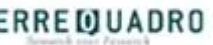
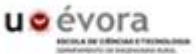




UNIVERSITÀ  
DEGLI STUDI  
FIRENZE



# Foresight Analysis in Viticulture and Arable Crops

Area 4 – Entrepreneurship in Farming  
Lesson 11 – Entrepreneurship in SPA  
Sequence ID – 48

Erre Quadro srl



Co-funded by the  
Erasmus+ Programme  
of the European Union

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### A4.L11.T6 Foresight Analysis

Dario Brugnoli, [dario.brugnoli@errequadrosrl.com](mailto:dario.brugnoli@errequadrosrl.com), Errequadro, Italy

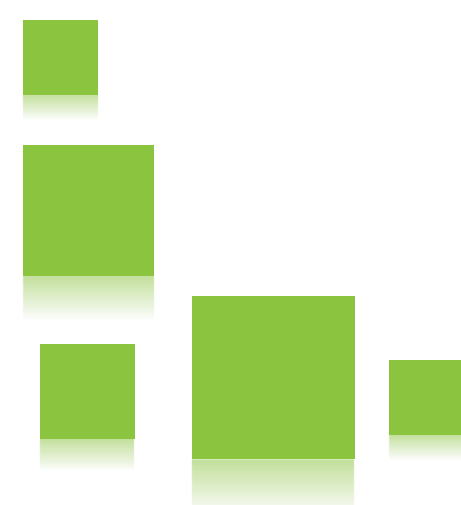
Riccardo Apreda, [riccardo.apreda@errequadrosrl.com](mailto:riccardo.apreda@errequadrosrl.com), Errequadro, Italy

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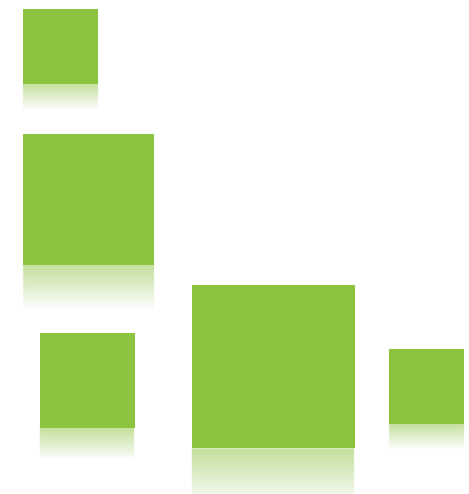


- INTRODUCTION
- METHODOLOGY
- RESULTS
- EXAMPLE
- FINAL INSIGHTS





# INTRODUCTION





## Precision Agriculture

In the last years, digital technologies strongly burst into the traditional concept of "agriculture" triggering a revolutionary **change of paradigm**.

**Precision agriculture** can be defined like that kind of agriculture in which all the resources are managed accurately, starting from planning the field to harvesting.

Like in every young technological field, some of the **emerging solutions** will reach a **high level of adoption**, some of them, instead, **will fail and disappear**.





## Foresight analysis

The ability to forecast future developments represents for companies a decisive prerequisite to plan appropriate **responses to change**.

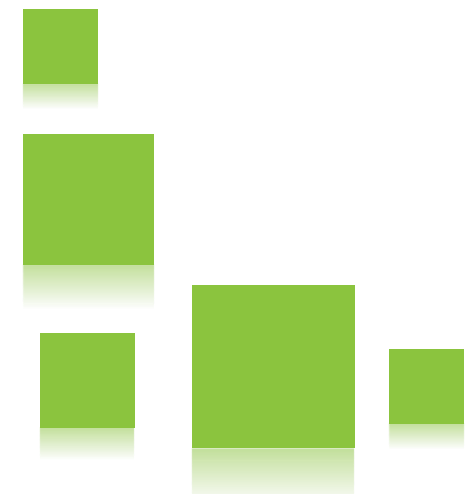
Being ready for **new challenges** will enable enterprises to increase their competitive level by foreseeing the **emerging technologies** benefits well in advance.

The terms "**foresight analyses**" refer to all methodologies that allow to align short-term companies needs with long-term strategic objectives.





# METHODOLOGY

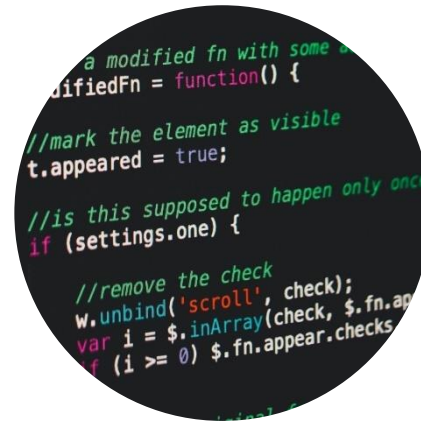


# The Adopted Methodology

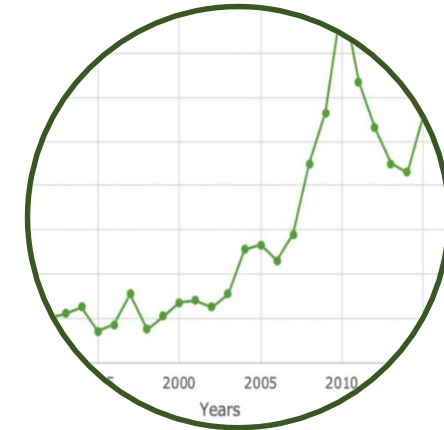
The adopted methodology is built up on **three macro-phases**:



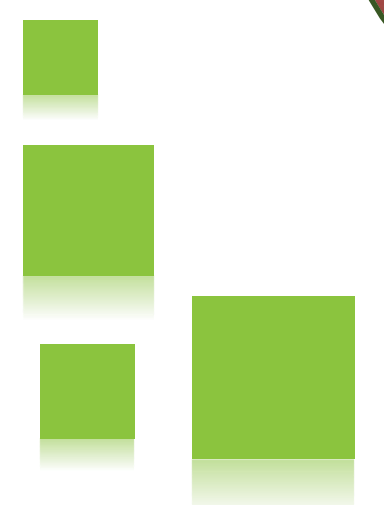
1. Data extraction



2. Cluster detection and analysis



3. Results rationalization







## Why patents and scientific papers?

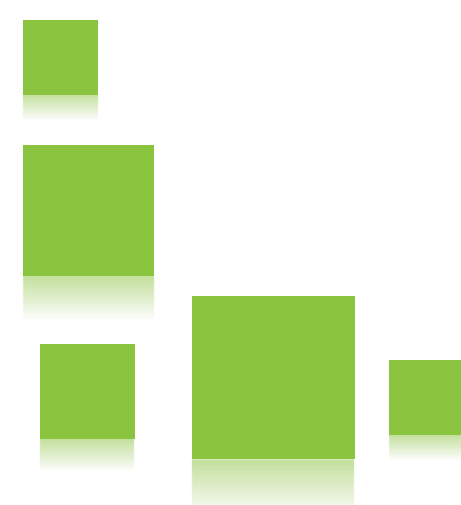
Patents and scientific papers represents the most complete sources of information to outline the results achieved by the academic and industrial **Research & Development**, providing the definition of potential differences and similarities between specific technological fields.



# How to Extract Information?

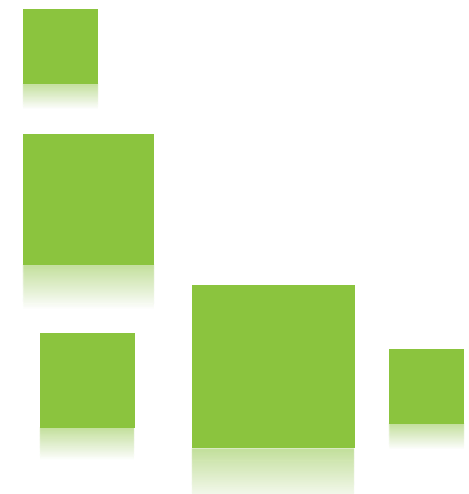


Advanced text analysis software tools and human competences have been combined, to perform the analysis both on patents and scientific papers.





# RESULTS



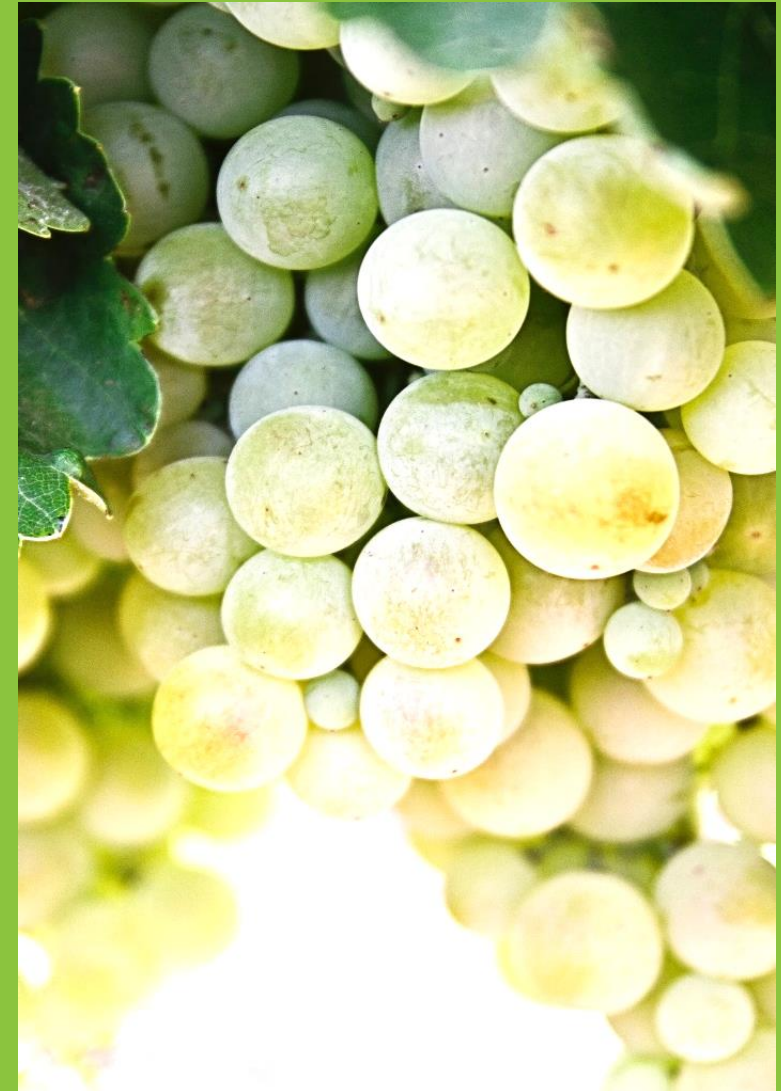


## Technological Clusters: Viticulture

**Data processing:** algorithms and proceedings for data elaboration, computing systems etc. aimed to process several kinds of data deriving from variables detected on the vineyard.

**Measurement and Data Detection:** systems for detecting variables and parameters related to vineyards such as distance, temperature, pressure etc.

**Data Transfer:** telecommunication systems aimed to transmit collected data and information between two or more sources. This cluster includes aeriels, wireless communication systems, networking solutions etc.

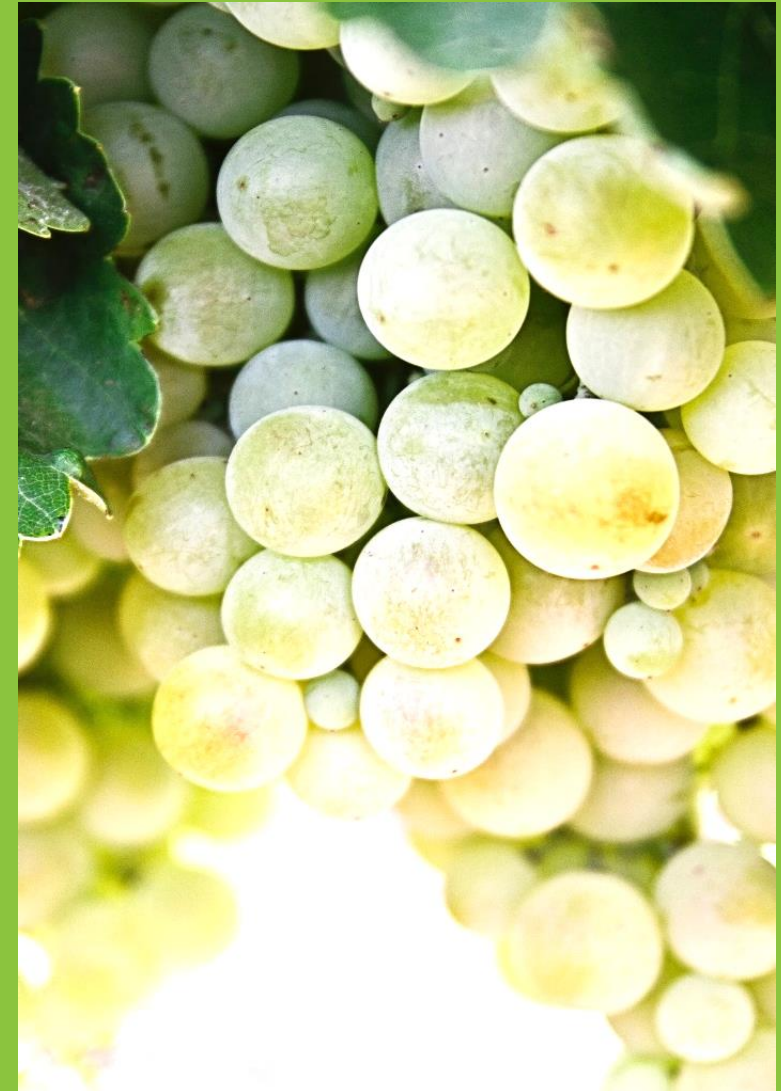




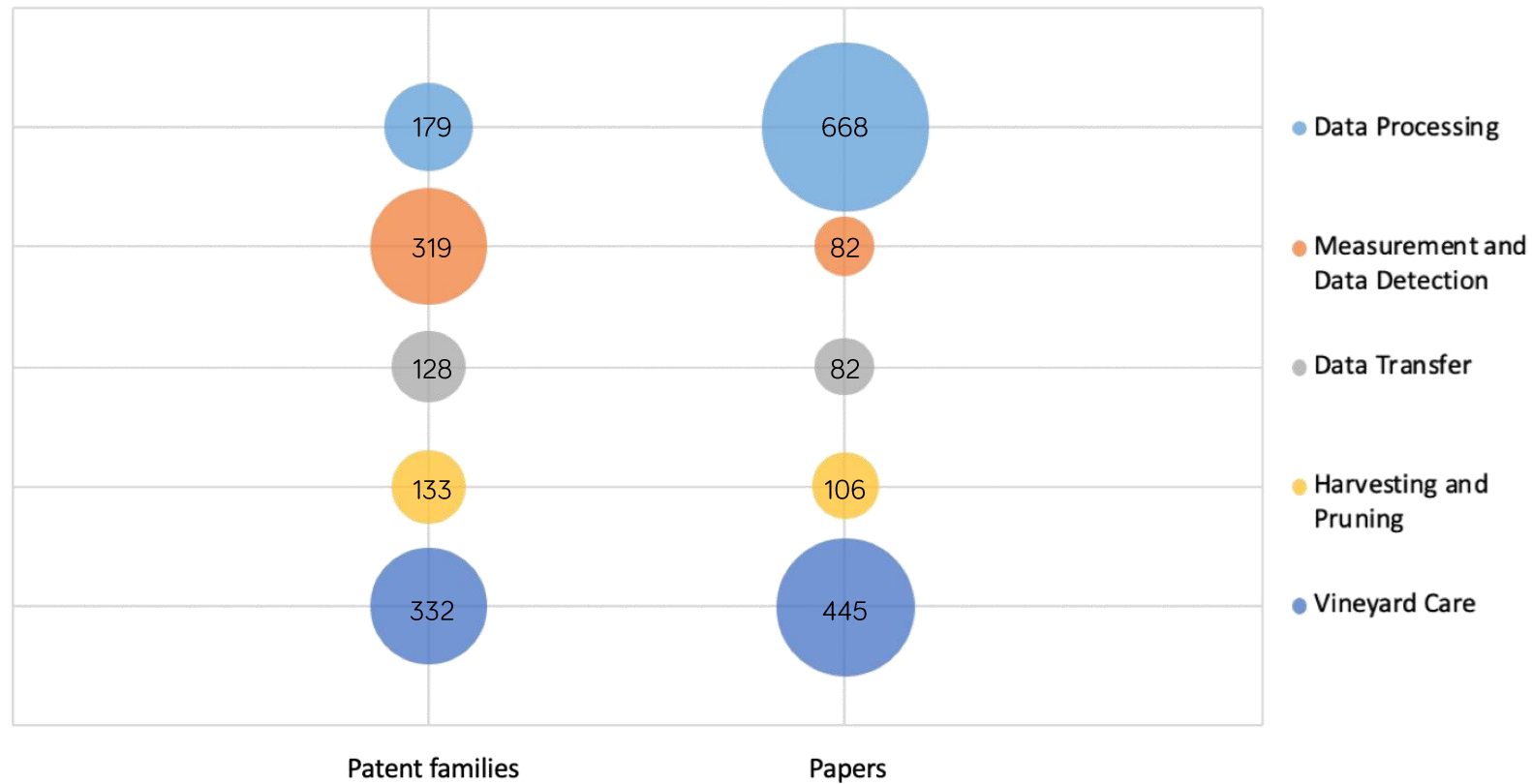
## Technological Clusters: Viticulture

**Harvesting and Pruning:** systems having function of interaction with plants in order to pick grapes or to prune the vineyard.

**Vineyard Care:** systems having functions of planting, cultivating, irrigating or protecting the vineyard.



# Number of Documents for Each Cluster Viticulture



Number of documents for each cluster in PA applied on viticulture

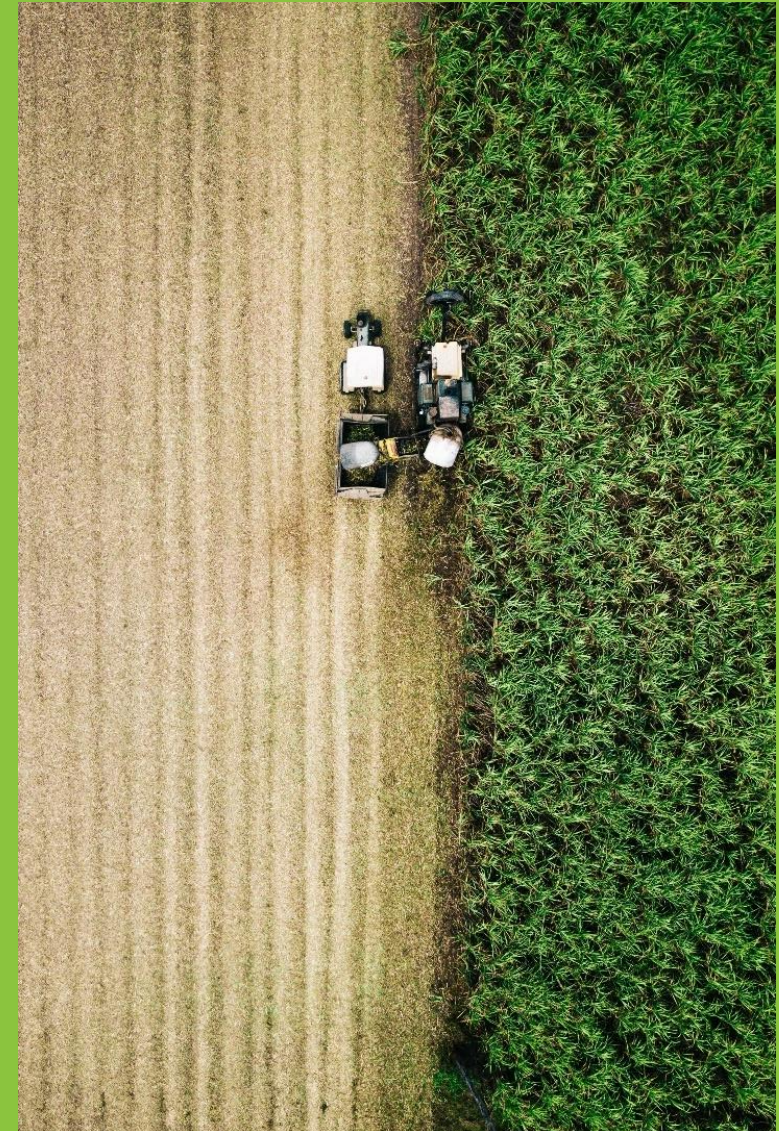


## Technological Clusters: Arable Crops

**Data processing:** algorithms and proceedings for data elaboration, computing systems etc. aimed to process several kinds of data deriving from variables detected on the fields.

**Measurement and Data Detection:** systems for detecting variables and parameters related to fields such as distance, temperature, pressure etc.

**Data Transfer:** telecommunication systems aimed to transmit collected data and information between two or more sources. This cluster includes aerials, wireless communication systems, networking solutions etc.





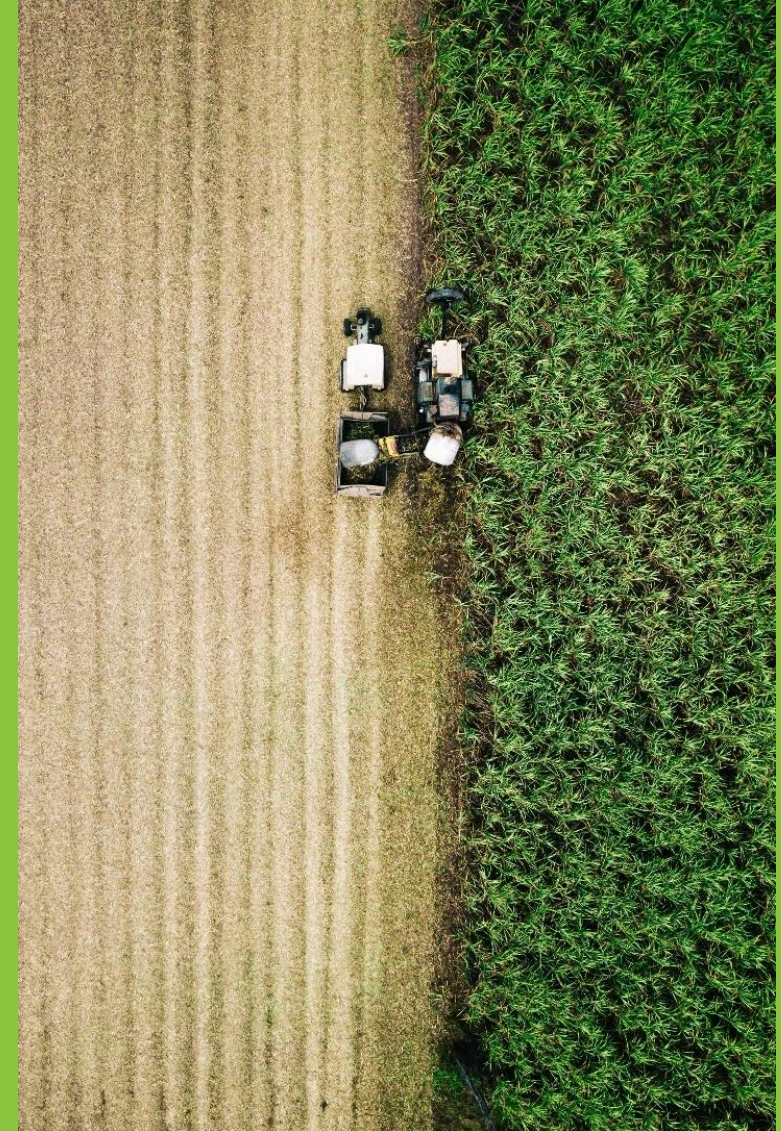
## Technological Clusters: Arable Crops

**Harvesting and Manipulating:** systems for harvesting the crops from the field and/or for their successive handling, e.g. automatic systems and robots.

**Planting and Soil Working:** systems having functions of supporting each agricultural operation before and during the positioning of new seeds or plants in the field.

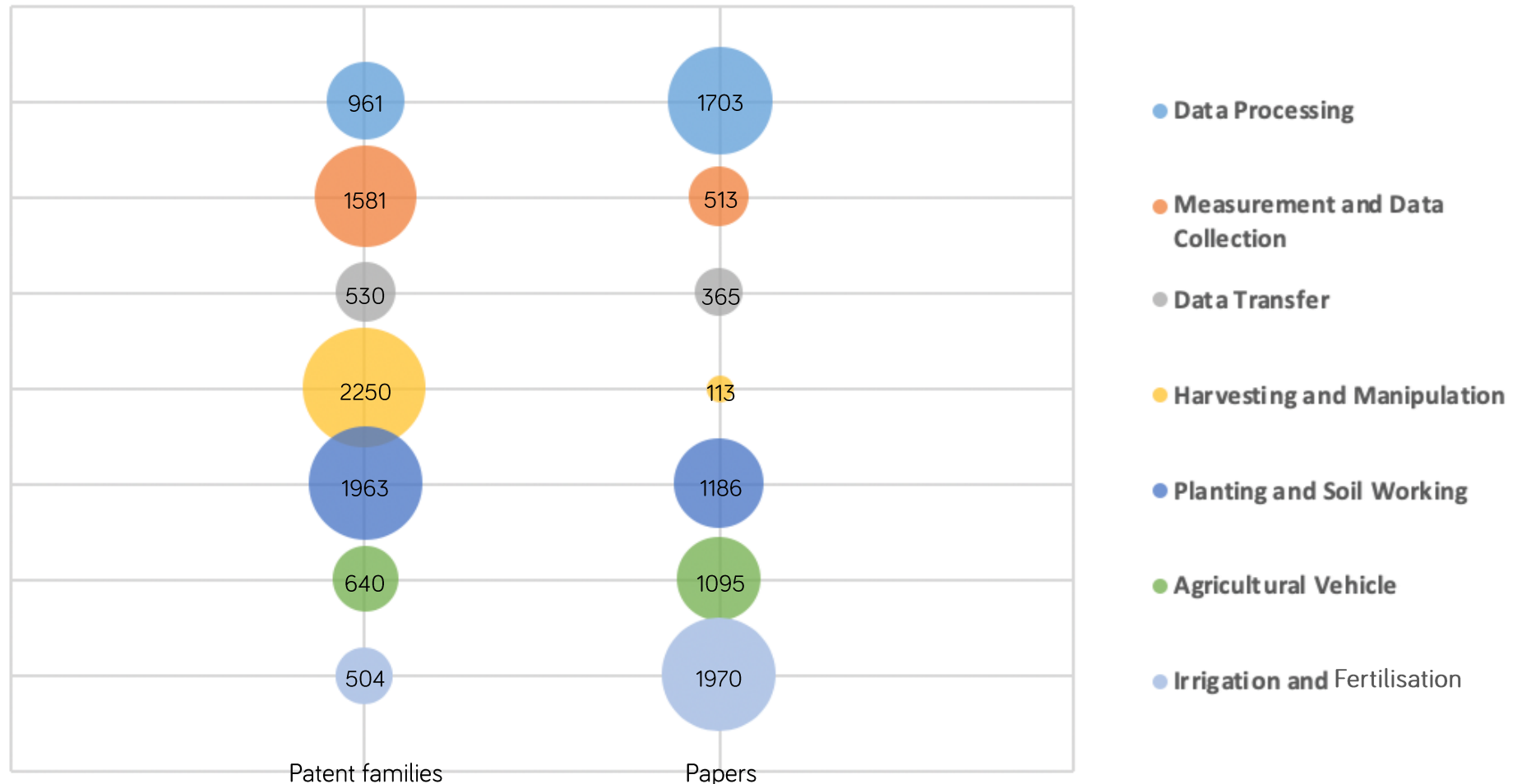
**Agricultural Vehicle:** vehicles and related accessories or their subsystems aimed to support every step of agricultural process.

**Irrigation and Fertilisation:** systems for distribution of irrigating or fertilising substances on a field.

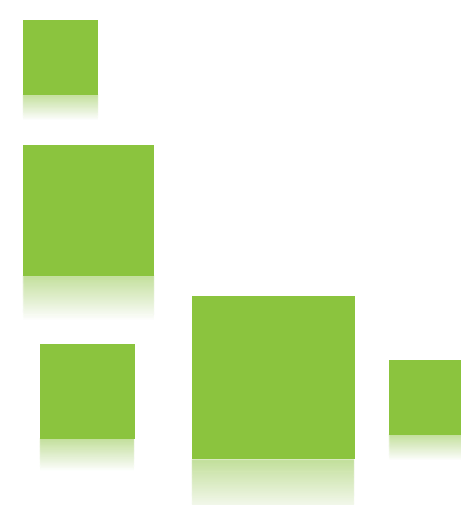




# Number of Documents for Each Cluster Arable Crops

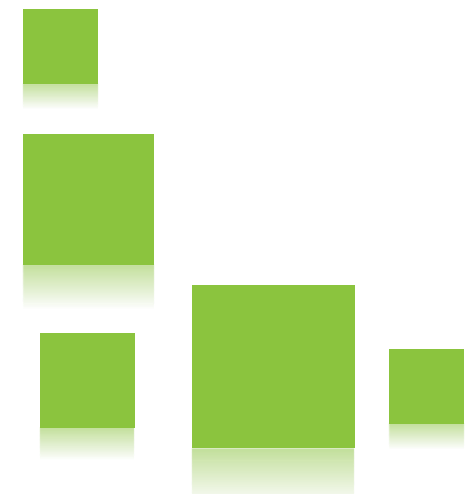


Number of documents for each cluster in PA applied on Arable Crops





EXAMPLE



# Number of Documents for Each Cluster Arable Crops

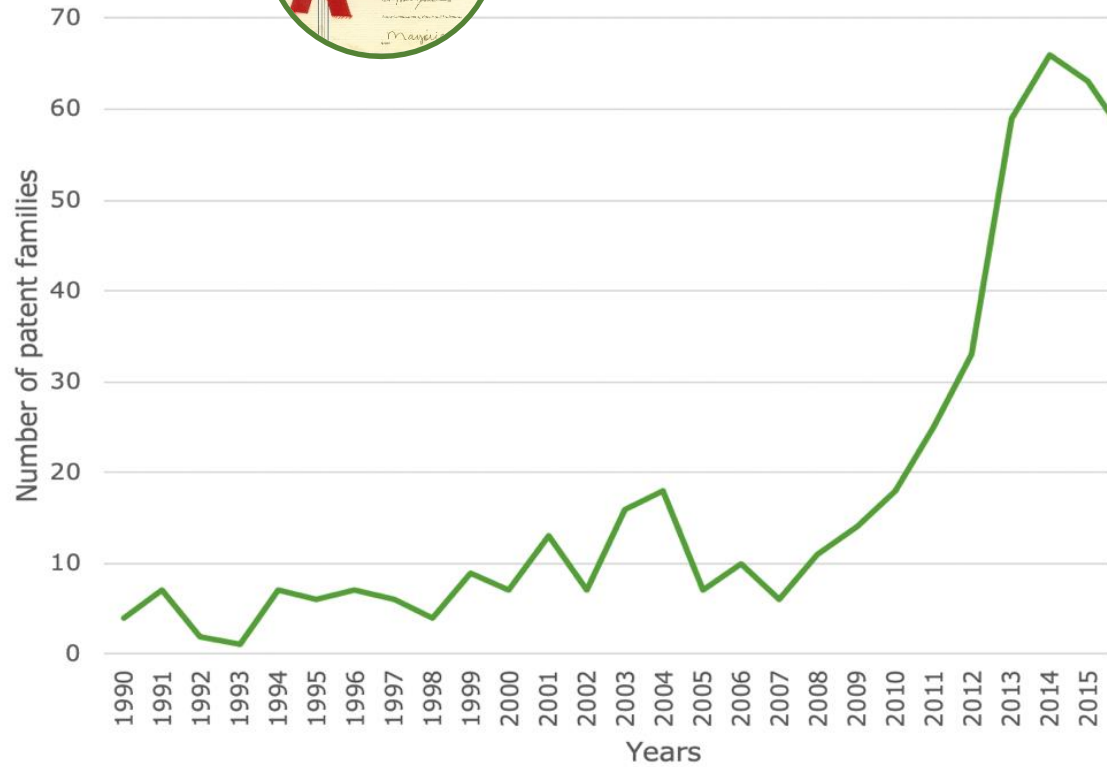


Number of documents for each cluster in PA applied on Arable Crops

# Irrigation and Fertilisation



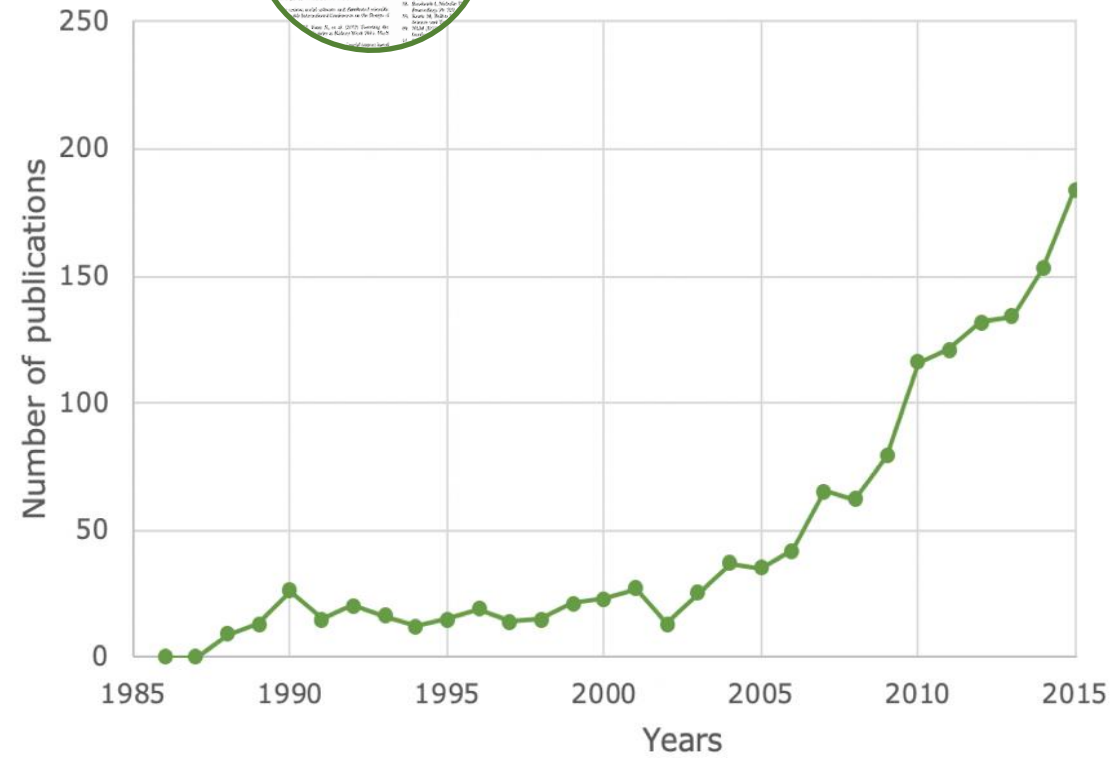
Patent families



Distribution of the patent families according to filing dates



Scientific papers



Distribution of the scientific literature according to publication dates

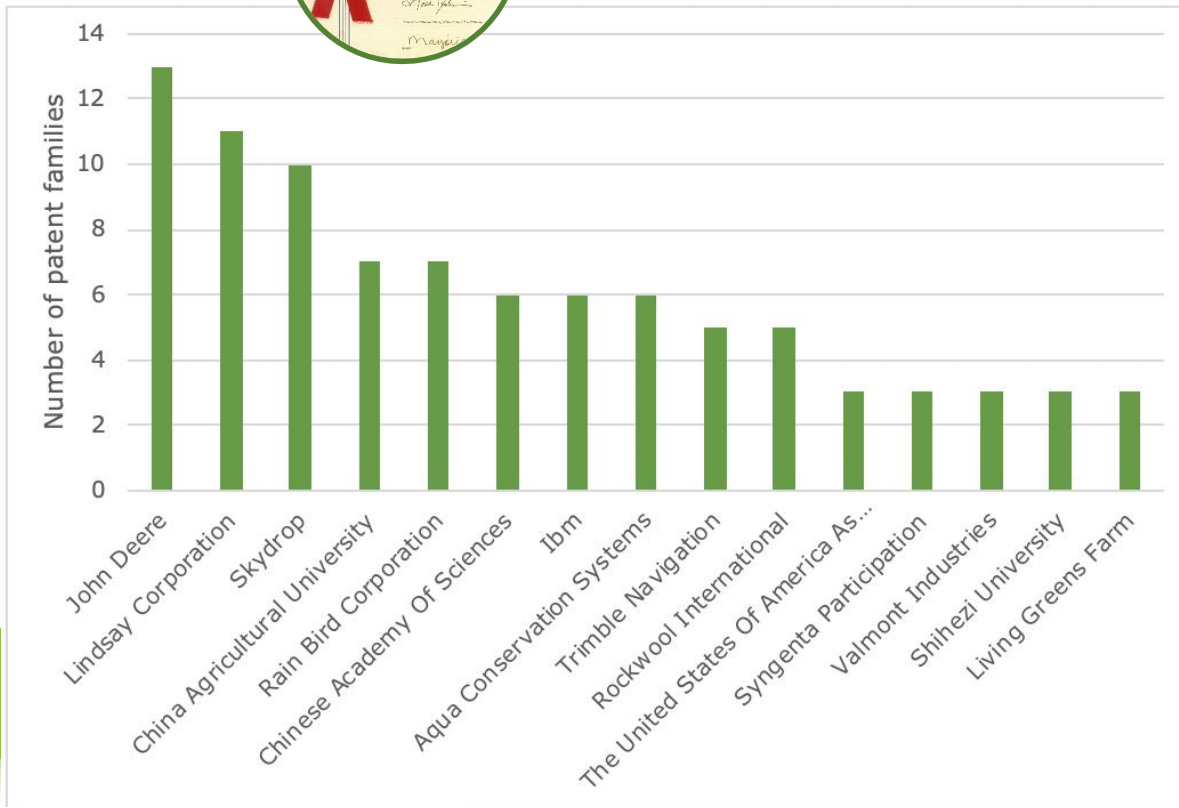
# Irrigation and Fertilisation



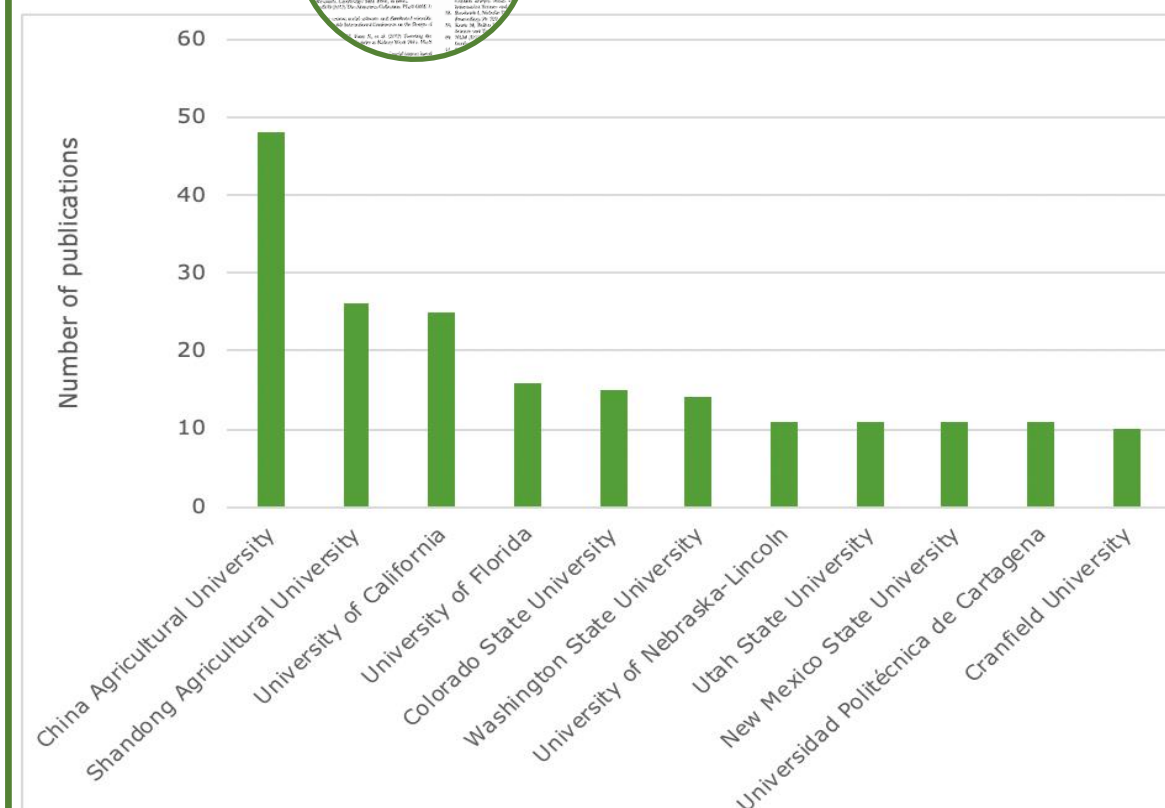
Patent families



Scientific papers



Main Assignee



Main Affiliations

# Irrigation and Fertilisation



Patent families



Scientific papers

**Sensor datum**  
**Irrigation zone**  
**Irrigation schedule**  
**Sprinkler management system**  
**Controllable irrigation valve**  
**Irrigation system**  
**Irrigation controller**  
**Sprinkler head**  
**Precision agriculture system**  
**Fluid distribution system**  
**Water harvesting**  
**Sprinkler arm**  
**Soil type**

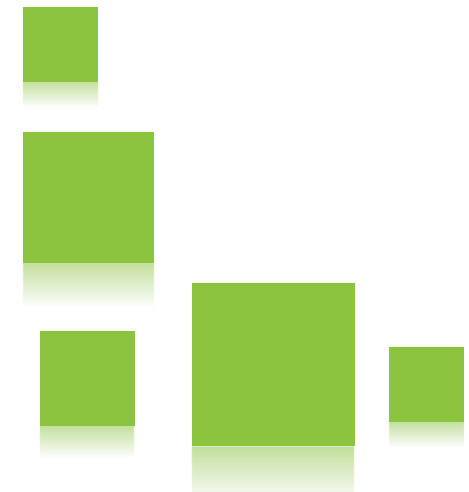
Patents' tag cloud

**Soil moisture**  
**Water management**  
**Evapotranspiration**  
**Irrigation management**  
**Water use efficiency**  
**Drip irrigation**  
**Precision Agriculture**  
**Irrigation scheduling**  
**Sprinkler irrigation**  
**Irrigation systems**  
**Remote sensing**  
**Water saving**

Papers' tag cloud

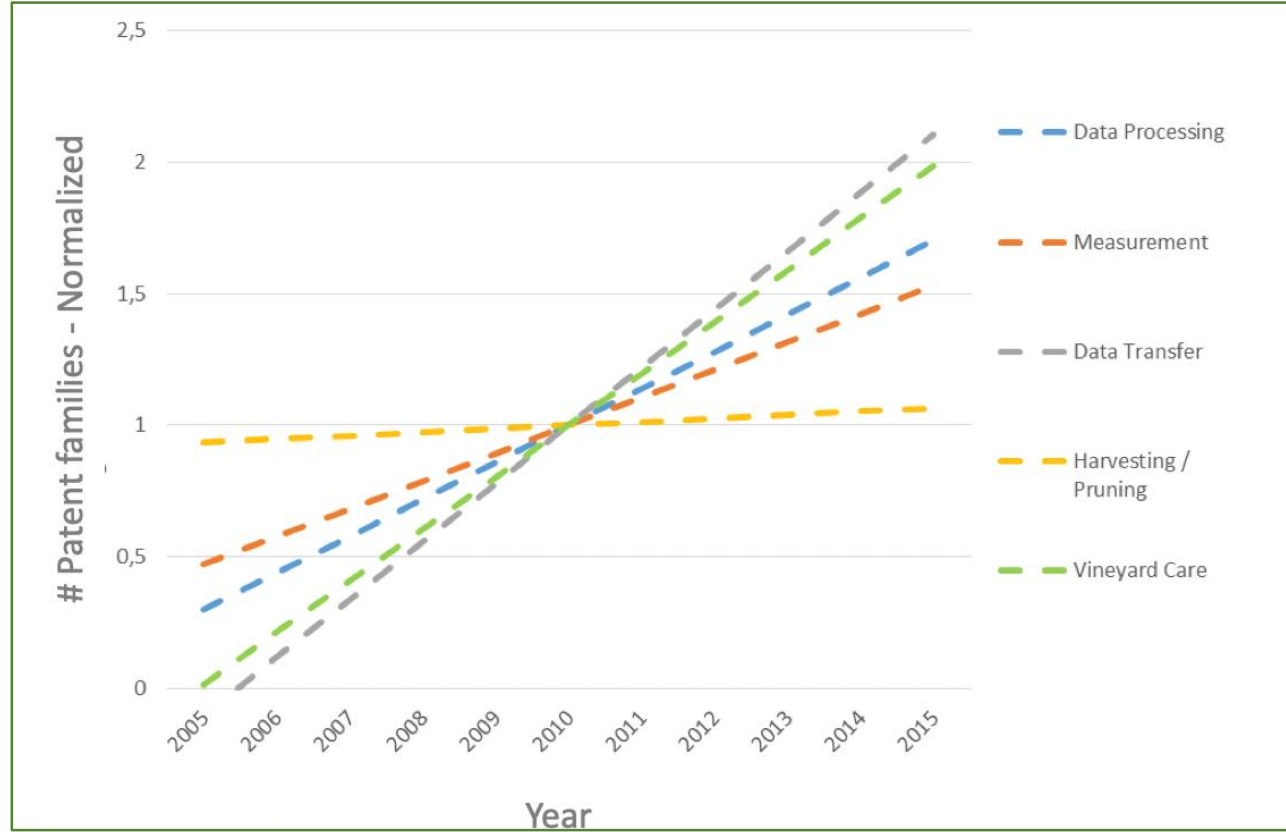
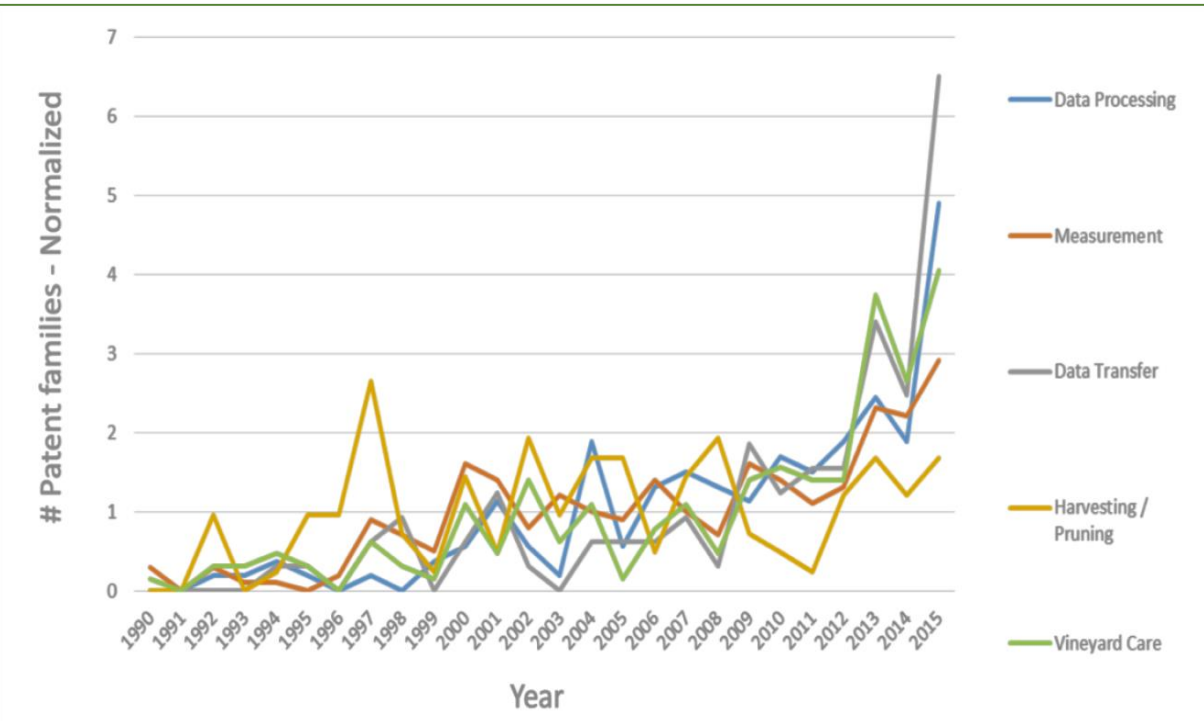


# FINAL INSIGHTS



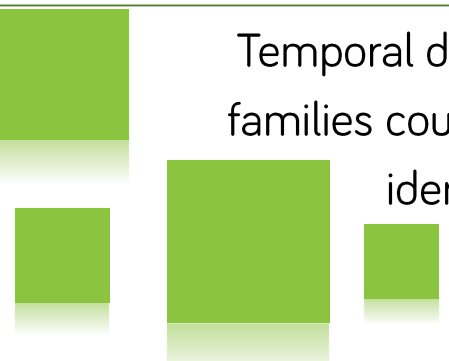


# Viticulture Results



Temporal distribution of the normalized patent families count according to filing dates for each identified technological cluster

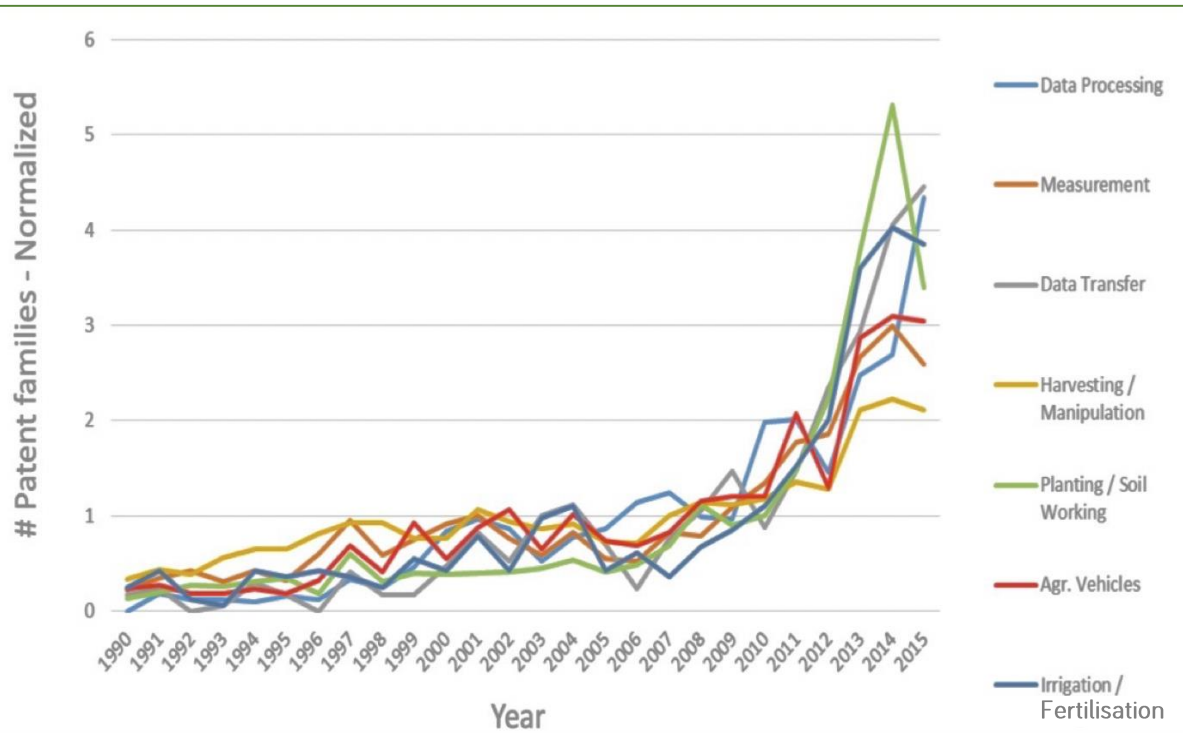
Trend for each identified technological cluster



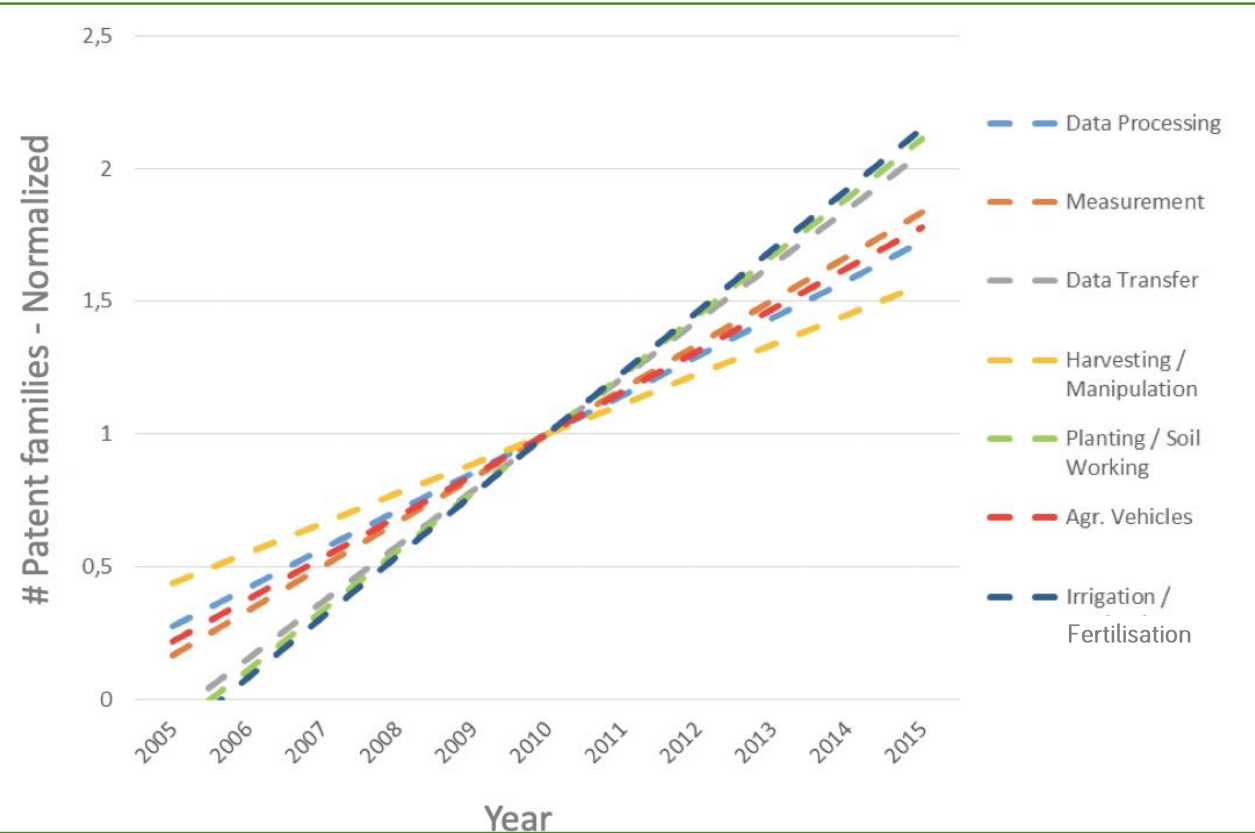




# Arable Crop Results



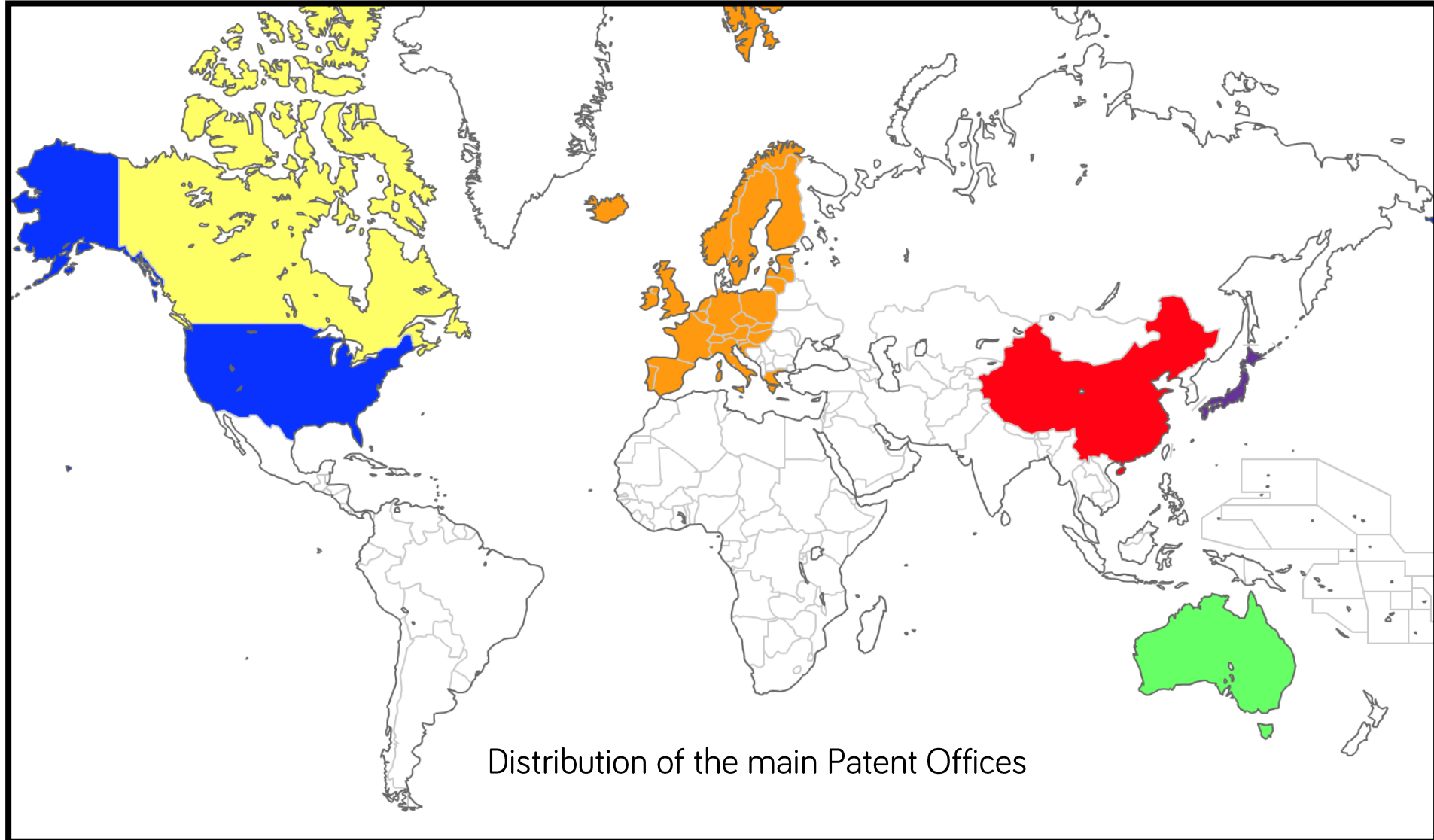
Temporal distribution of the normalized patent families count according to filing dates for each identified technological cluster



Trend for each identified technological cluster



# Patents distribution



Distribution of the main Patent Offices





# Main affiliations





# Technologies from the Analysis



	Cluster	Technology				
Viticulture	Data processing	Control Systems	Image Processing	Navigation		
	Measurement	Control Systems	Image Processing	Optical Systems	Remote Sensing	
	Data transfer	Optical Systems	Sensing Systems	Navigation	Satellite Technology	
	Harvesting / Pruning	Robotics	Sensing Systems	Image Processing		
	Vineyard Care	Irrigation	Optical Systems	Aerial Vehicle	Sensing Systems	
Arable Crops	Data processing	Image Processing	Optical Systems			
	Measurement	Control Systems	Optical Systems	Aerial Vehicle	Image Processing	Satellite Technology
	Data transfer	Control Systems	Sensing Systems			
	Harvesting / Manipulation	Control Systems	Manipulators	Robotics		
	Planting / Soil Working	Control Systems	Autonomous Vehicles	Navigation		
	Agricultural Vehicles	Control Systems	Autonomous Vehicles	Aerial Vehicle	Remote Sensing	Image Processing
	Irrigation / Fertigation	Control Systems	Sensing Systems	Efficiency		

Most frequent technologies across the analysed clusters

