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Development of an Early Warning System to anticipate emerging risks in Plant Health in the UK - *ex ante* assessment:

proof of concept study

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EFSA / EPPO Joint workshop

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Project specifics

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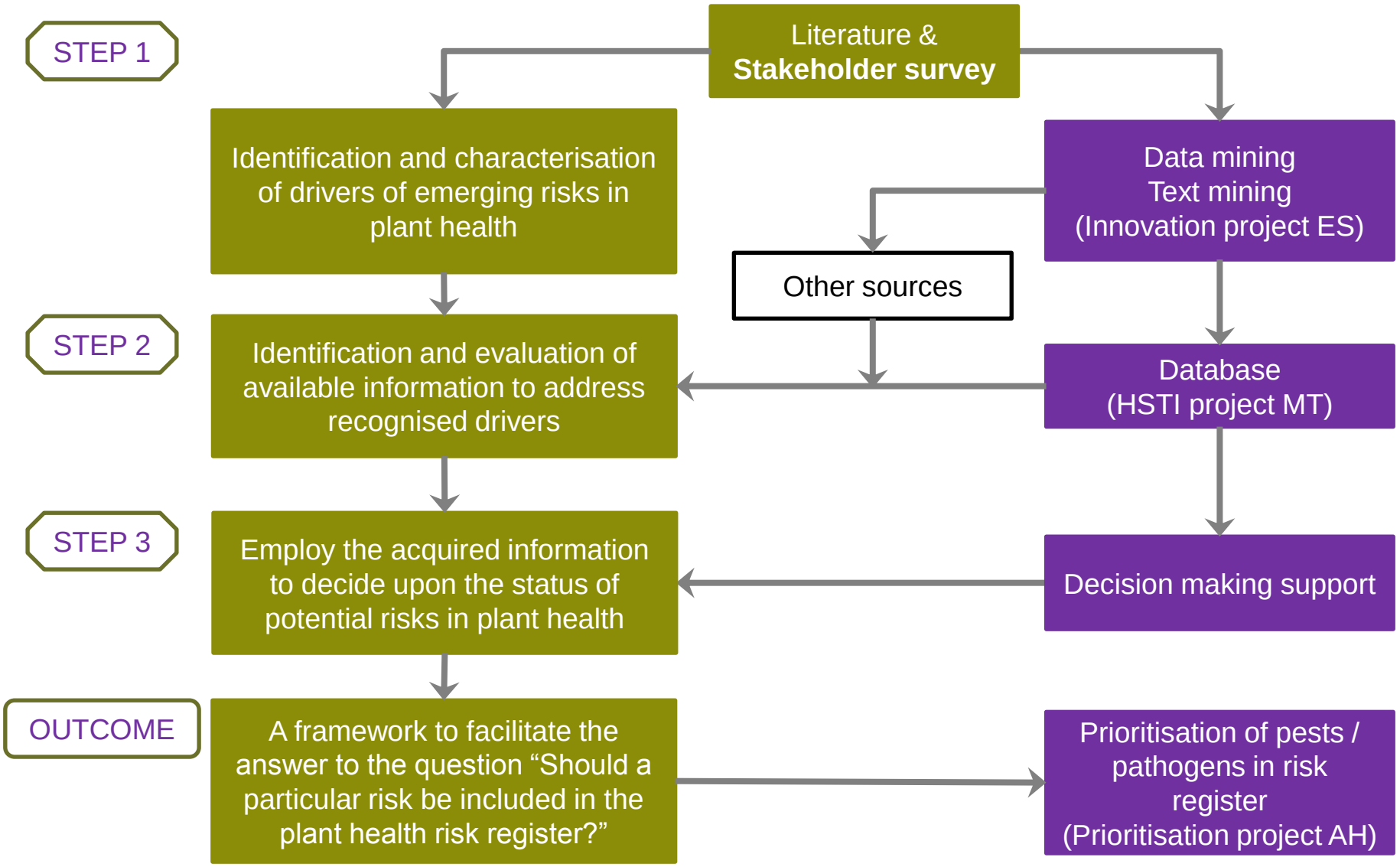
- Context
  - Accidental entries potentially affecting native broadleaf trees
  - Timeframe: next 5 years
- Proof of concept
  - Small, experimental scale
  - Progress in separate modules
    - Case study to test framework
- Main challenges
  - Gathering and flow of information
  - Filtering gathered information
  - Synthesising information to sense-making units
  - Evaluating units
  - Output to risk register

Overview of modules contributing to a framework



Definitions – emerging risks

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- New / unknown threats, e.g. new (to the UK) pests and/or diseases, new pathways of new (to the UK) pests and/or diseases
  - This would help predict a crisis similar to the one related to *Phytopthora* and/or *Chalara* plant health crises in the UK

- New / unknown "triggers" to known threats, *i.e.* pests and/or diseases already in the UK plant health risk register
  - This would help updating the prioritisation in the UK plant health risk register

Stakeholder consultation exercise (Defra)

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Expert / Stakeholder affiliation		Number of individual invitations sent	Number of responses received	Number of respondents participating in workshop
Academia	24	31	4*	3*
Government departments & government affiliated organisations	25	66 62 sent by FERA 4 invited within	8	3
In house (*i.e.* FERA)		8	3	0
Industry & not for profit organisations	79	111 108 sent by FERA 3 invited within	13	2
Other – private email addresses	14	14	2	1
TOTAL	142	230	30	9

* *Via* private email address

Consultation exercise

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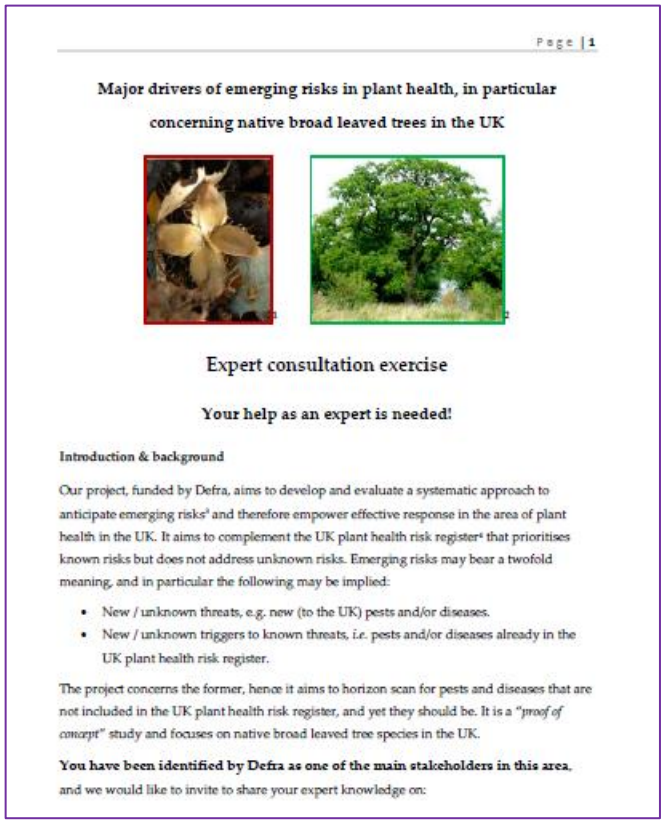

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Major drivers of emerging risks in plant health, in particular concerning native broad leaved trees in the UK

Expert consultation exercise

Your help as an expert is needed!

Introduction & background

Our project, funded by Defra, aims to develop and evaluate a systematic approach to anticipate emerging risks[3] and therefore empower effective response in the area of plant health in the UK. It aims to complement the UK plant health risk register[4] that prioritises known risks but does not address unknown risks. Emerging risks may bear a twofold meaning, and in particular the following may be implied:

- New / unknown threats, e.g. new (to the UK) pests and/or diseases.
- New / unknown triggers to known threats, *i.e.* pests and/or diseases already in the UK plant health risk register.

The project concerns the former, hence it aims to horizon scan for pests and diseases that are not included in the UK plant health risk register, and yet they should be. It is a *"proof of concept"* study and focuses on native broad leaved tree species in the UK.

You have been identified by Defra as one of the main stakeholders in this area, and we would like to invite to share your expert knowledge on:

Question 1 → **Drivers** that contribute to the occurrence of emerging risks for native broad leaved tree species in the UK

Question 2 → Crucial **temporal and/or spatial changes** linked with each identified driver → appropriate indicators of emerging risks for native broad leaved tree species in the UK

Questions 3 and 4 → **Monitoring** appropriate indicators (per driver) in order to detect early signals of emerging plant health risks of native broad leaved trees in the UK→ what **information** is **needed**, where can be found or how could be collected

Analysing acquired information

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Drivers and crucial temporal and spatial changes

Areas (*i.e.* large group) of relevant issues

→ Revised and improved by WG3 in workshop

Capacity	6
Control / Regulation	20
Climate change	8
Detection	4
Land Use	28
Host	9
Pest / Pathogen	14
Policy making	4
Public	14
Trade	25
Uncertainties	3
Weather	1
Other environmental, economic, political	7

Examples of included issues

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- Crucial temporal and spatial changes
  - E.g. changes in character of age and structure of tree populations
- Emerging trends
  - E.g. market trends
- Policy making
  - E.g. EU plans for change in relevant policies
- Forestry practices
  - E.g. planting of non-natives
- Other environmental, economic, political changes
  - E.g. catastrophic events

Employ the acquired information to decide upon the status of potential risks in plant health

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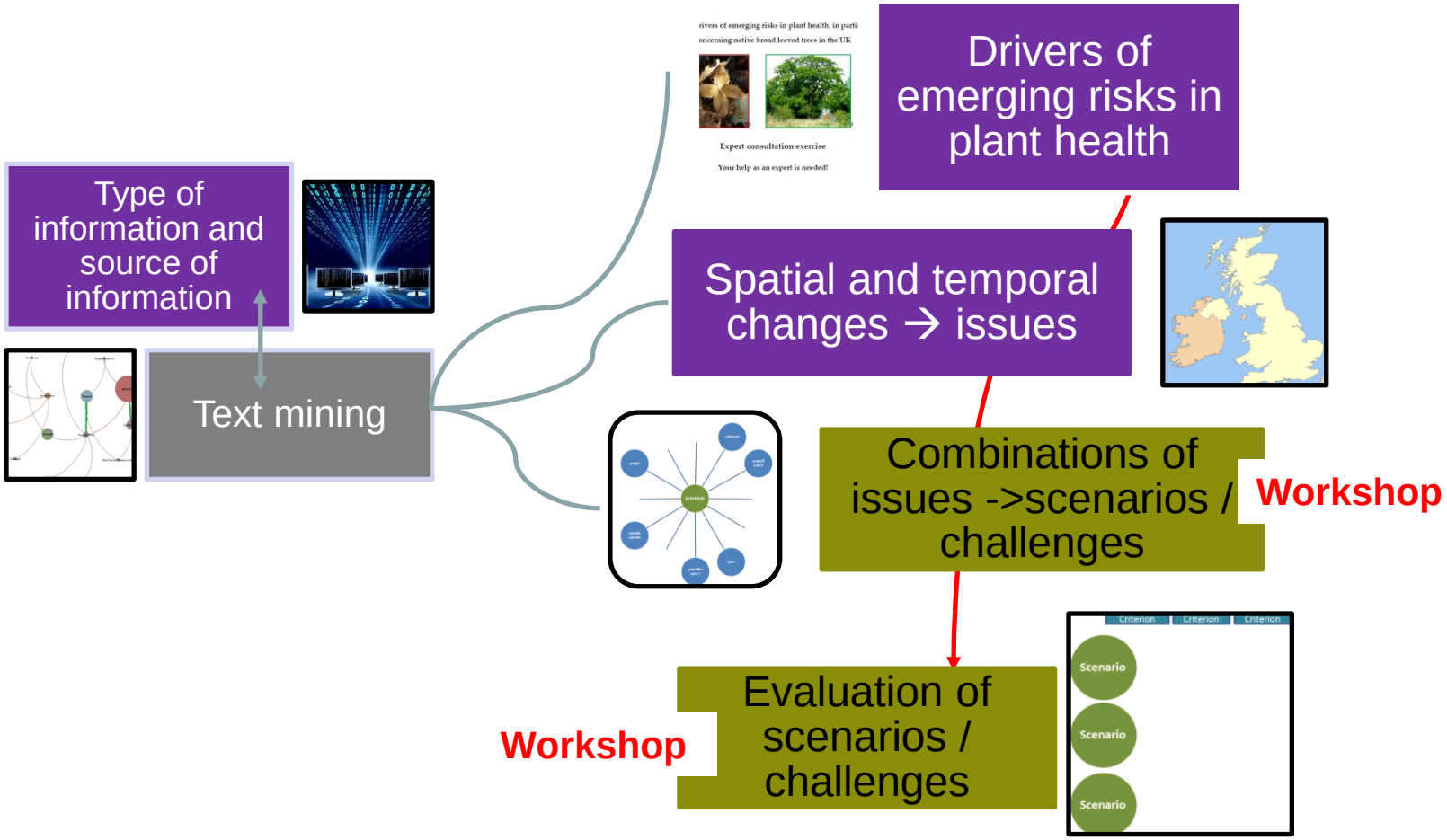

Combinations of issues –> scenarios / challenges

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- Highly complex system
- Dynamic inter-relationships
- Issues interlinked in more than one way instead of sequence of steps

Expert workshop – activity 1

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Review the issues in the separate groups

Add more issues as required, e.g. pest / pathogen / host species; global issues:
http://foresight.jrc.ec.europa.eu/survey_issues.pdf

Synthesize issues in terms of potential risk scenarios / challenges for plant health of native broadleaf trees in the UK

Minimum number: 3
Maximum number: N/A

Expert workshop 27th March 2014, Fera

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Expertise	WG1	WG2	WG3
Economics		1	
Integrated pest assessment			1
Landscape	1		1
Plant conservation	1		
Plant health – Control	1		
Plant Pathology		1	
Plant Pest assessment		1	
Risk analysis		1	1
Tree pathology	1	1	1
Total	**4**	**5**	**4**

WG approaches and common denominators

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- Approaches developed in each working group were very different but common denominators were:
  - Pathway
  - Demand (links with trade)
    - Public demand - directly or indirectly linked with pests
    - Industry demand – source materials from cheaper places for which quality control may be lesser and risk of introducing pests higher

Working Group 1 - different possible ways to approach this

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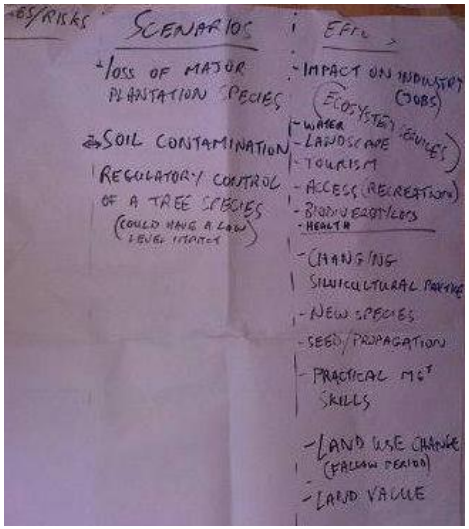
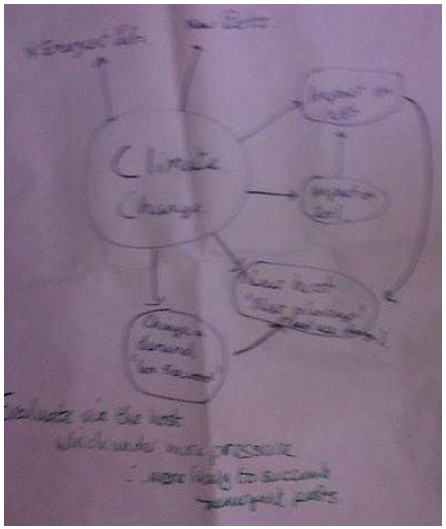
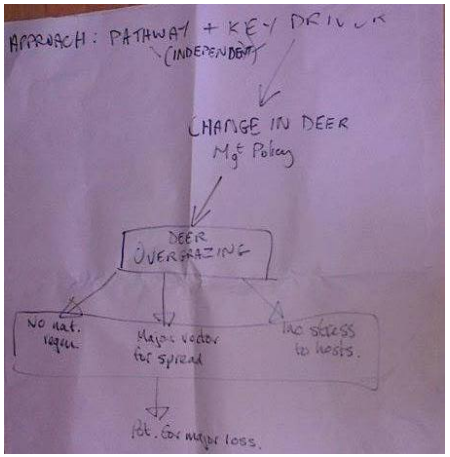
Everything is dynamic – “name” depends on time and space

Core impact - then causes and effects	Key driver - then evaluation via hosts	Pathway perspective	Pathway and key driver







Working Group 2 – matrix approach

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Dimensions to take into account; a dimension could lead to a scenario or a combination of dimensions could lead to a scenario.

- Multiple starting points
- Dynamic movement of points across, *i.e.* up/down, left/right
- Dimensions could affect positively or negatively, e.g. environment:
  - Positively on receptors
  - Negatively on agents

Working Group 3 – likelihood and impact approach

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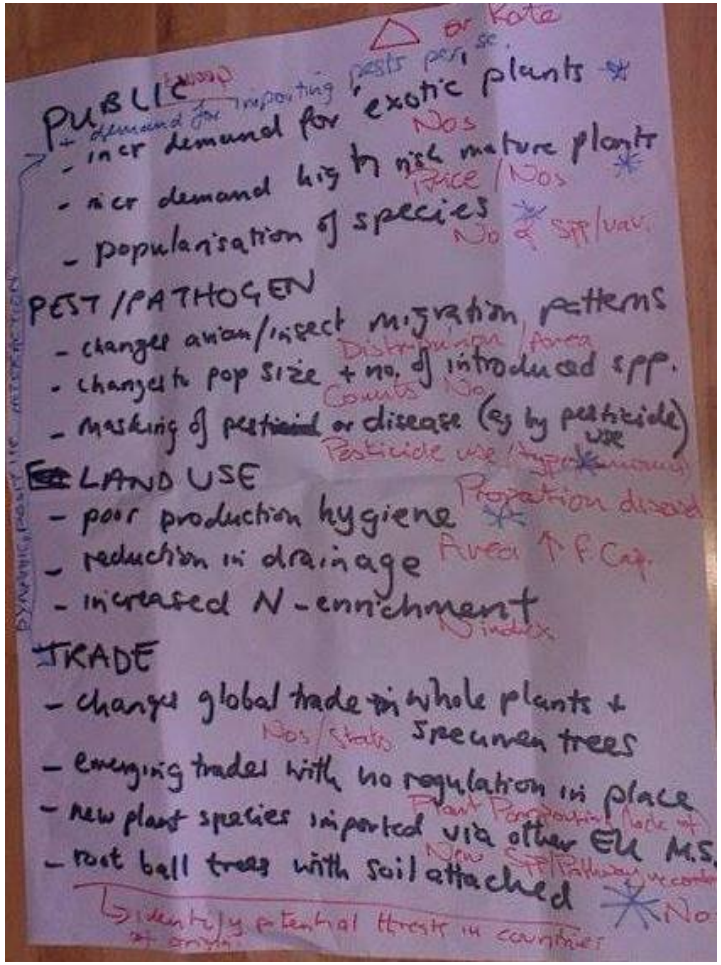
- Review of identified issues
- Devise a “quick” scale (1-5) – needs to be re evaluated and refined
- Assess likelihood of each issue to lead to an emerging threat
- Identified the issues with the most “5”s
  - + Possibility to employ this for filtering information
  - - Issues that individually may not seem “that“ important but in combination with other may be crucial in leading to an emerging threat



Expert workshop – activity 2

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Employ the potential scenarios / challenges developed in your working group to decide the criteria you would use in order to evaluate them

- Discrete, measurable criteria
- Measurement units
- Scale

Working Group 1 – List

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- Additional things to the ones already in place in the risk register
- Scenario from a host point of view
- Assumption that risk register is measuring the social economic environmental impacts / values and also captures effectively the effect of mitigations

	Criterion 1	Criterion 2	Criterion 3	Criterion 4
Scenario 1				
Scenario 2				
Scenario 3				
Scenario 4				

- List of criteria in workshop
- *Via* email

Working group 1 – List

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Measurable

- Development of trade – rate of change (increase / decrease)
  - Trade volumes (changes – rate of change)
  - Changes in packaging methods (again volume)
- Synergistic effects - multiple pressures on hosts
  - Count of pests impacting on the same host
  - Count of pathogens impacting on the same host
  - Count of pressures impacting on the same host
- On going impacts – monetary value
- Impact on land value – monetary value

- Impact on industry resilience
- Environmental resilience
- Impact on consumer choice (Private home – garden; health and well being)

Added

- To take into account pest/host
  - Pathogenicity of pest/pathogen
  - Vulnerability of host

Working group 1 – List

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Participant of WG1 *via* email

- Biological diversity
  - Range of native tree species
  - Number of organisms supported by different tree types
- Employment
  - Change in number of people employed per unit area
- Site productivity
  - Volume of timber
  - Range of species that can be supported
- Water quality
  - Suspended solids
  - pH
  - Pesticide concentration
- Scale of impact
  - Local, regional, national
- Scope of impact (probably related to biological diversity)
  - Does it affect a narrow or wide range of species?
  - Does it have a secondary impact on a narrow or wide range of associated species?

Working Group 2 – Quantitative Pathway Risk Assessment

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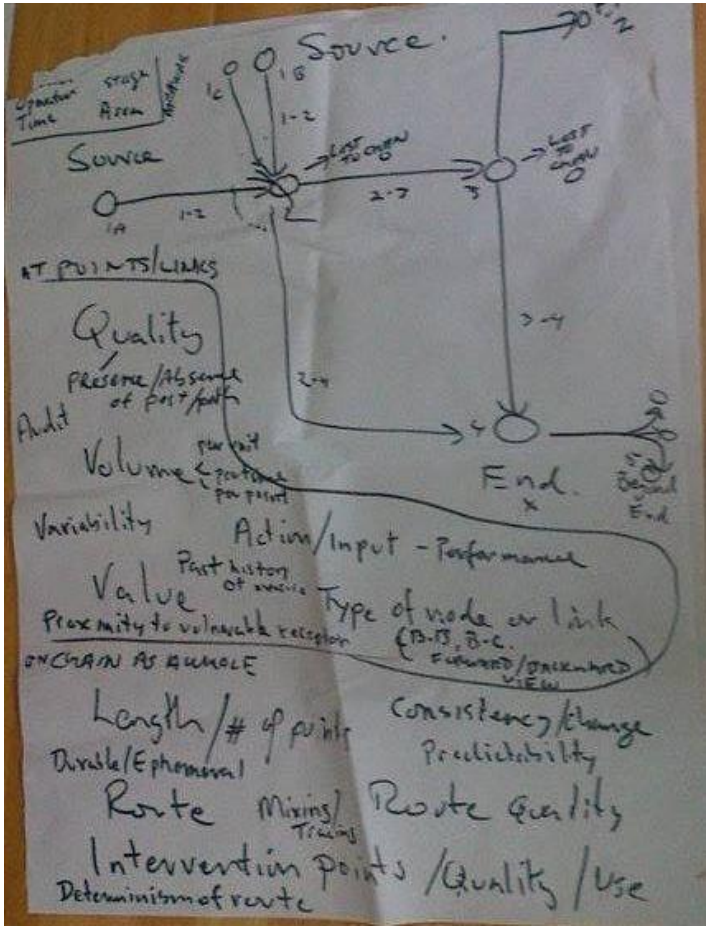
Modelling pathway – supply chain

- Idealised short supply chain with material moving from one point to another - measuring each point
- Metrics
  - Product, e.g. biomass
  - Operation
  - Time
  - Area,
  - Stage
- Number of nodes in the system, links
- Traceability of products – not in place
- Could this help us to prioritise scenarios?
  - Yes, you can identify pathways that would hold “high” risk
  - It may not be dependent on pathogens
  - Predictable routes, unpredictable routes – but risk of pests / different from uncertainties tagged



Working group 3 – Multivariate analysis of scenarios

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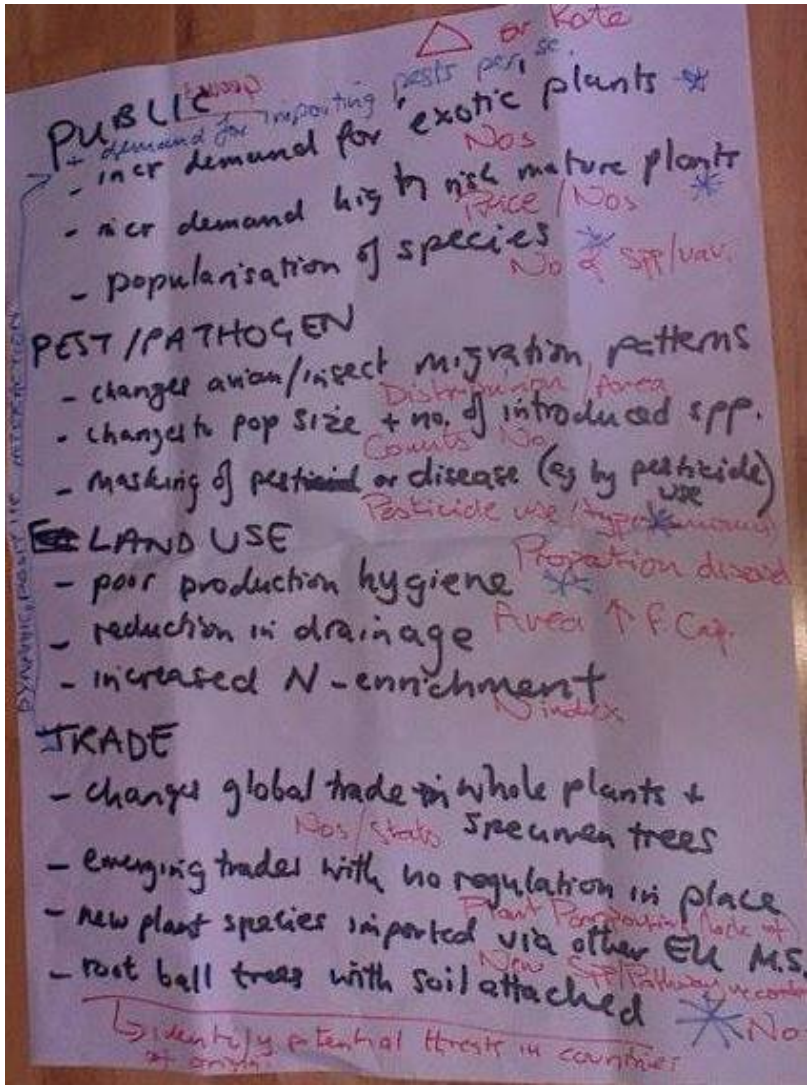
Measurement of modules of scenario

- Multidimensional issue
  - Assumption that the issues used are the criteria for the scenario
  - Modules are measurable, but are these enough to estimate “potential risk” – each pathway may have a different risk associated
- Approach dependent on pathogen
  - Risk of introduction, entry, spread, establishment (all in risk register)
- Multivariate analysis with all components together – but most probably there is not enough information to populate the model



Key messages / challenges

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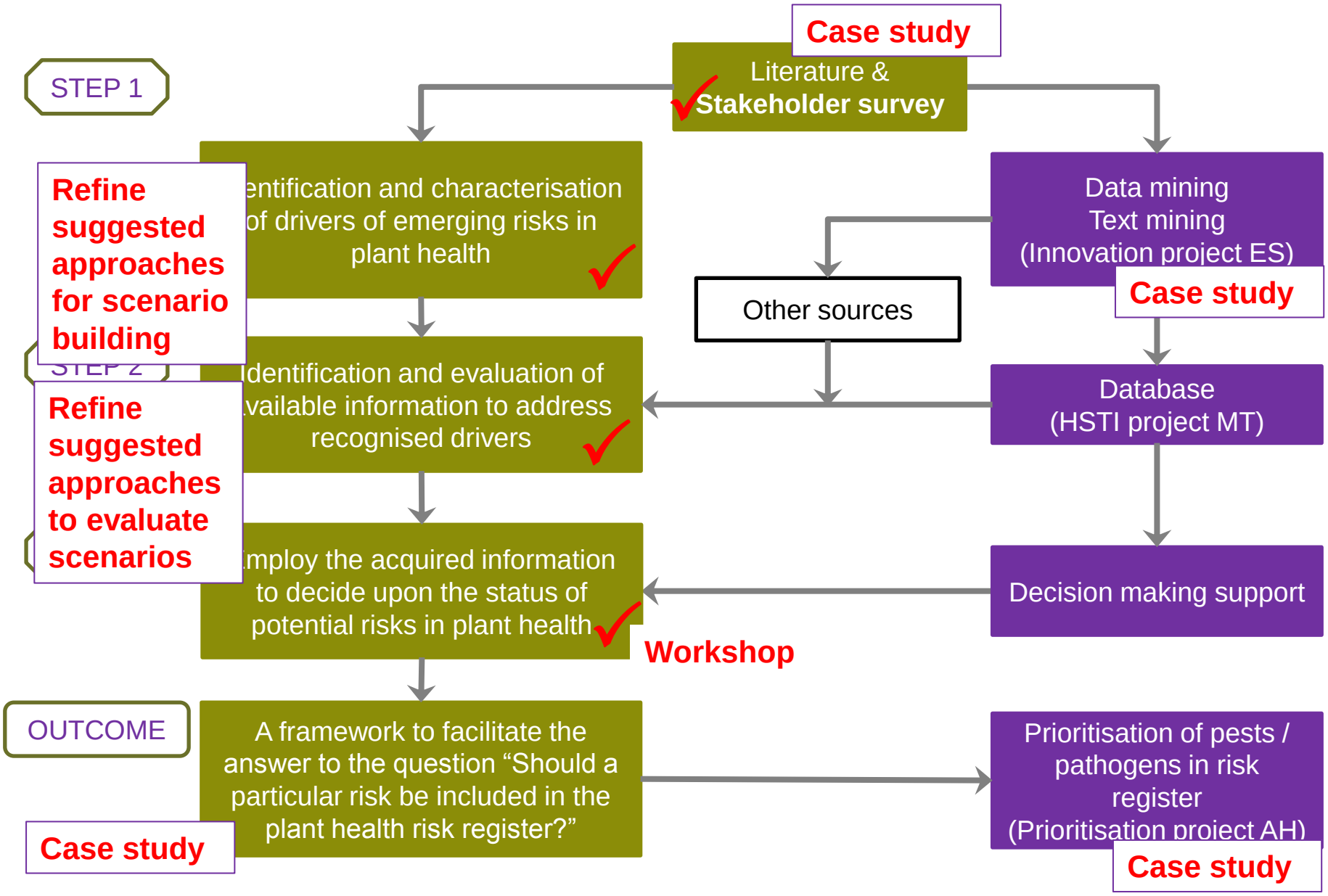
- Filtering the information to create plausible future scenarios
- Multi criteria appraisal of scenarios
  - Measurable, discrete criteria applicable across a range of scenarios
  - Measures beyond cost
- Pest/host - inevitable to be at the centre of scenario evaluation?
  - Pathogenicity of pest / pathogen
  - Vulnerability of host
- Pathway importance
  - Collaboration and intelligence sharing with industry

Next steps


Case study
Literature &
Stakeholder survey
STEP 1
Refine suggested approaches for scenario building
entification and characterisation of drivers of emerging risks in plant health
Data mining
Text mining
(Innovation project ES)
Case study
Other sources
Refine suggested approaches to evaluate scenarios
dentification and evaluation of vailable information to address recognised drivers
Database
(HSTI project MT)
mploy the acquired information to decide upon the status of potential risks in plant health
Decision making support
Workshop
OUTCOME
A framework to facilitate the answer to the question “Should a particular risk be included in the plant health risk register?”
Prioritisation of pests / pathogens in risk register
(Prioritisation project AH)
Case study
Case study

Acknowledgments

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- Defra
  - Funding
  - David Farnell for useful guidance and help in consultation exercise
- Fera colleagues
  - Sarah Hugo, Andy Hart, Glyn Jones, Neil Parkinson
- All experts
  - Responders of consultation exercise (Jan 2014)
  - Participants in the experts' workshop (Mar 2014)

Q & A session

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Thank you for your attention!