



## Prospective study on the evolution of agricultural techniques

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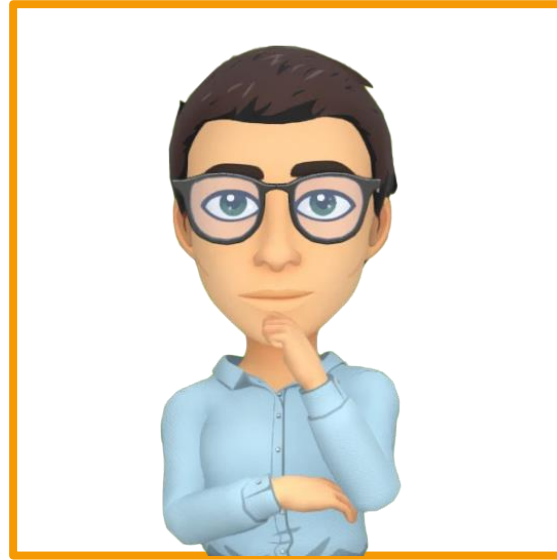
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# Who are we ?



**David TARGY**

Economist / University of Paris  
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**Paul PANNETIER**

Agronomic engineer / UniLaSalle  
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# Plan



**01** AXEMA and foresight

**02** Methodology of the study

**03** Presentation of results

01

# AXEMA and foresight

The French union of industrial players in the  
agricultural equipment sector



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# A trade union representing the agricultural equipment sector

AXEMA in figures is...

**260** Member companies

**86 %** Small and medium-sized enterprises

**21** Product families

**4** Areas of expertise

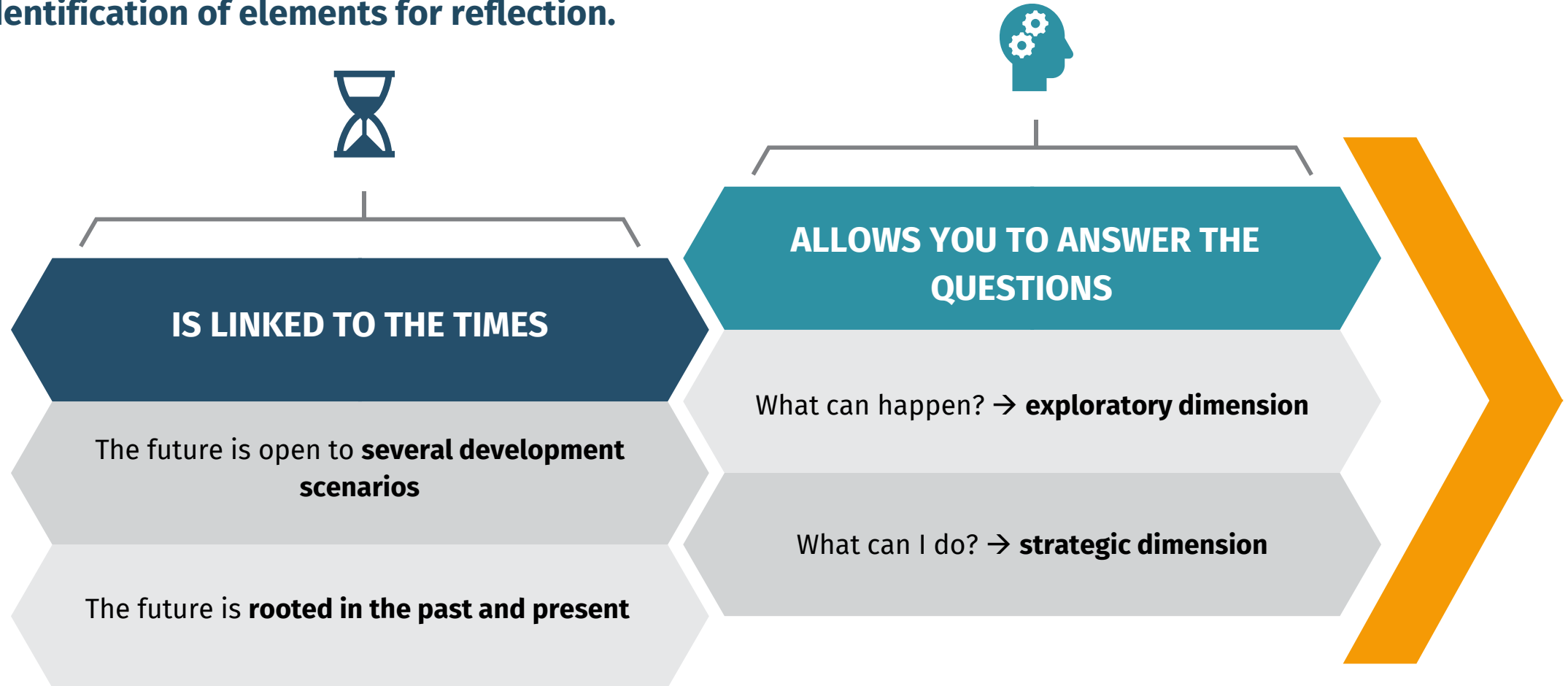
**15** Staff

**5** Strategic directions



# The foresight...

Is a set of research studies concerning the future evolution of societies and allowing the identification of elements for reflection.



# Choice of the subject of the foresight study

## Weed control

### Social

Impact of chemical weed control techniques on farmers' and public health



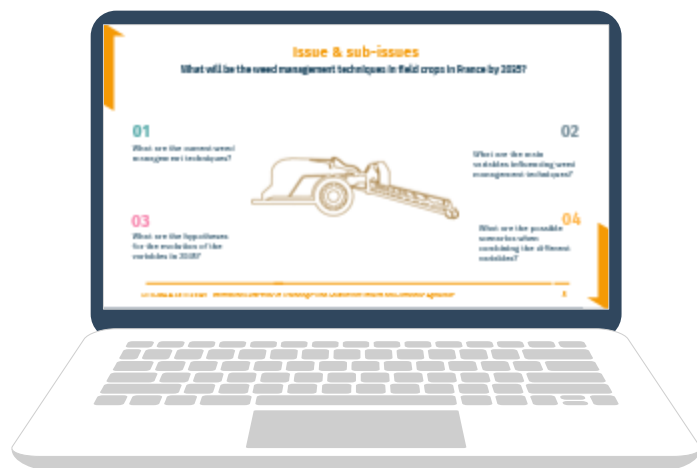
### Environmental

Impact of chemical weed control techniques on water and soil pollution and on biodiversity



### Economic

Impact of practices on yields and food prices



# Issue & sub-issues

**What will be the weed management techniques in field crops in France by 2035?**

01

What are the current weed management techniques?

02

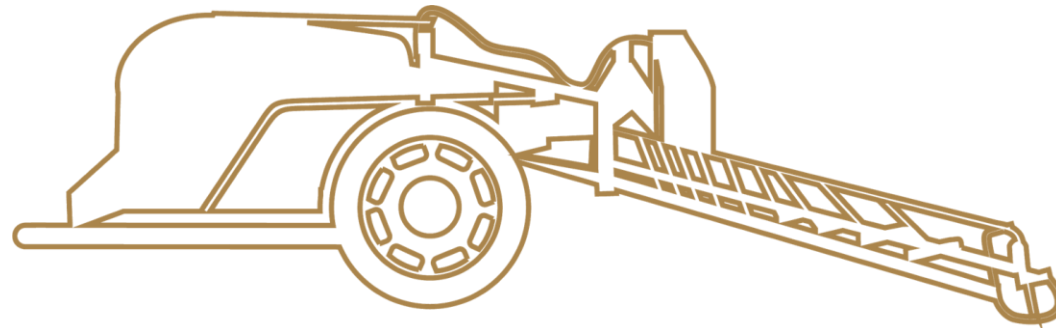
What are the main variables influencing weed management techniques?

03

What are the hypotheses for the evolution of the variables in 2035?

04

What are the possible scenarios when combining the different variables?



02

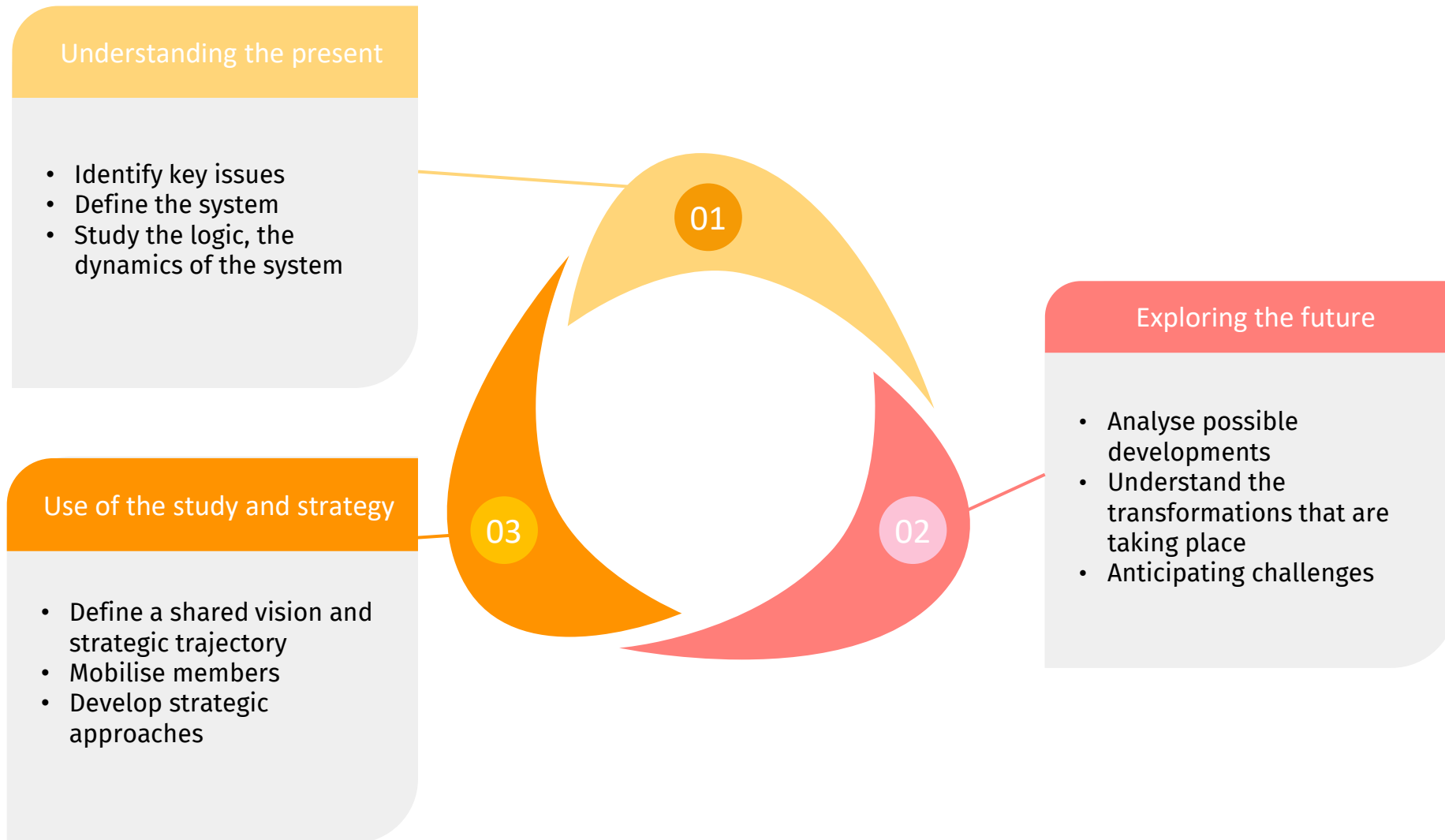
## Methodology of the study

Exploratory foresight



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# The stages of a prospective process



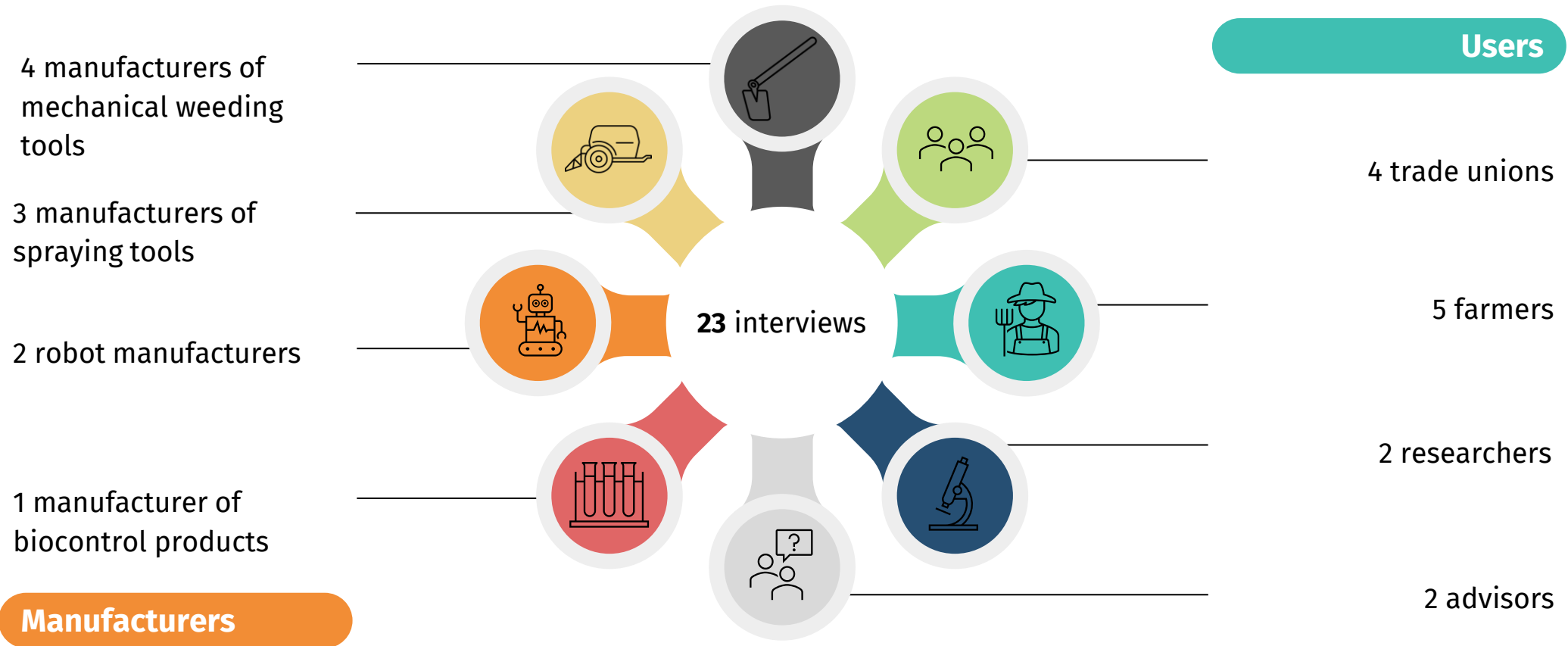
# Expert opinion survey

## Individual semi-directive interview



# Conducting the expert opinion survey

## Profiles of the experts surveyed



03

## Presentation of the results



# Result of the expert opinion survey

## Convergences

### Regulation

*There is an increase in the regulation of PPPs\*.*

### Weed resistance

*There is an increase in the number of herbicide resistant weeds.*

### Bad image of herbicides

*There is a growing public mistrust of chemical weed control.*



### Reduction of the workforce

*It is difficult to find manpower to carry out weeding (especially chemical weeding).*

### Localized spraying

*Weed control will be carried out by applying herbicides only to the areas to be sprayed.*

### Mechanical weeding

*There will be an increase in mechanical weeding in conventional agriculture.*

# Result of the expert opinion survey

## Convergences

### No belief in the alternative

*Electric, thermal or steam weeding... is too energy consuming for use in field crops.*

### Difficulty in accessing new technologies

*The adoption of new technology request significant investment and the development of new skills for farmers.*



### Difficulty of doing No-Till without chemistry

*It is difficult to do soil conservation agriculture without herbicides. As the soil is not worked, it becomes a favourable ground for weeds.*

### The use of agronomic levers

*« The key word in the future will be agronomy. »*

# Result of the expert opinion survey

## The differences

### Having your own equipment

*Farmers want to have flexibility in the use of their tools.*

### Ability to grow crops without herbicides

*Herbicides no longer have a future because resistance is developing and there are less products available.*

### Sharing equipment

*Farmers want to reduce their costs and share their experiences.*

### Inability to grow crops without herbicides

*The trend is towards much more systematic use of products because herbicides are becoming less and less effective.*

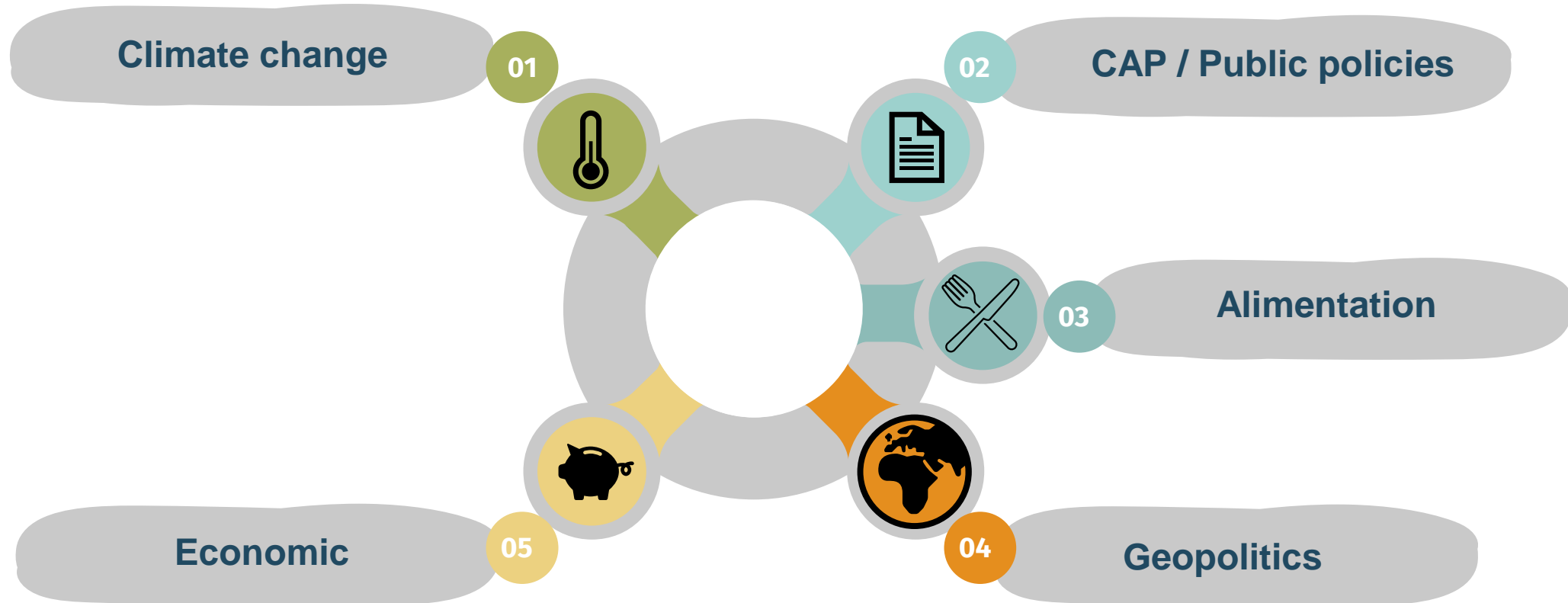
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# Variables influencing weed control

The 5 variables that indirectly influence



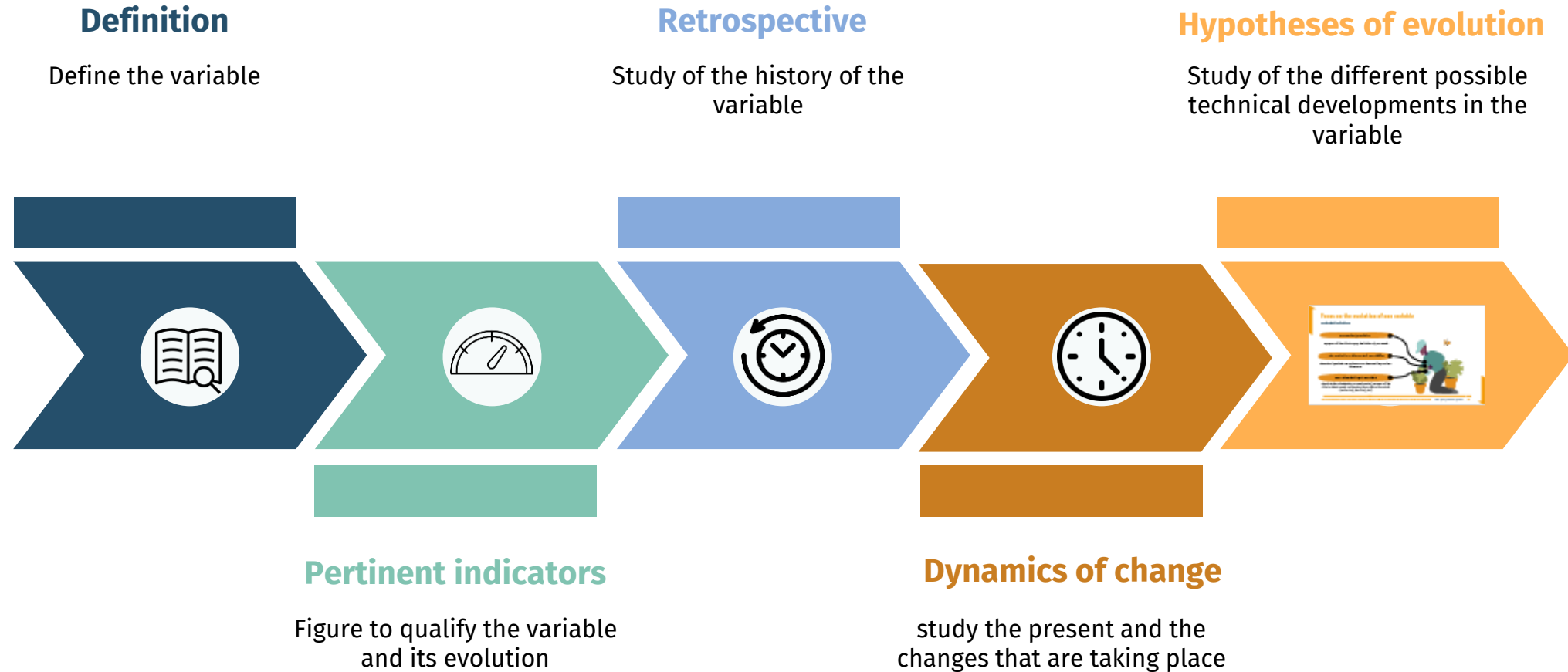
# Variables influencing weed control

The 10 variables that directly influence



# The study of variables

Each variable was studied in a structured approach



# Focus on the evolution of one variable

## Technical solutions

### Increasing precision

Sprayers will be able to spray herbicide only on weeds.

### The arrival of a biocontrol weedkiller

Biocontrol products can replace PPPs\* because they are less dangerous.

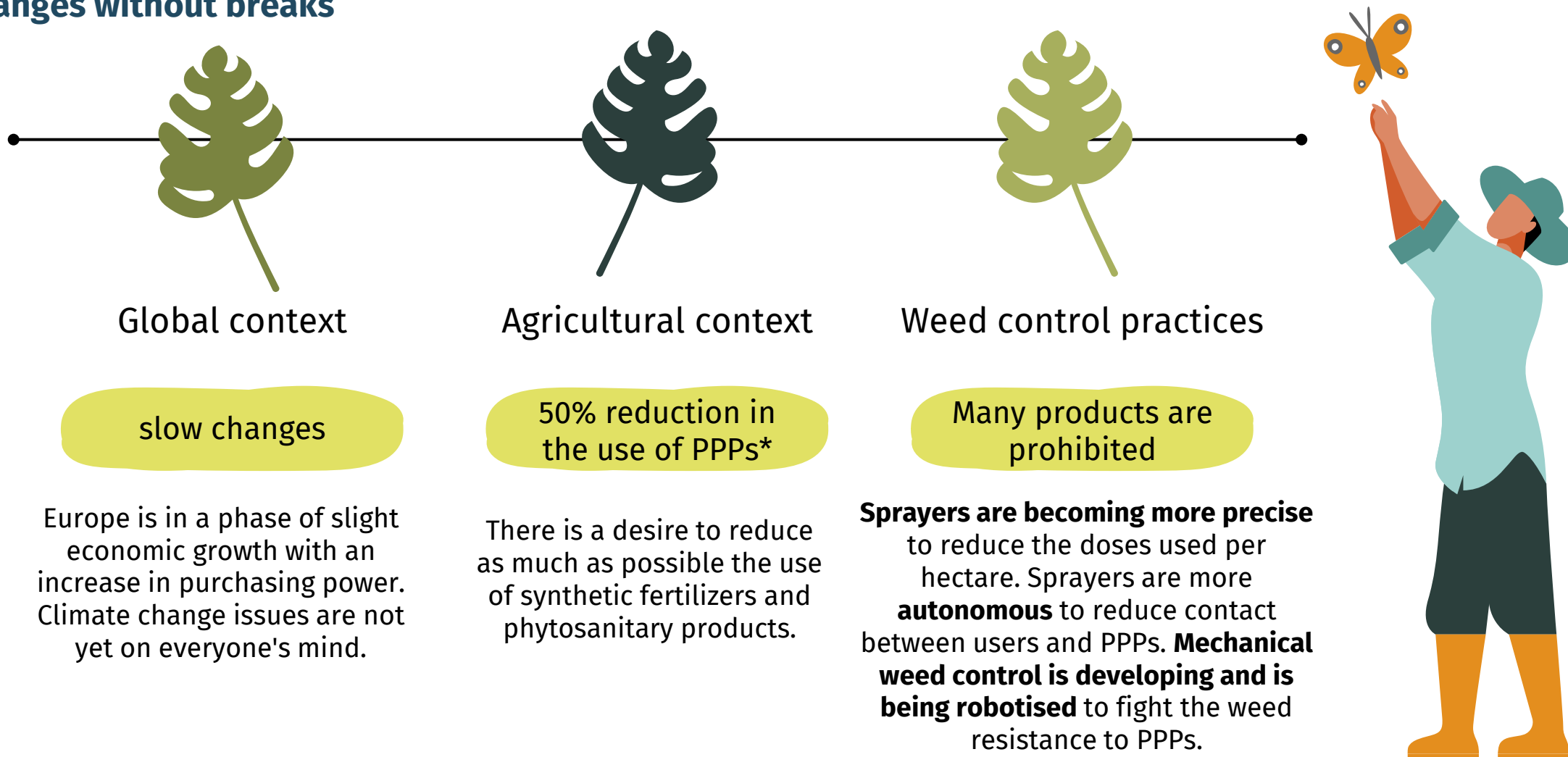
### Non-chemical spot weeding

Thanks to the robotisation of weed control, farmers will be able to detect weeds and destroy them without chemicals (mechanical, electrical, etc.).



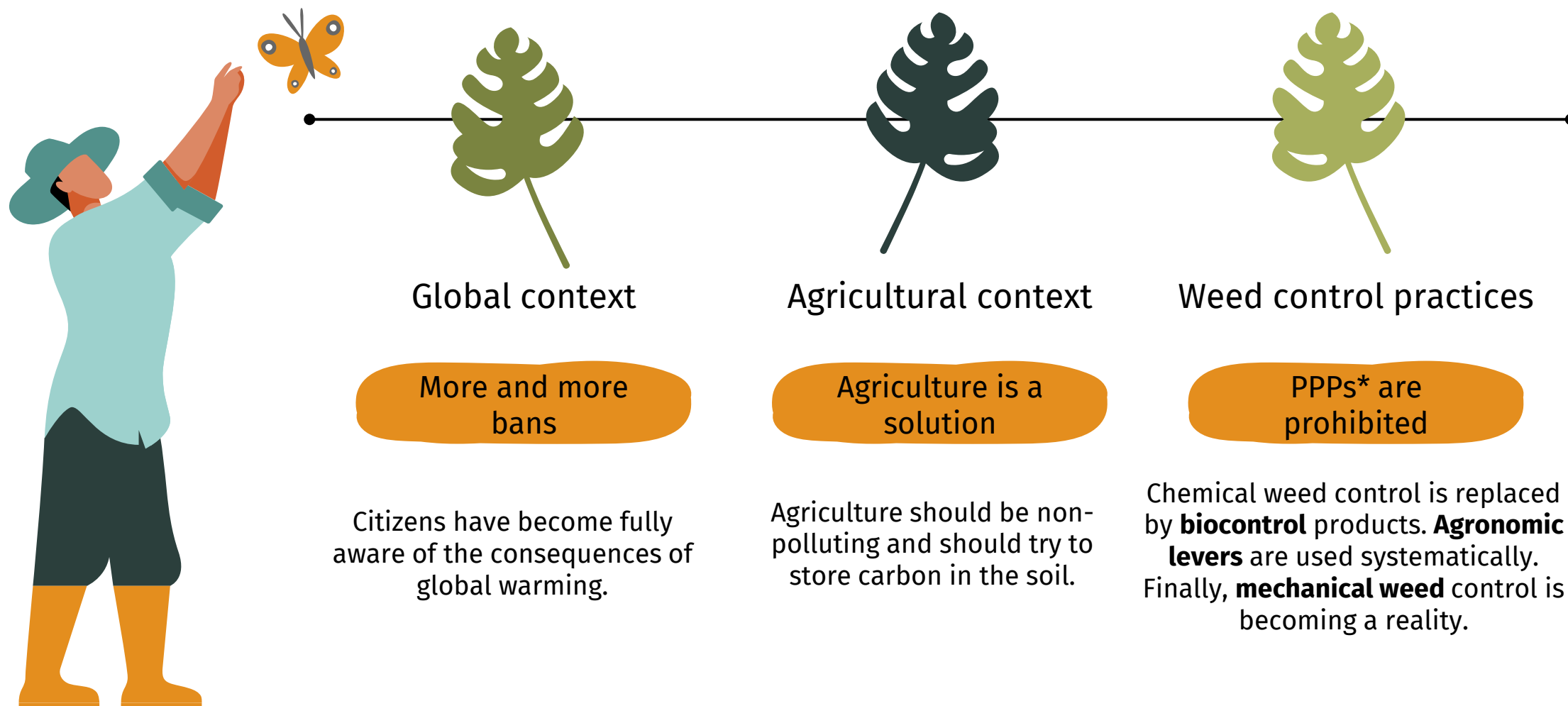
# Presentation of the trend scenario

## Changes without breaks



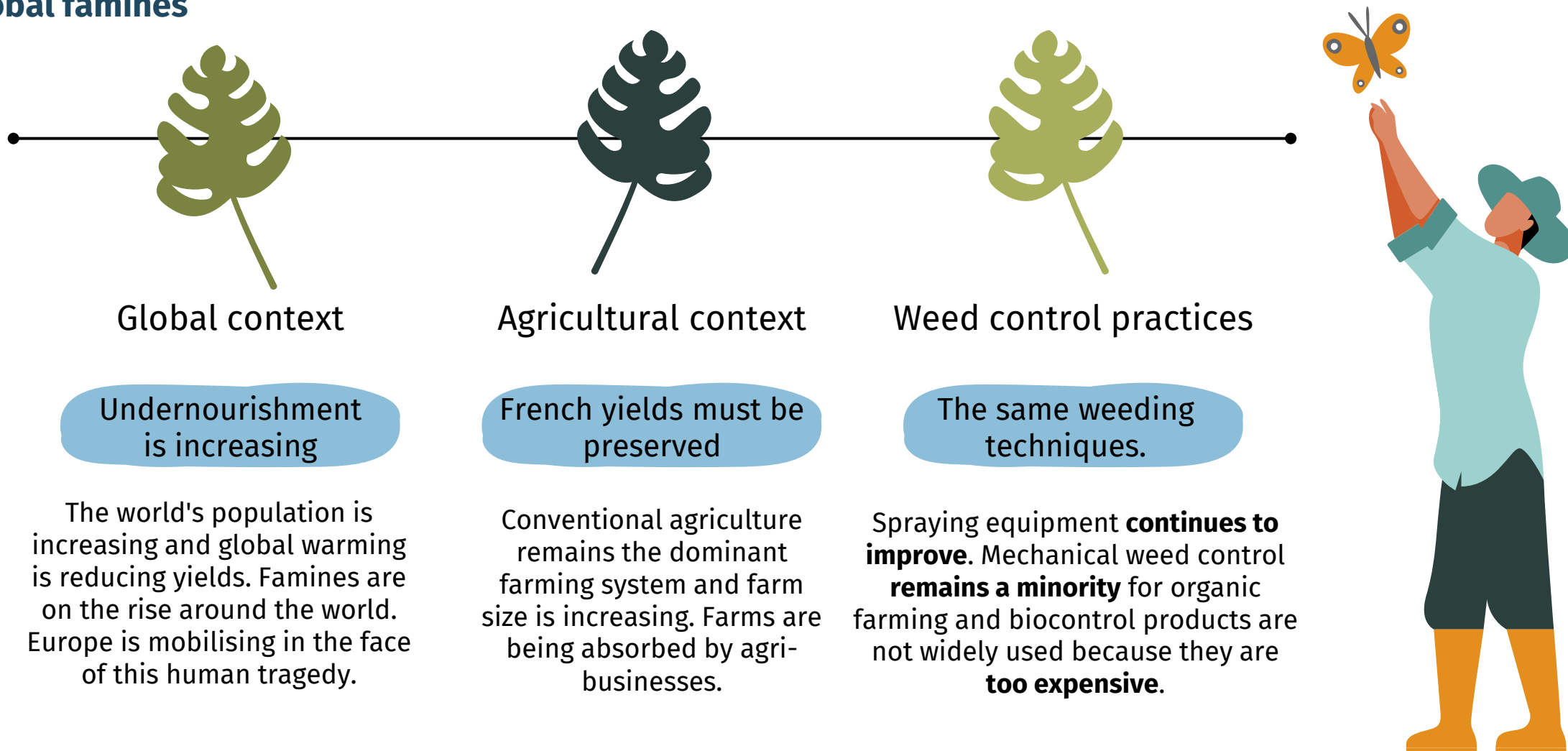
# Presentation of the breakdown scenario 1

## A prohibition on herbicides



# Presentation of the breakdown scenario 2

## Global famines



# Conclusion

"What weed management techniques will be used in field crops in France by 2035?"

## The future of weed control

The future of weed control will probably pass by **localised spraying**, **mechanical weeding** and the use of **agronomy**.

## Discussion of the results

This question, which may seem **very technical** at first impression, leads us to consider **multiple interconnected variables**, mixing complex issues of **technological evolution**, **economic issues** and **social issues**.

## Continuation of the study

It is up to us **to write a sustainable future** for weed control.





# Thanks!

Do you have any questions ?

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