeeper	National beekeeping associations (UNAF, SNA, SPMF) (FR, 1); Imkerverband Sachsen-Anhalt e.V. (DE, 1)
	Business	National Federation of Sanitary associations (FR, 1); Sanitary laboratories (MS, 1)
	NGO	NGOs (Aurelia Stiftung, BUND, NABU) (DE, 1); Bees Wasps and Ants Recording Society (UK, 1)
	Public	Public (EU/MS, 1)

3.3 Stakeholder mapping by researchers

The online consultation involved 18 researchers selected as leading relevant work packages and tasks within PoshBee and with a spread of geographic coverage (BE, CH, DE, EE, ES, FR, IE, IT, PO, SE, and UK). Participants included: Alex Klein, Cecilia Costa, Denis Michez, Francesco Nazzi, Jane Stout, Joachim de Miranda (plus wider SE team), Marie-Pierre Chauzat, Marika Mand (plus wider EE team), Mark Brown, Matthias Albrecht, Olli Schweiger, Peter Neumann, Philippe Bulet (plus wider CNRS/BioPark team), Pilar de la Rua, Rob Paxton, Tom Breeze, Tomasz Kiljanek, and Yves Le-Conte. Researchers were asked to map stakeholders for the ***Standardise Protocols*** and ***Bee Health Card*** separately and to consider both ***European*** and ***Member State*** stakeholders. Completed maps (Figure 3) were collated and stakeholders assigned to sectors and broad category types (as for the exercise above).

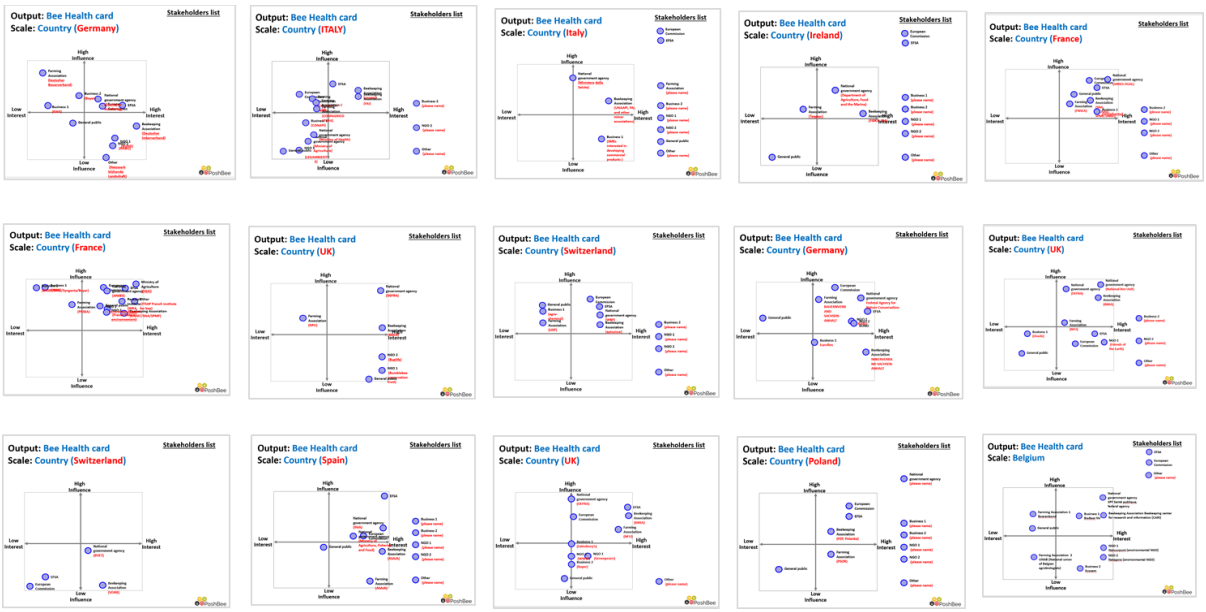


Figure 3: Examples of completed stakeholder maps completed by PoshBee researchers.

3.3.1 Results for Standardised Protocols

192 stakeholders were mapped with 97 unique names and the findings are summarised in Table 4. The top 6 stakeholders, based on the highest influence and interest, identified by the workshop participants were: National beekeeping associations, Agrochemical companies, ANSES, EFSA, EC, and Ministries of Agriculture.

Table 4. *Standardised Protocols*. Summary of stakeholder mapping exercise conducted by PoshBee research partners for Standardised Protocols. Numbers in parentheses indicate the number of times a stakeholder was mapped, along with an indication of whether the stakeholder is national (country name or MS for Member States in general) or European (EU). Note some stakeholders were mapped onto different areas of the map by participants, which reflects individual views, attitudes and experiences. Stakeholders in **bold** were in the top most important identified.

Sector	Category	Stakeholder name
High influence & High interest	Beekeeper	**National beekeeping association**; Apisuisse (CH, 1); BBKA (UK, 3) ; Bee-Life (EU, 1); BF (SE, 1); CARI (BE, 1); EAPB (EE, 1); EPBA (EU, 1); FAI (IT, 1); FNOSAD (FR, 1); SBR (SE, 1); SNA (FR, 1); SPMF (FR, 1); UNAAPI (IT, 1); UNAF (FR)
	Business	**Agrochemical company**; (EU/MS, 4); BASF (EU/MS, 2); Bayer (EU/MS, 3); BioBest (MS, 1); Eurofins (EU/MS, 1); KEMI (SE, 1); KRAV (SE, 1); LabServices (EU, 1); Phytopharma (EU, 1); Sainsbury's (UK, 1); Syngenta (EU/MS, 1); Vetopharma (EU, 1)
	EC	**ANSES** (FR, 2); **EC** (EU, 13); **EFSA** (EU, 16)

	Farmers	Boerenbond (BE, 1); CIA (IT, 1); COLDIRETTI (IT, 1); CONFAGRICOLTURA (IT, 1); COPA-COGECA (EU, 1); NFU (UK, 2)
	Government	**Ministry of Agriculture;** Defra (UK, 3); DGAL (FR, 1); Federal Agency for Nature Conservation (DE, 2); INIA (ES, 1); Italian Ministry of Health (IT, 1); Jordbruksverket (SE, 1); Livsmedelsverket (SE, 1); Ministero Politiche Agricole (IT, 1); Ministry of Agriculture (IT, 1); Ministry of Agriculture, Fisheries and Food (ES, 1); Naturvårdsverket (SE, 1); NBU (UK, 1); SPF Santé publique, federal agency (BE, 1); WBF (CH, 1)
	Media	Media (EU/MS, 2)
	NGO	ECNC (EU, 1); IUCN (EU, 1); Pollinis (EU, 1)
	Public	Public (EU/MS, 3)
	Researchers	INRA (FR, 1); ITSAP French institute for bee (FR, 1)
High influence & Low interest	Beekeeper	FAI (IT, 1); UNAAPI (IT, 1)
	Business	AGROFARMA (IT, 1); Bayer (EU/MS, 1); KWS (DE, 1)
	EC	EC (EU, 1)
	Farmers	BAUERNVERBAND SACHSEN-ANHALT (DE, 1); COLDIRETTI (IT, 1); COPA-COGECA (EU, 4); Deutscher Bauerverband (DE, 1); FNSEA (FR, 1); HS (SE, 1); LRF (SE, 1); NFU (UK, 1); PSOR (PO, 1); Teagasc (IE, 1); USP (CH)
	Government	Department of Agriculture, Food and the Marine (IE, 1)
	Public	Public (EU/MS, 8)
Low influence & High interest	Beekeepers	VDRB (CH, 1)
	Business	LP (SE, 1)
	EC	EC (EU, 1)
	NGO	Ecosem (BE, 1); Greenpeace (EU, 1); LEGAMBIENTE (IT, 1); Natagora (BE, 1); Natuurpunt (BE, 1); WWF (EU, 1)
	Public	Public (EU/MS, 9)
Low influence & Low interest	Beekeeper	ASAJA (ES, 1);); Bee-Life (EU, 1); Deutscher Imkerverein (DE, 1); EPBA (EU, 2); Federation of Irish Beekeepers' Associations (IE, 1); IMKERVERBAND SACHSEN-ANHALT (DE, 1); Irish Beekeepers Association (IE, 1); Polanka (PO, 1); PZP (PO,1)
	Business	Bayer (EU/MS, 1); BioBasiq (SE, 1); CONAPI (IT, 1): Eurofins (EU, 1); Oracle (UK, 1)
	Farmers	ASAJA (ES, 1); National union of Belgian agrobiologists (BE, 1)
	Government	BLW (CH, 1); BVET (CH, 1); Deutsche Bundestag (DE, 1); Estonian Chamber of Agriculture and Commerce (EE, 1)
	NGO	All-Ireland Pollinator Plan (IE, 1); Apimondia (EU, 1); BBCT (UK, 1BugLife (UK, 1); Bund (DE, 1); COLOSS (EU, 1); Friends of the Earth (EU/MS, 1); Greenpeace (EU, 1); IUCN (EU, 1); NABU (DE, 1); Naturskyddsföreningen (SE, 1); PAN (EU, 1); Pollinera Sverige (SE, 1); WWF (EU, 2)
	Public	Public (EU/MS, 6)
	Researchers	Academia (EU, 2)

3.3.1 Results for the Bee Health Card

219 stakeholders were mapped with 102 unique names and the findings are summarised in Table 5. The top 4 stakeholders, based on the highest influence and interest, identified by the workshop participants were: National beekeeping associations, EFSA, EC, and Ministries responsible for bees/bee health.

Table 5. ***Bee Health Card*****.** Summary of stakeholder mapping exercise conducted by PoshBee research partners for the Bee Health Card. Numbers in parentheses indicate the number of times a stakeholder was mapped, along with an indication of whether the stakeholder is national (country name or MS for Member States in general) or European (EU). Note some stakeholders were mapped onto different areas of the map by participants, which reflects individual views, attitudes and experiences. Stakeholders in **bold** were in the top most important identified.

Sector	Category	Stakeholder name
High influence & High interest	Beekeeper	**National beekeeping association;** Apisuisse (CH, 1); BBKA (UK, 3); CARI (BE, 1); Bee-Life (EU, 2); EAPB (EE, 1); EPBA (EU, 1); FAI (IT, 2); FIBKA (IE, 1); FNOSAD (Fr, 2); IBA (IE, 1); Polanka (PO, 1); PZP (PO, 1); SNA (FR, 3); SPMF (FR, 3); UNA (FR, 1); UNAAPI (IT, 3); UNAF (FR, 2)

	Business	Bayer (EU/MS, 3); BioBest (BE, 1); Eurofins (EU/MS, 2); LabServices (EU/MS, 2); LP (SE, 1); Phytopharma (FR, 1); Syngenta (EU/MS, 2); Vetopharma (FR, 2)
	EC	**EC** (EU, 15); **EFSA** (EU, 16)
	Farmers	BAUERNVERBAND SACHSEN-ANHALT (DE, 1); COLDIRETTI (IT, 1); COPA-COGECA (EU, 2); FNSEA (FR, 1); KRAV (SE, 1); NFU (UK, 2)
	Government	**Ministry responsible for bees/bee health**; ANSES (FR, 3); DAGI (FR, 1); Defra (UK, 3); Department of Agriculture, Food and the Marine (IE, 1); Deutscher Bundestag (DE, 1); Estonian Chamber of Agriculture and Commerce (EE, 1); INIA (ES, 1); Jordbruksverket (SE, 1); KEMI (SE, 1); Livsmedelsverket (SE, 1); Ministero della Salute (IT, 1); National Bee Unit (UK, 1); Naturvårdsverket (SE, 1); SPF Santé publique (FR, 1); WBF (CH, 1)
	Media	Media (EU/SE, 2)
	NGO	Apimondia (EU, 1); BUND (DE, 1); COLOSS (EU, 1); ECNC (EU, 1); France Nature Environment (FR, 1); Générations futures (FR, 1); IUCN (EU, 1); NABU (DE, 1)
	Public	Public (EU/MS, 4)
	Researchers	Academics (EU/MS, 2); CNRS (FR, 1); INRA (FR, 2); ITSAP (FR, 2)
High influence & Low interest	Business	Agrochemical industry (EU/MS, 2); BASF (EU/MS, 3); Bayer (EU/MS, 3); DoW (EU/MS, 2); KWS (DE, 1); OEPP (FR, 1); Syngenta (EU/MS, 3)
	EC	EC (EU, 1)
	Farmers	Boerenbond (BE, 1); CIA (IT, 1); CONFAGRICOLTURA (IT, 1); COPA-COGECA (EU, 3); Deutscher Bauerverband (DE, 1); FNSEA (Fr, 1); NFU (UK, 1); Teagasc (IE, 1); USP (CH, 1)
	Government	Federal Agency for Nature Conservation (DE, 1)
	NGO	Pollinis (EU, 1)
	Public	Public (EU/MS, 6)
Low influence & High interest	Business	CONAPI (IT, 1); Oracle (UK, 1); Sainsbury's (UK, 1)
	EC	EC (EU, 1)
	Farmers	HS (SE, 1); LRF (SE, 1); UNAB (BE, 1)
	Government	Agriculture Ministry (IT, 1); Health Ministry (IT, 1)
	NGO	Greenpeace (EU, 1); IUCN (EU, 1); LEGAMBIENTE (IT, 1); WWF (EU, 2)
	Public	Public (EU/MS, 11)
Low influence & Low interest	Beekeeper	ASAJA (ES, 1); Bee-Life (EU, 1); BF (SE, 1); Deutscher Imkerverband (DE, 1); EPBA (EU, 2); Europäischer Berufs- und Erwerbsimkerbund (CH, 1); IMKERVERBAND SACHSEN-ANHALT (DE, 1); Netzwerk blühende Landschaft (DE, 1); SBR (SE, 1); VDRB (CH, 1)
	Business	Bayer (EU/MS, 1); BioBasiq (SE, 1); Ecosem (BE, 1); Eurofins (EU, 2)
	Farmers	ASAJA (ES, 1); PSOR (PO, 1)
	Government	BVET (CH, 1)
	NGO	Apimondia (EU, 1); BBCT (UK, 1); BugLife (UK,1); BUND (DE,1); Friends of the Earth (UK, 1); Greenpeace (EU, 2); NABU (DE, 1); Natagora (BE, 1); Naturskyddsföreningen (SE, 1); Natuurpunt (SE, 1); PAN (EU, 1), Pollinera Sverige (SE, 1); WWF (EU, 1)
	Public	Public (EU/MS, 4)

3.4 Biases in the stakeholder mapping exercises

The stakeholder mapping exercise is an expert elucidation process aiming to characterise the different types of stakeholders relevant for PoshBee outputs. It has not been undertaken as quantitative analysis, but has used a broad range of experts to ensure that the most important stakeholders are identified. There are inevitably biases in the process given that the individual expertise, experience and geographic location are not fully representative. However, best efforts were made to include a wide diversity of experts.

Individual views of, and experiences of interaction with, stakeholders also vary and inevitably lead to different mapping positions for a given stakeholder. This is unsurprising especially with large entities such as the European Commission or large company. Even so, there was generally a strong convergence for all major stakeholders mapped.

4. Policy engagement

The mapping by both PoshBee stakeholders and researchers highlighted the importance of the European Commission, and given the prominent role of the Commission as a funder and high level decision making body we have made the development of the science-policy dialogue a high priority with dedicated Task (10.6). This will run throughout the lifetime of the project and continuously feed into the knowledge exchange and impact strategy.

A key first step, for PoshBee to engage with EC policy advisors, was a meeting with relevant policy experts on 19 October 2018. The aim was to present an overview of PoshBee to EC staff, and then start discussions about relevant policies, policy entry points, timelines and methods of engagement. Participants included:

- Jean-Charles Cavitte (PoshBee Policy Officer, DG AGRI: bee research)
- Gaétan Dubois (DG AGRI: agro-ecology research)
- Agneta Norgren (DG AGRI: apiculture programmes)
- Judit Krommer (DG AGRI: animal products' market)
- Vujadin Kovacevic (DG ENV: biodiversity/pollinator initiative)
- Josefina Enfedaque (DG RTD: biodiversity research)
- Sofie Hofkens (DG SANTE: pesticides regulation)
- Agnès Rortais (EFSA: bees)
- Cristina Soriani (DG REA: PoshBee Project Officer)
- Simon Potts, Mark Brown & Marie-Pierre Chauzat (PoshBee)

Key contacts for each policy area were identified to act as a basis for ongoing science-policy activities. Csaba Szentes (EFSA) is also a member of the PoshBee SSC and provided advice and guidance during the PoshBee 2019 AGM.

Additional activities are planned to actively engage with policymakers at the Member State and global (e.g. UN CBD, IPBES). A full report on policy engagement will be provided in Deliverable 10.8 Report on current policies and entry points relevant to PoshBee outputs and planned policy briefs.

5. Facilitating activities for knowledge exchange and dissemination

Knowledge exchange and dissemination activities are clearly outlined in work package 11 and these will cover the “how” and “when” of communications, and will draw upon work package 10 (including this report) for the “what” and “who”. There are a number of parallel ongoing activities which will support and enhance this.

Incentives and barriers. To further maximise the impact of PoshBee’s expected outputs, there is a dedicated Task 10.2, which assess the incentives for and barriers to the adoption of outputs. Although scientifically novel, the effectiveness of bee health monitoring will be largely determined by its rate of uptake. Task 10.2 will explore both objective and subjective factors that could incentivise or produce barriers to the adoption of these tools under a variety of different implementation strategies (e.g., a nationally funded scheme) determined in conjunction with stakeholders (Task 10.7). This Task will be used to inform the knowledge exchange and impact strategy.

Synthesis of project findings and external knowledge. Task 10.3: PoshBee will deliver many advances in the state of the art, and it will be essential to synthesise these in a suitable and widely available format and integrate them with other knowledge generated outside of the project in order to provide stakeholders with the best quality information. Three main topic areas will be addressed: (i) Exposure

(ii) Effects, and (iii) Omics. Each topic will synthesise the outputs generated by the relevant WP, and also identify and integrate knowledge from other EU and national activities and projects (e.g., EFSA, MUST-B, other H2020 projects) using quantitative analyses of complementary datasets, meta-analysis and review tools as appropriate. Outputs from each topic area will include manuscripts for peer-reviewed publication in the primary scientific literature coupled with non-technical summaries aimed at the relevant stakeholders identified in Task 10.1.

PoshBee Stakeholder Advisory Board (SAC). The SAC will be active throughout the project undertaking a number of roles to help facilitate knowledge exchange and impact. The SAC first formally met during the PoshBee 2019 AGM where an overview of knowledge exchange and impact activities were presented and potential areas of SAC input discussed. These included: helping map our major stakeholders; Identifying key contacts for most important stakeholders; providing guidance on tailored dissemination methods; reviewing our impact plan; and providing advice on arising issues. Attendees at the meeting included: Anne Alix (ECPA & Dow AgroSciences); Ed Pilling (Dow AgroSciences); Enric Vila & Mari Ángeles Diaz (AgroBio); Sam Page (Bumblebee Conservation Trust); and Sonja Braaker (BASF). SAC members unable to attend: Christian Maus (Bayer); Isabelle Villard (Vetopharma); and Martin Dermine (PAN-Europe). The SAC will meet annually face to face at the PoshBee AGM's and by Skype/telecon in-between.

Horizon scanning. Task 10.7: The regulations and policies surrounding the use of plant protection products are very dynamic and, given major recent shifts, it is pertinent to forward scan for upcoming threats and opportunities. This will ensure research efforts, both within and beyond PoshBee, are addressing key knowledge gaps early on. To facilitate this, we will establish a horizon scanning expert group to meet at the project mid-point and towards the end of the project. The group will comprise the WP leaders of PoshBee, members of the stakeholder advisory committee and additional representatives of industry, policy and research.

Coordination of development of tools and guides for practitioners. Task 10.5: Each WP 1-9, will produce a set of protocols, tools, and best practice guides based on their core activities. This Task aims to ensure that these outputs are developed and available for the stakeholder community (based on Tasks 10.1 and 10.2) in a timely manner within the lifetime of PoshBee, and available for knowledge exchange activities (Tasks 10.1, 10.2, 10.6 and WP11). Further, this Task will also make an inventory of other protocols, tools, and best practice guides already being used by stakeholders (e.g., beekeepers, suppliers of managed pollinators, risk assessors, growers) to help identify entry points for new PoshBee-generated outputs (see Tasks 10.1, 10.2 and 10.3).

6. Knowledge Exchange plan overview

For each expected output of PoshBee, a specific knowledge exchange plan draws upon the stakeholder mapping (Task 10.1), incentives and barriers assessment (Task 10.2), knowledge synthesis (Task 10.3), policy engagement. This provides the necessary framework for work package 11's Communication and dissemination strategy and the Exploitation Plans (Task 11.2) which will be delivered through Task 11.3 (Dissemination, communication and outreach). These are summarised in Table 6, with specific stakeholders identified in Tables 2 to 5, and will be periodically updated as outputs develop (e.g. air sensor tool) and engagement with stakeholders progresses.

Table 6. Overview of knowledge exchange plans for Standardised protocols and the Bee Health Card.

PoshBee Output: "What"	**Stakeholders: "Who"**	**Dissemination, communication and outreach: "How" and "When"**
Standardised protocols	**Priority Stakeholders** ANSES, Agrochemical industry, EC, ECPA, EFSA, National ministries of agriculture, and Researchers	Task 11.2: Communication and dissemination strategy and the Exploitation Plans and Task 11.3: Dissemination, communication and outreach
	Other Stakeholders COPA-COGECA, National farmer organisations, NGOs, Media, Pollination service suppliers, and Public	
Bee Health Card	**Priority Stakeholders** ANSES, Agrochemical industry, Businesses (e.g. Bee medicine suppliers, queen honeybee breeders), EC, EFSA, National beekeeping associations, Media, National farmer organisations, National ministries of agriculture, and National ministries for bee health	Task 11.2: Communication and dissemination strategy and the Exploitation Plans and Task 11.3: Dissemination, communication and outreach
	Other Stakeholders Businesses (agri-food, Pollination service suppliers retailers), NGOs, Public, and Researchers	

Appendix A: Detailed mapping of Deliverables on to expected outputs. * Denotes key Deliverable contributing, acronym and number in parentheses are the Deliverable lead beneficiary and month of delivery. Underlined denotes proposed overall lead for that output. HB = honey bee; BB = bumble bee; SB = solitary bee.

Output Type	Specific output	Lead	Deliverables
Knowledge	Chronic and sub-lethal effects of chemicals and combinations (1 insecticide, 1 fungicide, Glyphosate)	INRA, EMU	3.1 (INRA, 27) Toxicokinetics of 3 chemicals in bees 3.3 (INRA, 27) Acute/chronic chemical effects and interactions in bees 3.4 (EMU, 27) Toxicokinetics/dynamics of chemicals in bees 4.1 (UMONS, 34) Chemical effects on SB
	Effects of chemical x pathogen and chemical x nutrition	MLU, RHUL, BERN, UMONS	*4.2 (MLU, 52) Chemical x pathogen x nutrition effects on SB 5.1 (UMONS, 34) Nutritional requirements of bees *5.2 & 5.3 (UMONS, 51) Chemical x nutrition effects on bees *6.1 (BERN, 39) Chemical x pathogen effects on HB *6.2 & 6.3 (RHUL, 39) Chemical x pathogen effects on BB *6.4 (MLU, 39) Chemical x pathogen effects on SB 10.3 (ANSES, 56) Synthesis of multiple stressor exposure *10.4 (MLU, 56) Synthesis of multiple stressor impacts
	Field level effects of stressors	WBF, ALU-FR	7.1 & 7.2 (WBF, 39) Multiple stressor effects on bees in semi-field 7.3 (ALU-FR, 60) Multiple stressor effects on bees in field
Protocols for bee regulatory testing schemes	Testing chemicals on life-stages and castes/sexes of model species	EMU	3.2 (EMU, 27) Improved protocols for chemical testing in bees
	Ground nesting model SB	MLU	*4.2 (MLU, 52) Chemical x pathogen x nutrition effects on SB
	Chemical x pathogen/nutrition	MLU, RHUL, BERN, UMONS	*4.2 (MLU, 52) Chemical x pathogen x nutrition effects on SB 5.1 (UMONS, 51) Nutritional requirements of bees *5.2 & 5.3 (UMONS, 51) Chemical x nutrition effects on bees *6.1 (BERN, 39) Chemical x pathogen effects on HB *6.2 & 6.3 (RHUL, 39) Chemical x pathogen effects on BB *6.4 (MLU, 39) Chemical x pathogen effects on SB
	Field testing	ALU-FR, WBF	7.1 & 7.2 (WBF, 39) Multiple stressor effects on bees in semi-field 7.3 (ALU-FR, 60) Multiple stressor effects on bees in field
Models	Holistic and agent based models of bee health (improved HB and BB, plus new SB models)	AU, SLU, UNIUD	8.1 (SLU, 39) Bee health definition and indicators 8.2 (UNIUD, 51) Chemical effects on bee health model 8.3 (AU, 36) Agent based risk assessment model for BB

			*8.4 (AU, 60) Risk assessment tool for EFSA
Proteomics tools for health monitoring	'Health card' for bees to monitor stressors and impacts	CNRS	9.1 (CNRS, 6) Haemolymph collection kit and tool 9.14 (CNRS, 48) HB MALDI imaging method *9.15 (CNRS, 60) Use of BeeTyping for monitoring *10.5 (CNRS, 56) Synthesis of Omics approaches
	Proteomics database for wider use	CNRS	D9.10 (CNRS, 60) Consolidated peptide/protein database and markers
Air sensor tool	Measuring atmospheric agrochemicals exposure in/outside hives	Bordeaux	D2.6 (Bordeaux, 39) New technology to measure environmental contamination
Toolkits	Multi-media knowledge exchange to enhance tool uptake and use	UREAD, RHUL, BERN	10.1 (UREAD, 12) Impact strategy *10.2 (UREAD, 48) Incentives and barriers to tool adoption *10.6 (BERN, 58) Responses to multiple stressors *10.7 (RHUL, 56) Overview of tools, protocols, guides *10.8 (UREAD, 24) Policy entry points and briefs