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## Lessons from a Prospective on the French Wine Industry Under Climate Change (2050)

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# Lessons from a Prospective on the French Wine Industry Under Climate Change (2050)

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# Wine industry: key domain of research on agriculture and climate change

## Economic and cultural importance of Wine in France

- 15% of value of French agricultural production, 250 000 jobs
- € 11 billions in export (2013), second export item
- Externalities on tourism, contribution to French culture...

## Wine production is very sensitiv to climate

- Climate conditions affect both grape yield and wine quality
- wines are diferenciated by climate conditions (terroir, vintage)
- recognised as « **witness of CC** » (harvest dates...)

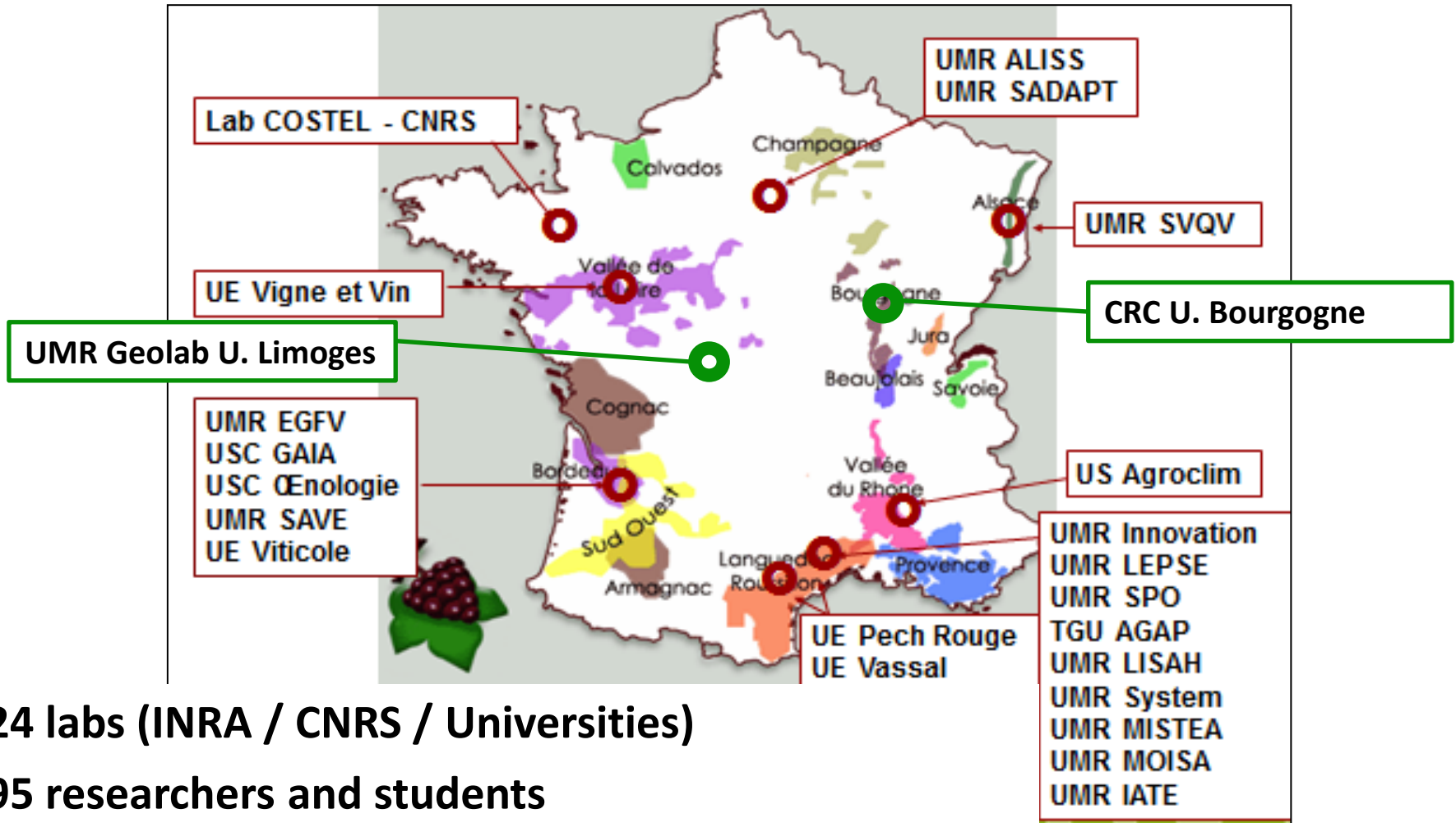
## Wine industry raises key scientific issues on adaptation

- Perennial crop : short and long term strategies
- Complex interactions in the value chain, numerous levers
- Institutions (GI) codify practices, innovation and location...



# LACCAVE project (2012-2016) (N. Ollat, J.-M.Touzard)

- Impacts of climate change on vine and wine
- solutions for adaptation in the wine industry



**24 labs (INRA / CNRS / Universities)**

**95 researchers and students**

Climatology, genetic, écophysiology, agronomy, œnologie, économiques, sociology....

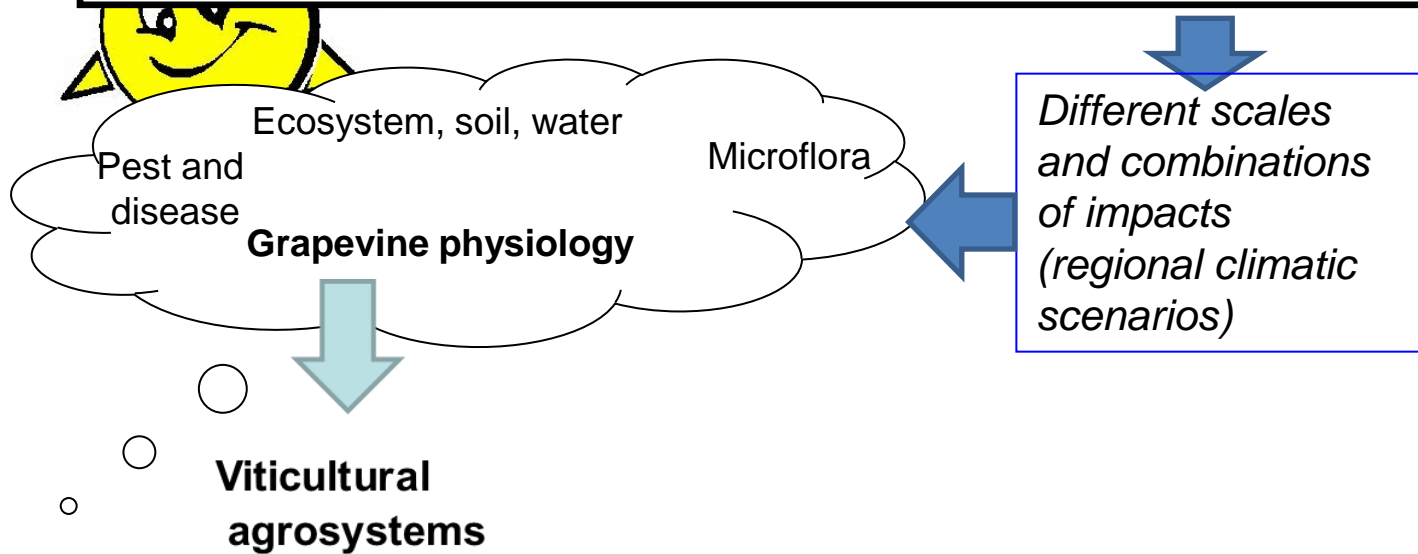
# Climate Change

CO<sub>2</sub>

Rise in variability  
and extrem events

Rise in average  
temperature

Dryness, change in  
pluviometry distribution



*Grape*

**Wine making  
processes**



*Wine*

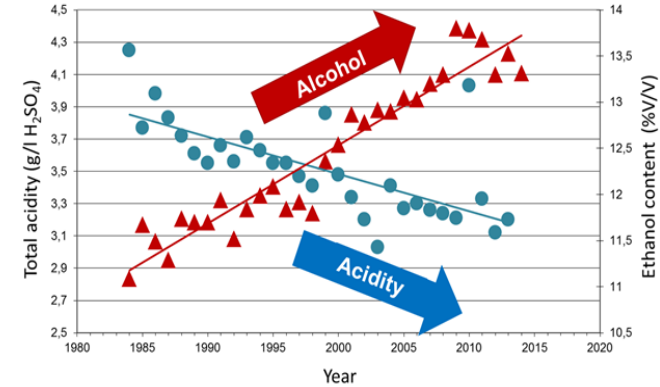
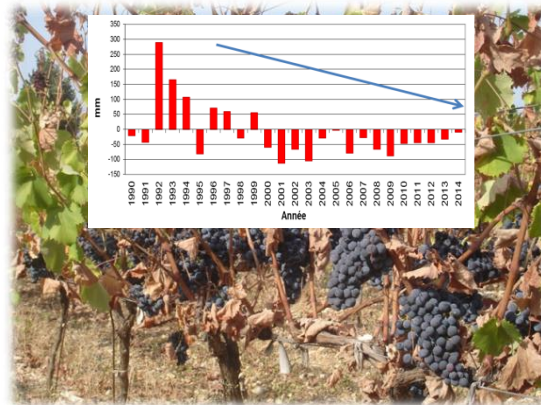
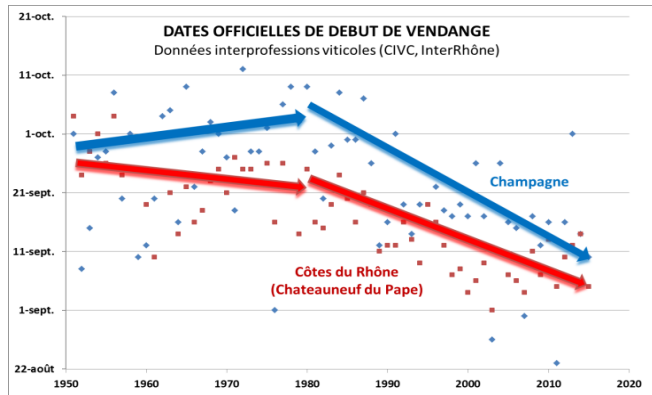
**Wine marketing  
chains**



# Climate Change impacts on vine and wine

observed, simulated

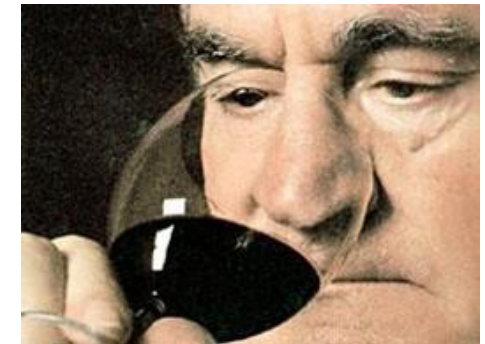
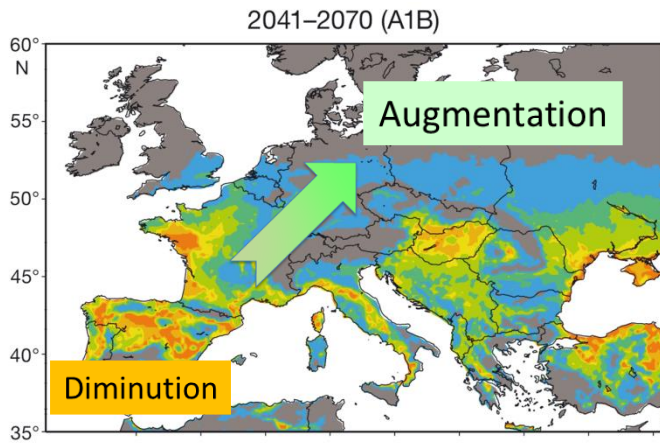
(Van Leuwen, Ollat, Touzard, 2016)



All development stages of vine are affected: earlier harvest

Water balance and stress  
Affect yield (and quality)

Change in berry composition  
More sugar, less acidity  
Modification of aromas



Evolution of potential planting areas

Economic impacts  
Incomes, assets, competitiveness

Perception of actors  
Tensions on GI labels

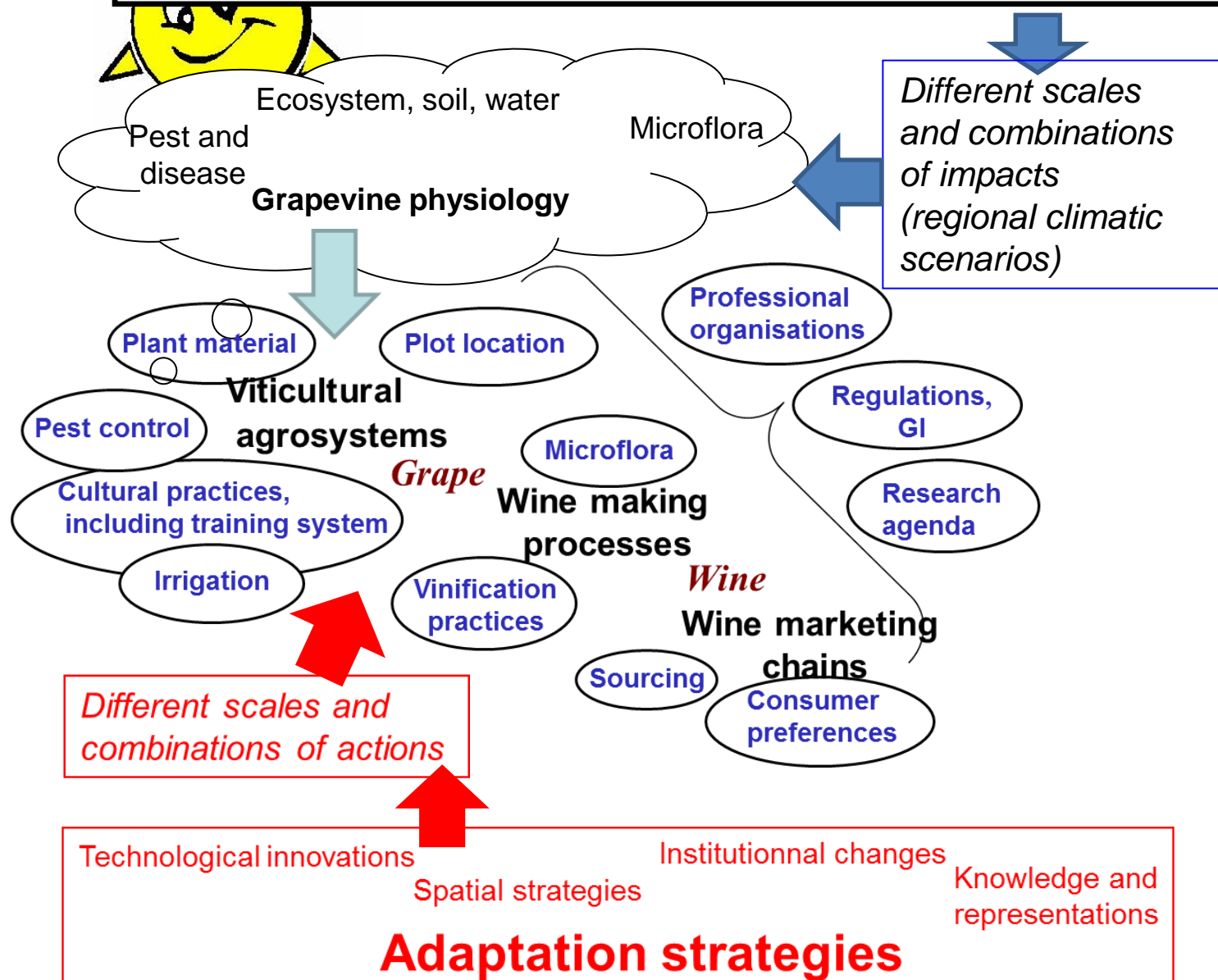
# Climate Change

CO<sub>2</sub>

Rise in variability  
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pluviometry distribution



# Focus on six main domains of adaptation

(Ollat, Touzard, Garcia de Cortazar, 2017)



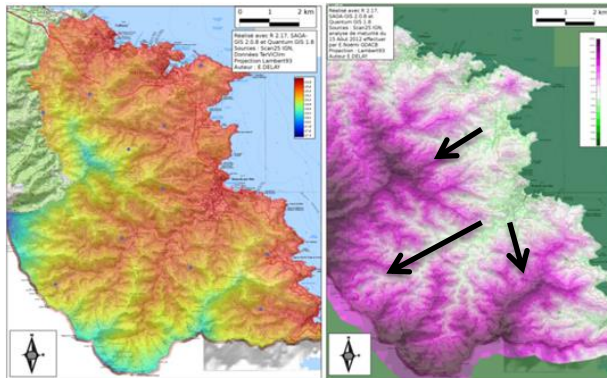
**« New » vine varieties**  
(old/foreign/created)  
late, resistant to drought...



**Changing viticultural practices**  
Pruning, soil management, irrigation  
digital viticulture, agroecology



**Enological innovations**  
To control acidity, alcohol,  
temperature, yeast



**Changing the location of vine**  
Moving up, new frontier  
creation of new vineyards...



**Changing the institutions**  
Code of practices, insurance,  
R&D policy



**The role of consumers**  
Acceptance, involvement  
(experimental economics)





# A prospective study on the French Wine System

- To capitalise on the multidisciplinary LACCAVE project and to explore combinations of different levers of adaptation...
- To provide different scenarios for actors of the French wine industry by 2050, not only the catastrophic one
- To test a new prospective methodology focusing on adaptation pathways
- To build common vision and develop learning networks between researchers and stakeholders of the industry

## A two steps approach

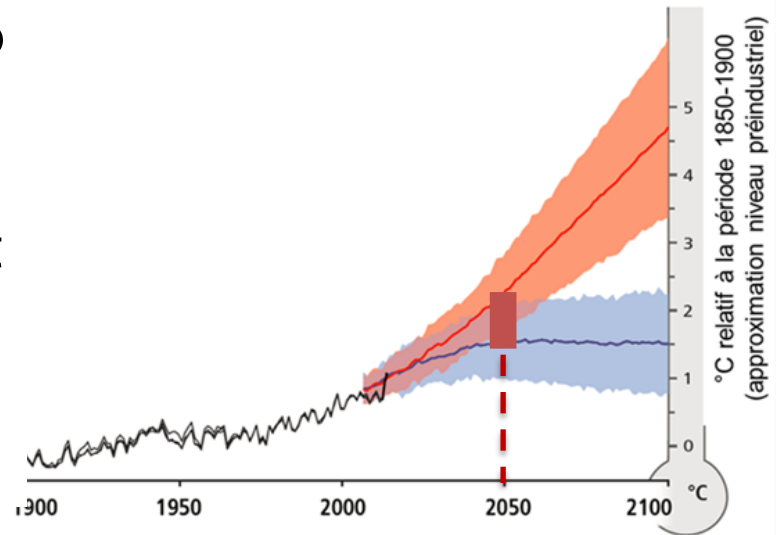
- 2014-16 : top down approach driven by a group of experts
- 2016-18 : bottom up participatory approach with stakeholders

# Choice of horizon 2050, assumptions on climatic context and impacts on vine and wine

## Median IPCC climatic scenario for 2050 :

- around + 2°C
- no radical change in rainfall but increasing water need for vine
- “moderate” increase of variability (extreme events)

Evolution de la température moyenne de la surface du globe  
(GIEC 2013 et NCDC 2016)



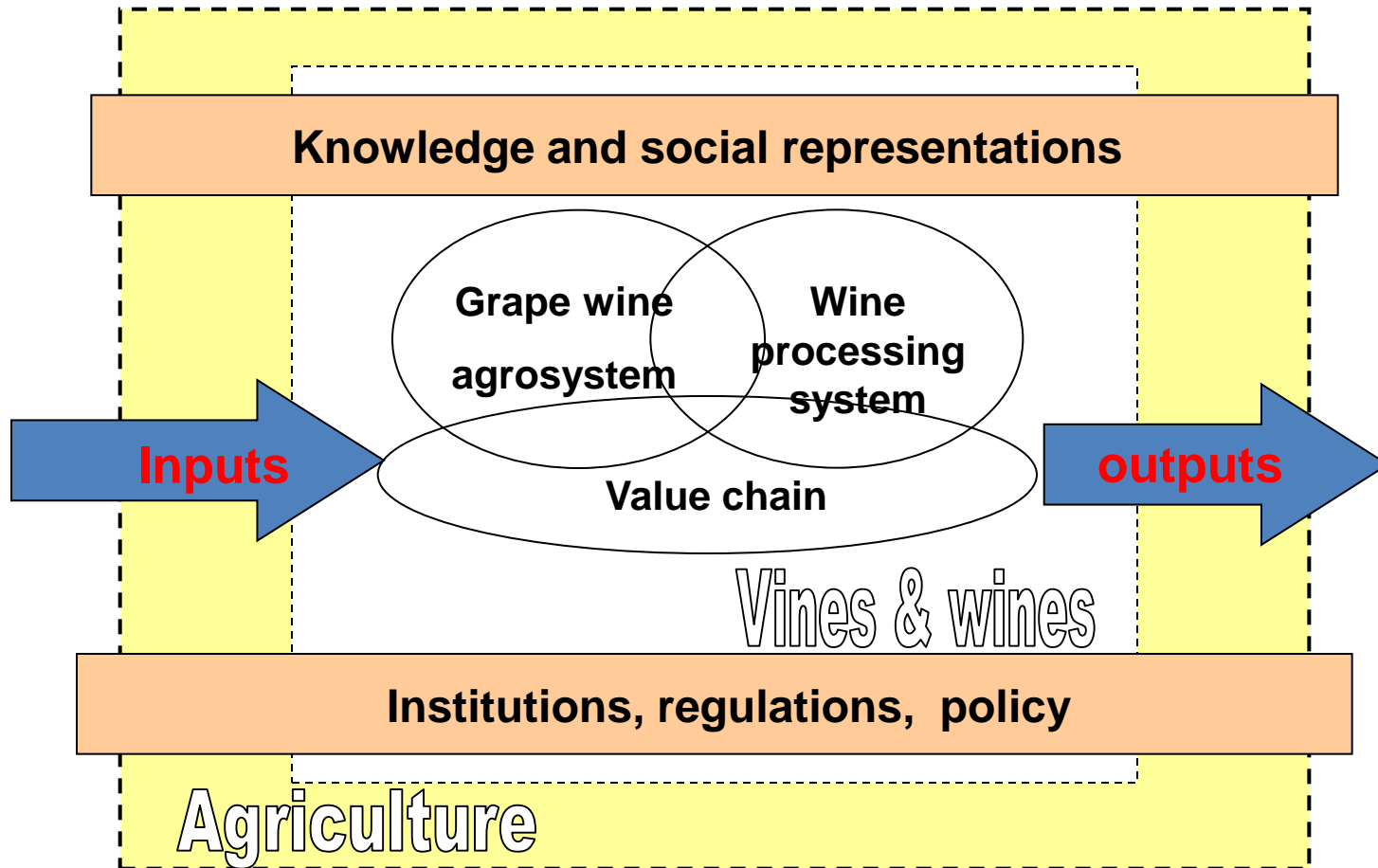
Scenario  
« Trump »

Scenario  
COP21

## Different impacts of CC according to a north-south gradient :

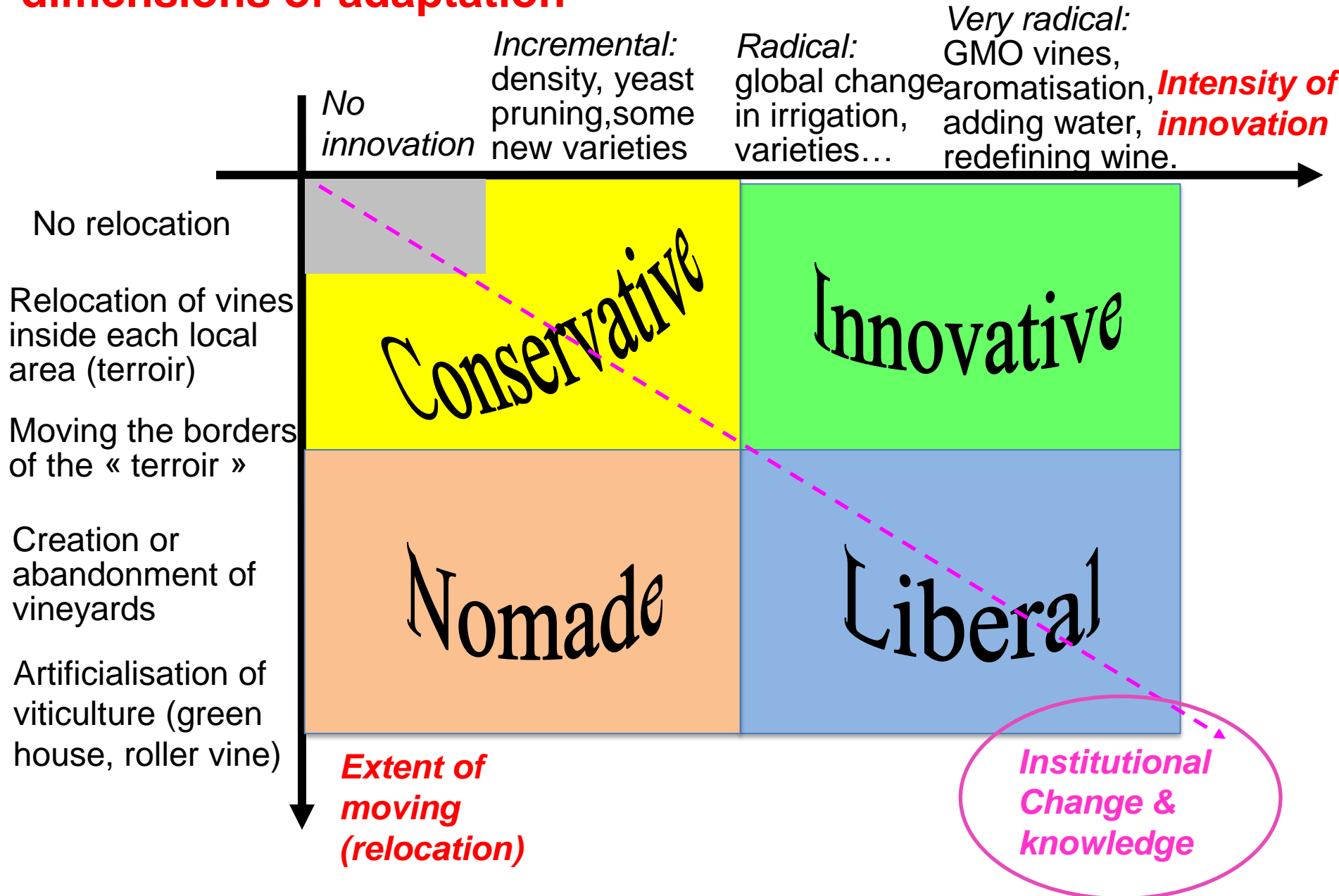
- In **the north**: maturity and productivity often favored by CC  
potential changes in wine characteristics (acidity)  
main problem : increased disease pressure
- In **the south**: drought and water balance deficit  
lack of freshness during maturity stage  
potential changes in wine (excess of alcohol degree)

# Systemic representation of the French wine sector

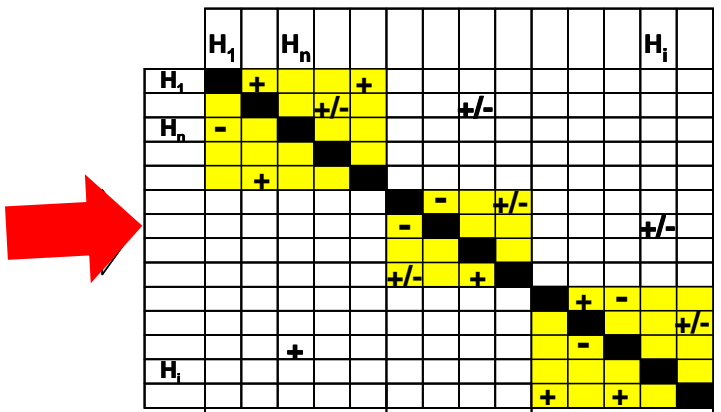
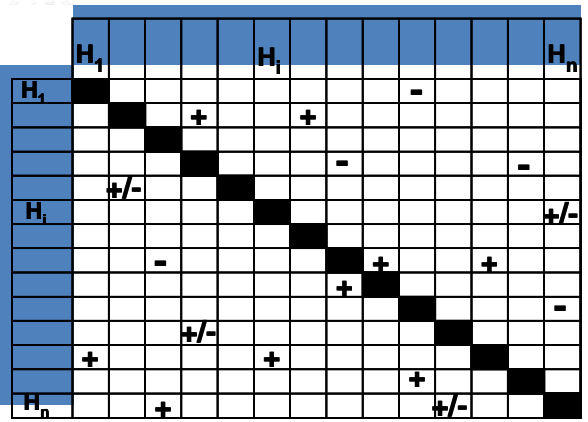
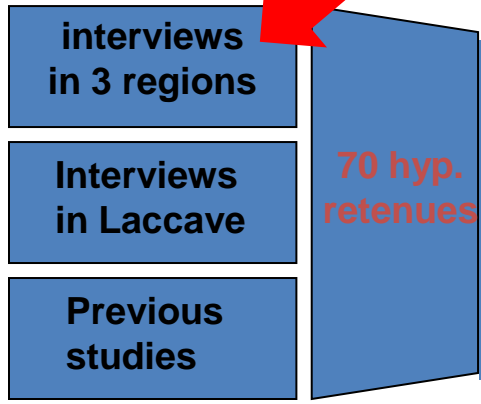
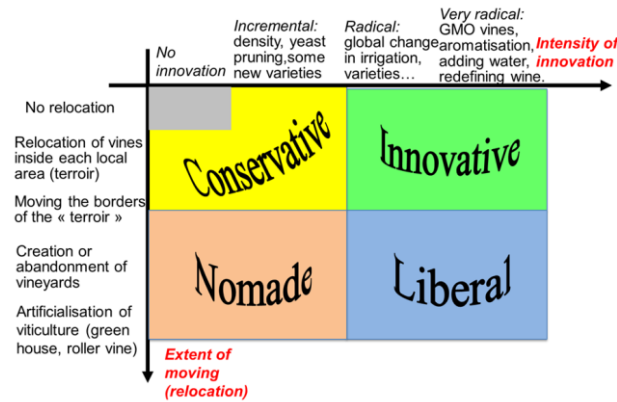


*Actors, Technics and product, Flows*

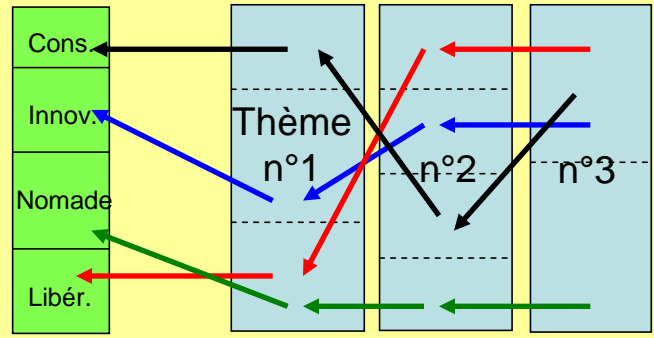
# First construction of four scenarios by crossing two main dimensions of adaptation



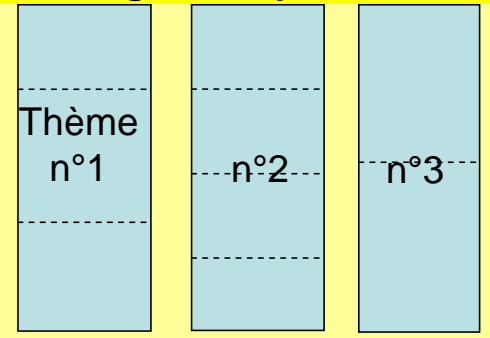
# Collection of data, selection of assumptions, construction of pathways



Agrégat n°1 n°2 n°3  
Driving assumptions



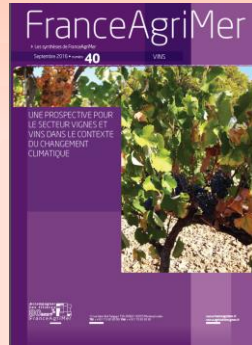
Finding the pathways which can build the adaptation scenarios



# Publication and dissemination of first results

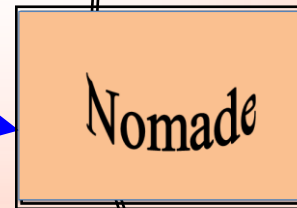
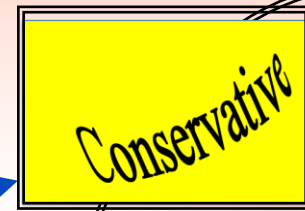
Each pathway is described by:

- Key assumptions (drivers, external and structural variables, events)
- Long narrative
- Summary

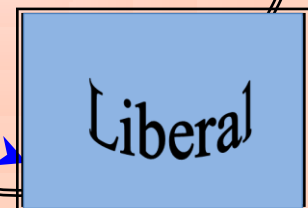


*path*

*present*



**About  
2050**



**Disséminations of scenarios**

**First presentations in :**

- professional assemblies and journals
- policy makers :national assembly, OIV
- mass media (TV, radios...)

# Four pathways preferentially leading to the four adaptation scenarios.

## ...Conservative

Facing pressure from i) health authorities on alcoholic drinks and ii) agricultural policy giving priority to land and water use to food crops, the wine industry, which is weakly linked to the research, perceives CC as a threat. Promoting the cultural and landscape image, the wine producers try to distinguish wine from other alcoholic drinks, but Gis wines and their regions become “island of resistance”, for a viticulture which starts to decrease in volume, area and value. This strategy becomes difficult to follow as CC is more intense.

## ...Innovative

Environmental, health and CC issues become an opportunity for the wine industry by integrating more and more innovation from the vineyard to the cellar. This development is allowed by a favorable and cooperative context which allow to maintain a relative stability between the French wine regions. This innovative context also relies on i) a voluntary research and innovation policy (private/public partnerships), ii) a binding policy on agricultural land management in the EU (zoning) and iii) more liberal conditions in terms of winemaking.

## ...Nomade

In the context of i) restrictive policy on alcohol and ii) a research focusing on the reduction of inputs use (pesticides and water), the consumers are aware to find the taste of the origin of the wines. Without sufficient knowledge to develop at large scale a “precision viticulture”, the wine producers find difficulty to reduce the variability of the wine quality. Some of them, joined by new investors, try to find "elsewhere" the reputation of the appellations, while others move to the plains where water is still available for irrigation.

## ....Liberal

In a more liberal and relatively favorable context, new international investors, mainly in blending & trading, lead to the redistribution of viticulture towards three kinds of areas: irrigated areas, residual inherited terroirs, new vineyards benefiting from climate change. Some “Terroir wines” or “regional brands” are still marketed, but the supply is mainly composed of technological wines controlled by few wine merchants. Climatic instability, competition between vineyards, deregulation and the power of international traders weaken the wine producers which are disorganized and can not fully benefit from R&D



## Second step (2017-2018): towards a participatory approach



max ~32.4 °C

A quoi ressemblera la filière Vigne et Vin à l'horizon 2050 ?  
Comment se sera-t-elle adaptée au changement climatique ?

Forum Prospective  
La filière Vigne et Vin dans le contexte du changement climatique  
Jeudi 24 Novembre 2016 // 9:00  
INRA, Château Couhins  
Villenave d'Ornon

INRA / 70 ans  
VOTRE AVENIR EST NOTRE CULTURE

Climate Smart Agriculture  
Booster

Organisation of  
« prospective workshops »  
In six wine Regions  
**Bordeaux/Cognac**  
**Champagne**  
**Bourgundy**  
**Languedoc**  
**Rhône Valley**  
**Alsace**



**80-100 stakeholders** react on the scenarios and propose strategies by using tablets available on discussion tables.

- 1) They **specified the pathways** leading to the four scenarios and explore their impacts
- 2) They **constructed strategies** to promote or avoid them

## Attitudes stratégiques et priorités (résultats)

	Proactivité positive	Proactivité négative	Réactivité anticipée	Veille	Ø
Le chemin vers la stratégie conservatrice	13.3%	23.3%	36.7%	21.7%	5.0%
Le chemin vers la stratégie innovante	81.7%	1.7%	16.7%	0.0%	0.0%
Le chemin vers la stratégie nomade	1.7%	26.7%	33.3%	38.3%	0.0%
Le chemin vers la stratégie libérale	5.0%	43.3%	21.7%	28.3%	1.7%

# Some results: strategic attitude on each scenario/pathway

## ...Conservative

Positive proactivity : 10-23%  
negative proactivity : 15-32%  
anticipated reactivity: 21-37%  
Strategic watch : 17-28%

Continuation of current adaptation strategies, with diversity of strategic attitude, and questions

Available in many regions if climate remains under 2C, but decrease of competitiveness .

Consumers keep preference on terroir and accept impact of CC on wine quality

## ...Innovative

**Positive proactivity : 56-86 %**  
negative proactivity : 1-17%  
anticipated reactivity: 9-24%  
Strategic watch : 0-14%

Innovating to stay in current wine areas, to protect multiple investments and specific assets

Alliance between producers, research, consumers questioning cost and orientation of investment

Need of climate stabilization (located investment).  
Consumers may accept technologies

## ...Nomade

Positive proactivity : 0-6%  
negative proactivity : 15-32%  
**anticipated reactivity: 24-41%**  
**Strategic watch : 35-49%**

Difficult to imagine, combination of threats and opportunities...

New actors investing in the wine production

New notions of « terroir » as principe of action

Consumers still purchasing specific and local wines

## ....Liberal

Positive proactivity : 5-16%  
**negative proactivity : 41-72%**  
anticipated reactivity: 18-31%  
Strategic watch : 12-22%

The end of current wine world, but a possible world !

Wine producers are excluded from the governance, dominated by wine merchants, blenders, retailers who are taking advantage from CC...

Consumers consider wine as industrial beverage

# Main outcomes and impacts of the prospective

- Successful **learning tool** in each wine region leading to awareness, capacity building, collective action that help the co-construction of climate strategy in regional vineyards
- **Political tool**: creation of a « national group on wine and CC » including the main wine organisations and administrations, and presentation at OIV (international organisation of vine and wine)
- **Innovation booster** : promoted by UE as an innovation for climate smart agriculture (Climate KIC)
- **Methodological outcomes** : interest of food system approach and prospective focusing contribution to the prospective methods for adaptation to CC on pathways
- Contribution to the Inra **research agenda** : new topics (soil, innovative systems, landscaping...) and new participatory method (living lab)
- **Impact on the society** (TV documentaries, national and international medias)

# Construction of shared messages

- Adaptation strategies could be reasonably implemented in all French vineyards **if global warming stays below 2°C**
- **Reduction of GHG** emission is imperative , “if you like wine you must support Paris COP21 agreements”
- **No single solution**, but different combinations of technical innovations, spatial strategies and institutional changes.
- The integration of solutions must be elaborated considering **the value chain**, including the consumer preferences
- The adaptation strategies must be coordinated **at local and regional levels** where climate impacts are specific and where the use of resources can be optimized
- The best way to adapt is based on **collaborative capacity between researchers and stakeholders**, at regional and inter regional levels
- Prospective can be successful tool for **climate smart agriculture**