

The impact of Framework Programme agricultural research

– a brief evaluation

Donal Murphy-Bokern

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PREAMBLE

All agricultural (including farm animal health and welfare) and forestry research is applied. Its purpose is to improve the performance of farms and forests – for food, raw materials, and the full range of social and environmental services that these natural resources can provide. This purpose is served when research is used to deliver new practices, technologies, products, and to support evidence-based policy-making. This is research impact. In late 2010, the European Commission (EC) asked us to assess the impact of its research in these areas conducted since 1998. The EC also asked us to reflect on the direction of future research considering current scientific developments, societal trends and European policies. This document sets out the results of our work.

It was clear to us at the outset that conventional ‘top-down’ methods of analysing research performance such as using citation indexes, patent searching, and searching policy documents were unlikely to provide the evidence needed. Consequently, we decided to take a bottom-up approach. We examined the full range of outputs of individual research projects as quantitatively as possible. We looked at about half of the projects in the EU’s relevant research portfolio in detail. Our assessment was based on a standardised audit of outputs. Data on outputs alone are not sufficient and so we examined how research was made available to users and used our experience in qualitatively assessing the implications of the research results for impact.

Following our individual analyses of project data, we came together for three days in Brussels to discuss the impact of the research as a whole. This report is largely based on those discussions. Each author brought a unique perspective and we hope this report reflects a clear consensus between the various carefully considered positions we each developed independently.

Our work revealed some clear and consistent messages about research impact that have implications not just for the content of future research but also for its structure and management. We decided therefore to provide six recommendations relevant to the strategic direction of research along with the conclusions of our assessment.

PREAMBLE (continued)

The European commission is to be commended for seeking an external assessment of the impact of its research in this way. Quickly bringing together such a diverse group of scientists and research users as we are was a significant undertaking for the EC officers who assisted us. The EC also provided a comprehensive library of supporting documents, and officials were always willing to help us during our work. In addition to examining project outputs, we had the benefit of in-depth and very helpful discussions with key EC research managers. Our experience with all the EC staff who supported us reflect their deep commitment to effectively leading and managing the research funding resource with which they are entrusted. We are very grateful for their help.

The European Union's agricultural and forestry research programmes extend back to the earliest days of the European Union (then the EEC), even before the Framework Programme were introduced. They have had a major impact on European agricultural and forestry science to the extent that this research community is one of the most European of professional groups. We hope our work is a contribution to the development of the research so that impact for Europe is increased further.

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Agricultural research – one of Europe’s long-standing common endeavours



Photo: Rothamsted Research



The scale of agricultural research in Framework Programmes

Framework programme	Areas covered	Budget – million Euros
FP4 (FAIR) 1994-1998	Agriculture, fisheries, forestry and food	647
FP5 1998-2002	Agriculture, fisheries and forestry	Ca. 520
FP6 2002 – 2006	Food quality and safety, policy support	Ca. 928
FP7 (KBBE) 2007- 2012	Food, agriculture, fisheries and biotechnologies	Ca. 1 900

Impacts

Scientific and technical

Innovation (e.g. patents and start-ups)

Economic and social (e.g. employment)

Environmental

Policy

European Research Area (capacity, structural, regional)

European value added (leverage, networking)

Impacts

The impact categories were provided by the European Commission in the Terms of Reference. The term 'innovation' refers to the conventional commercial innovation using patents, spin-offs, new companies as indicators.

Opportunities and trends

Innovation Union

Resource efficient Europe

Draft Becoteps White Paper

SCAR 2nd Foresight Report

SCAR 3rd Foresight Report consultation document

UK Foresight report on land use

A wide range of other literature sources

Some project examples

ECOWOOD

Development of a protocol for eco-efficient wood harvesting on sensitive sites

Protocols for sustainable wood extraction on sensitive sites

1.2 M Euros invested

Very wide range of research outputs

Targeted at primary users and policy-makers

Excellent project management



FMD ImproCon

Improvement of Foot and Mouth Disease control using vaccines

Impact: a 'vaccinate-to-live' strategy

Supported the evolving EU and international FMD control policy

2.4 M Euros invested by EU

Very wide range of research outputs – publications etc

Targeted at policy-makers



Photo: Ben Gamble



FMD ImproCon

The impact depends greatly on further outbreaks of FMD. Without vaccination, we could be faced with the control measures used in 2001 – mass culling and pyres.

Ideally, we would rather avoid an outbreak and thus avoid using the full impact of this project.

REBECA

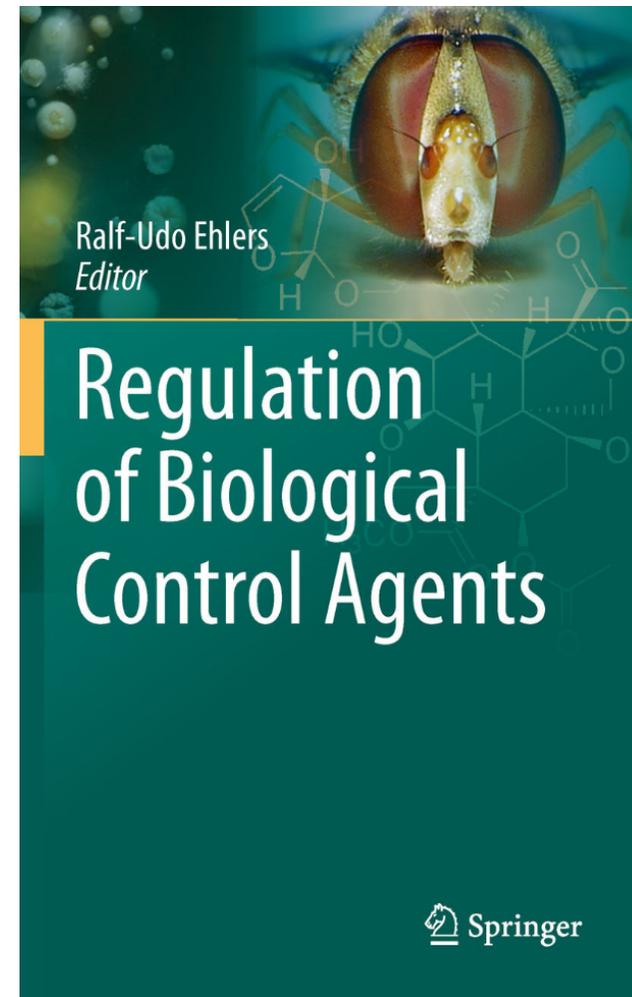
Enables rational regulation

Collaboration between key actors

1.0 M Euros invested by EU

Targeted at policy-makers

Impact depends on political decisions



REBECA

The impact depends entirely on the progress of pesticide safety policy. Recent reform has focused on the sharpening-up of hazard-based risk assessment in the regulation of conventional synthetic pesticides. In addition, the Sustainable Use Directive seeks to establish minimum standards of pesticide handling and use on farms.

Ironically, it seems that this focus on tightening the safety of the conventional plant protection system might have distracted policy-makers from the opportunities that biological control systems offer. The full impact of REBECA will take some years to realise and depends on political decisions.

EU-Sol

High quality *Solanaceous* crops for consumers, processors and producers by exploration of natural biodiversity

Major contribution to world-wide effort to sequence the genome of tomato – model for many vegetables

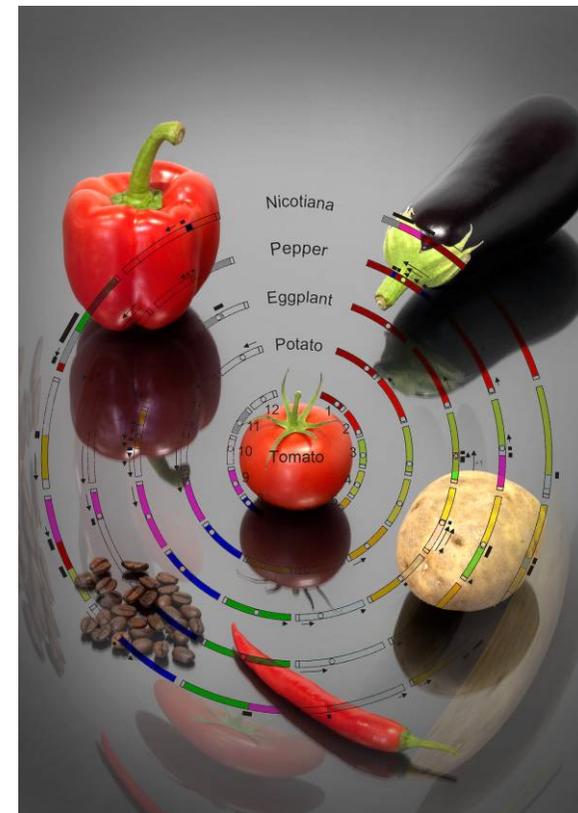
Genomics ‘toolkit’
to enable new elite germplasm

19 M Euro invested by EU (Total 26 M)

54 partners, 19 from private sector

Very high scientific output

Collaboration sustained



EU Sol

EU Sol was an excellent Integrated Project. It shows how this 'large project' approach allows 'big science' to happen in the EU.

Integrated Projects sought to address weaknesses in impact by including most actors in the supply chain. The end result is significant resource in large projects devoted to supply chain activities outside the core scientific challenge. At the same time, the scope of the core scientific work as set out by the EC was constrained by programme policies such as the 'fork-to-farm' adage that demanded that all research be driven by issues relevant to consumers. The 'Integrated Project' instrument enables 'big science' but is not an alternative to effective portfolio management.

Thankfully, projects such as EU Sol overcame these constraints through global international cooperation and real commitment from scientists.

EuroMARC

European mountain agri-food products, retailing and consumers



Research support to quality guidelines and assurance

Comprehensive supply-chain quality 'toolbox'

1 M Euro invested by EU

10 partners led by a sector association

Mountain products charter
Product label
Assurance system



CAPRI DynaSpat

Common agricultural policy regional impact assessment - the dynamic and spatial dimension



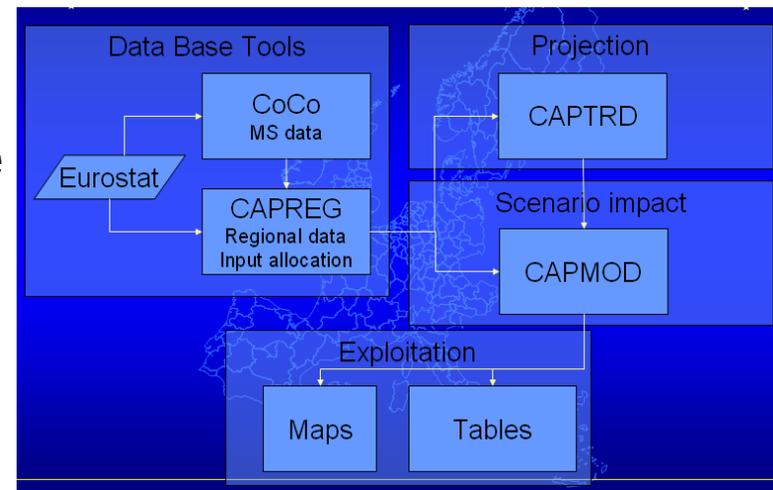
Centre-piece of evidence for the development of the CAP

Economic and bio-physical modelling system

750,000 Euro invested by EU building on two past EU projects

Operational for almost a decade

Impressive leverage



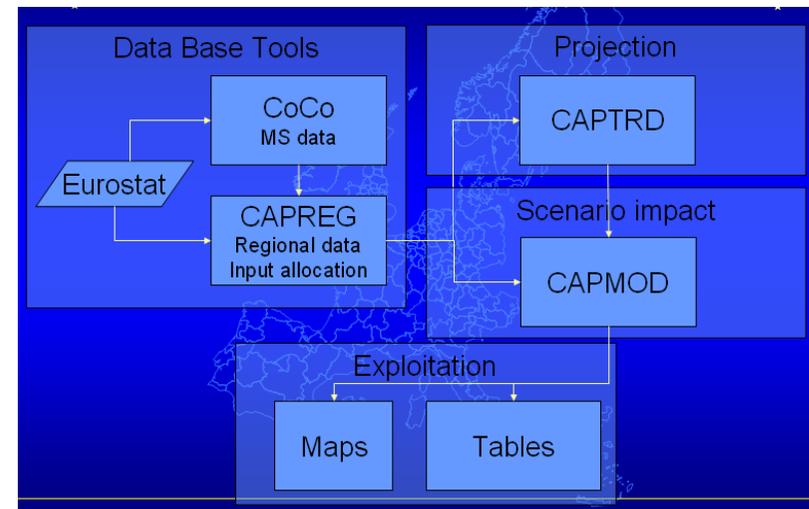
CAPRI DynaSpat

Common agricultural policy regional impact
assessment - the dynamic and spatial
dimension



***“For sure ... there would be no CAPRI without the
continuous support of the EU”***

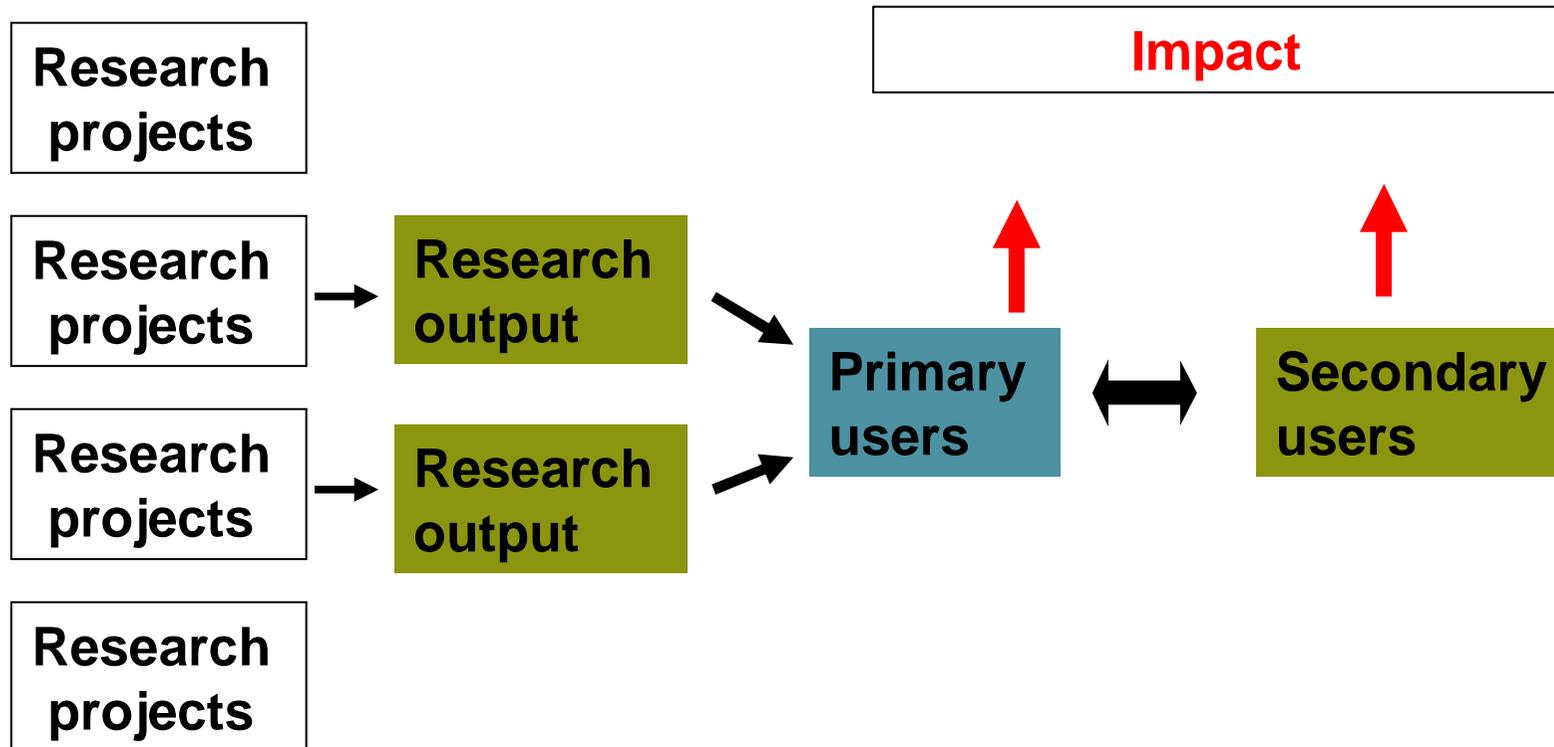
(Wolfgang Britz)



Assessing impact

Some considerations

How is impact from research generated?

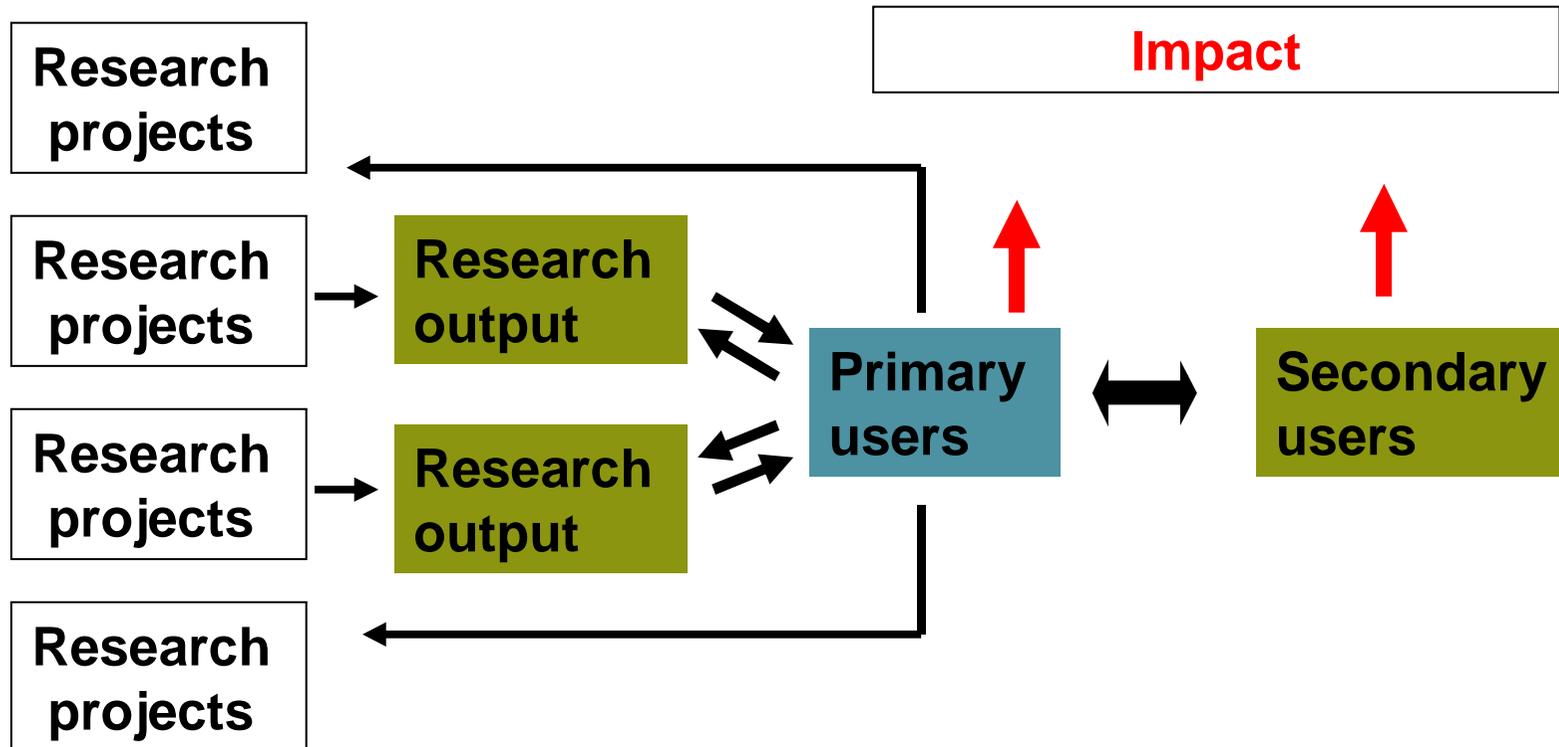


Traditional approach to impact

It is important to realise that impact is not delivered by researchers, it is generated by users.

Researchers deliver knowledge and understanding, not impact in terms of socio-political outcomes

How is impact from research generated?



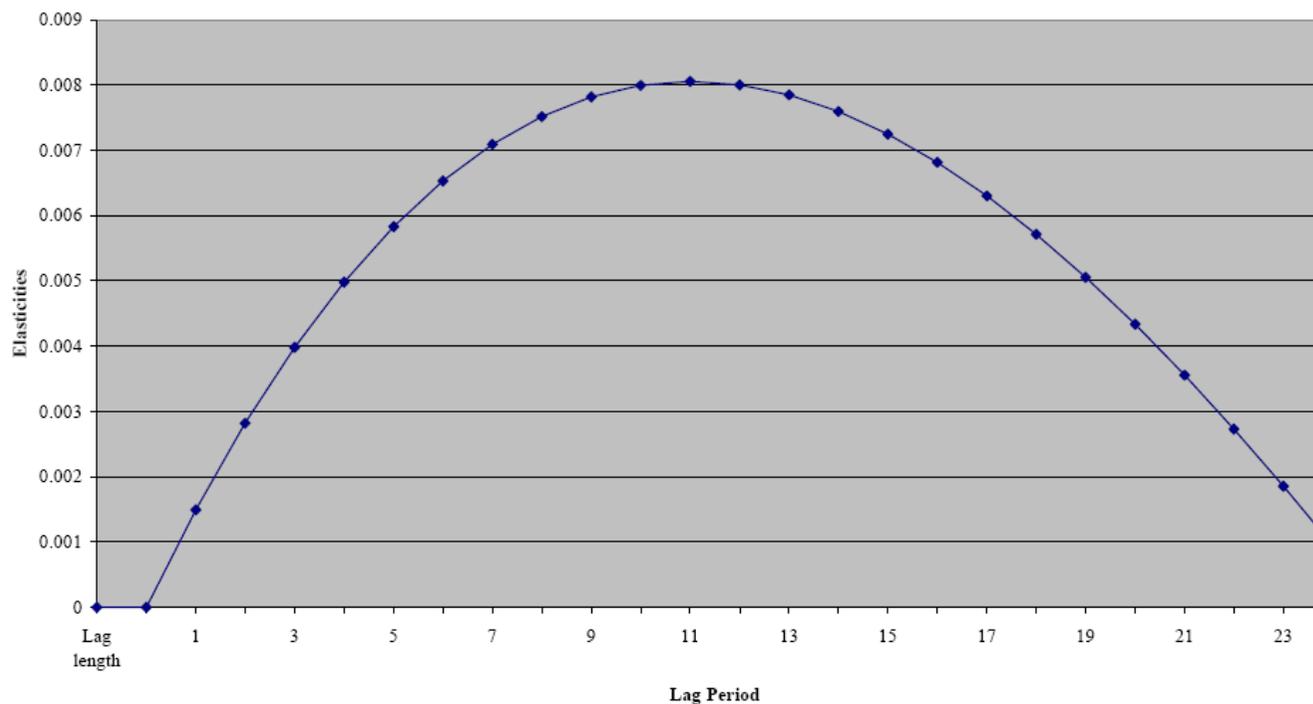
Traditional approach to impact

The participation of users in the identification of research questions is important and particularly appropriate in agriculture.

There are potential pitfalls in overly relying on users' views. Such interaction may be dominated by 'professional stakeholders', and there may be a drift to lower common denominators. A particular risk is that programme managers operate as mere programme administrators responding directly to stakeholder input rather than translating it into coherent projects and programmes.

There is evidence in EU calls of a lack of translation of stakeholder input with significant parts of call text written by for example Technology Platforms. Our evaluation draws attention to the risk of over-reliance on well organised stakeholders and on not complementing their input with interpretation.

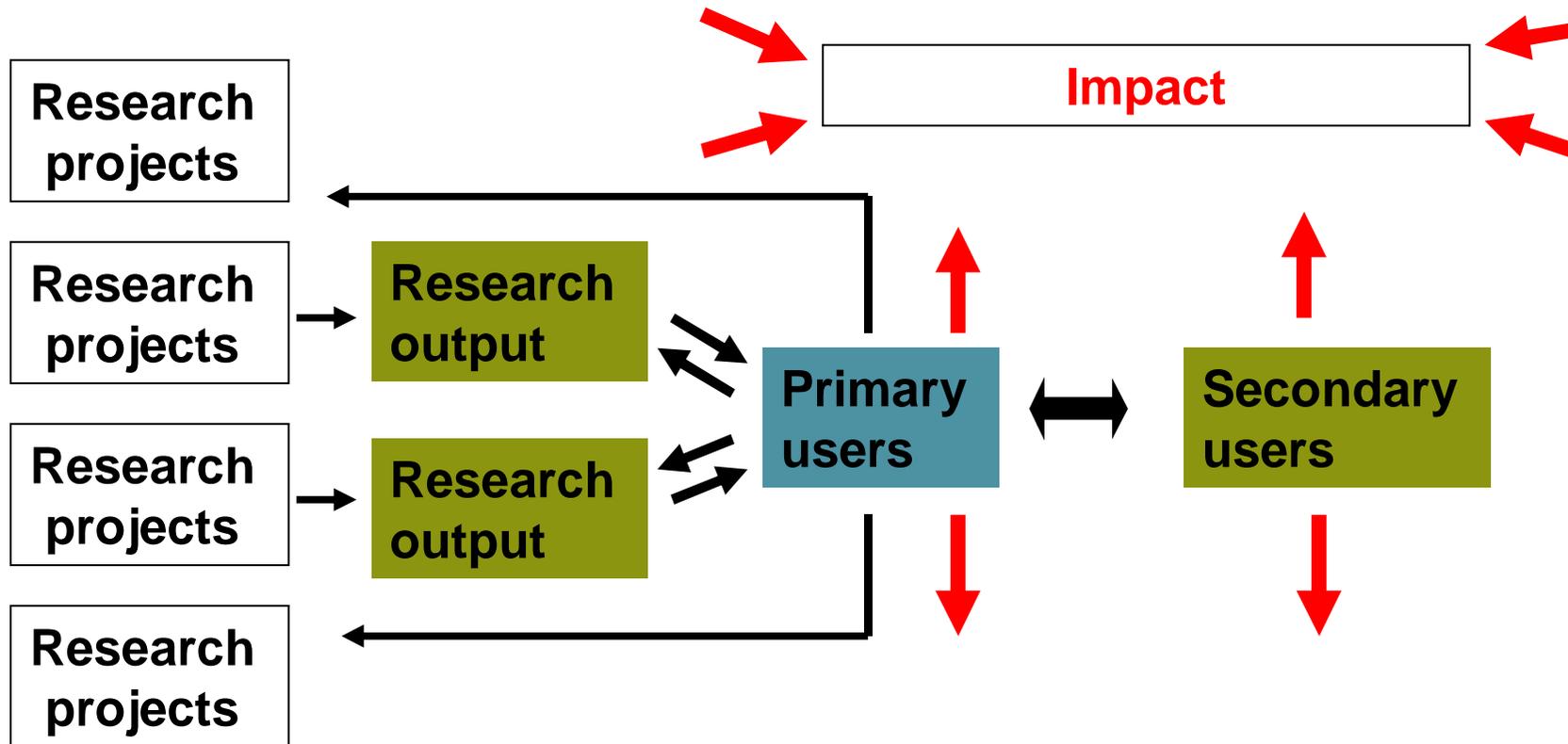
Generating impact takes a long time



Lagged impact of R&D on productivity

(Ref: Competitiveness of UK Farming: Measuring and Explaining Productivity Change. AES/Defra Conference, Sustainable Farming and Food. 30 January 2003. Bailey et al., presented by Colin Thirtle.

And there is diffusion – leaks in and out



Research impact is difficult to measure

Impact is the
widest effect in society

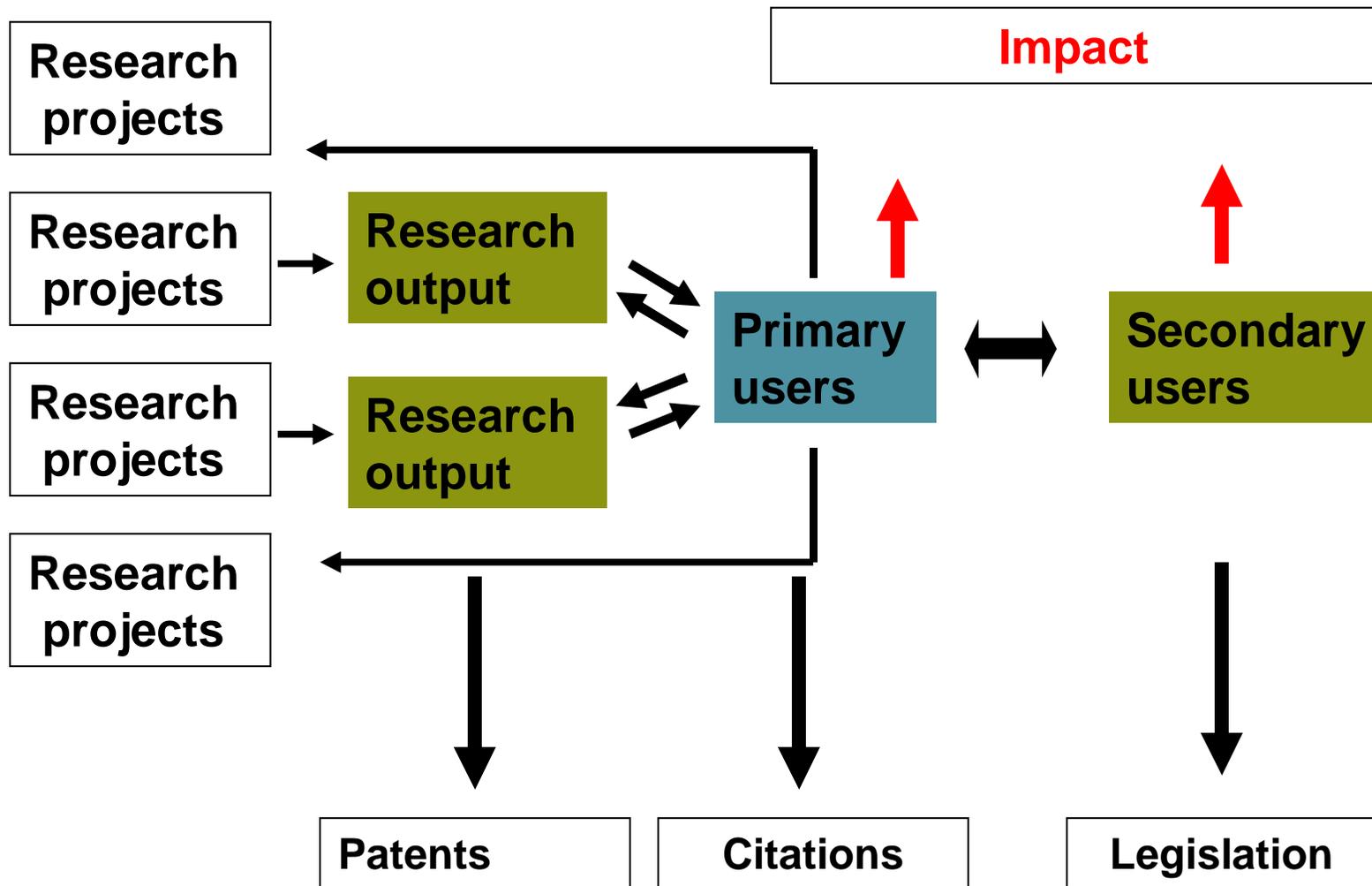
Impact takes time
to fully develop

Over time, causation
is less clear

Assessing impact

- approaches

Using indicators

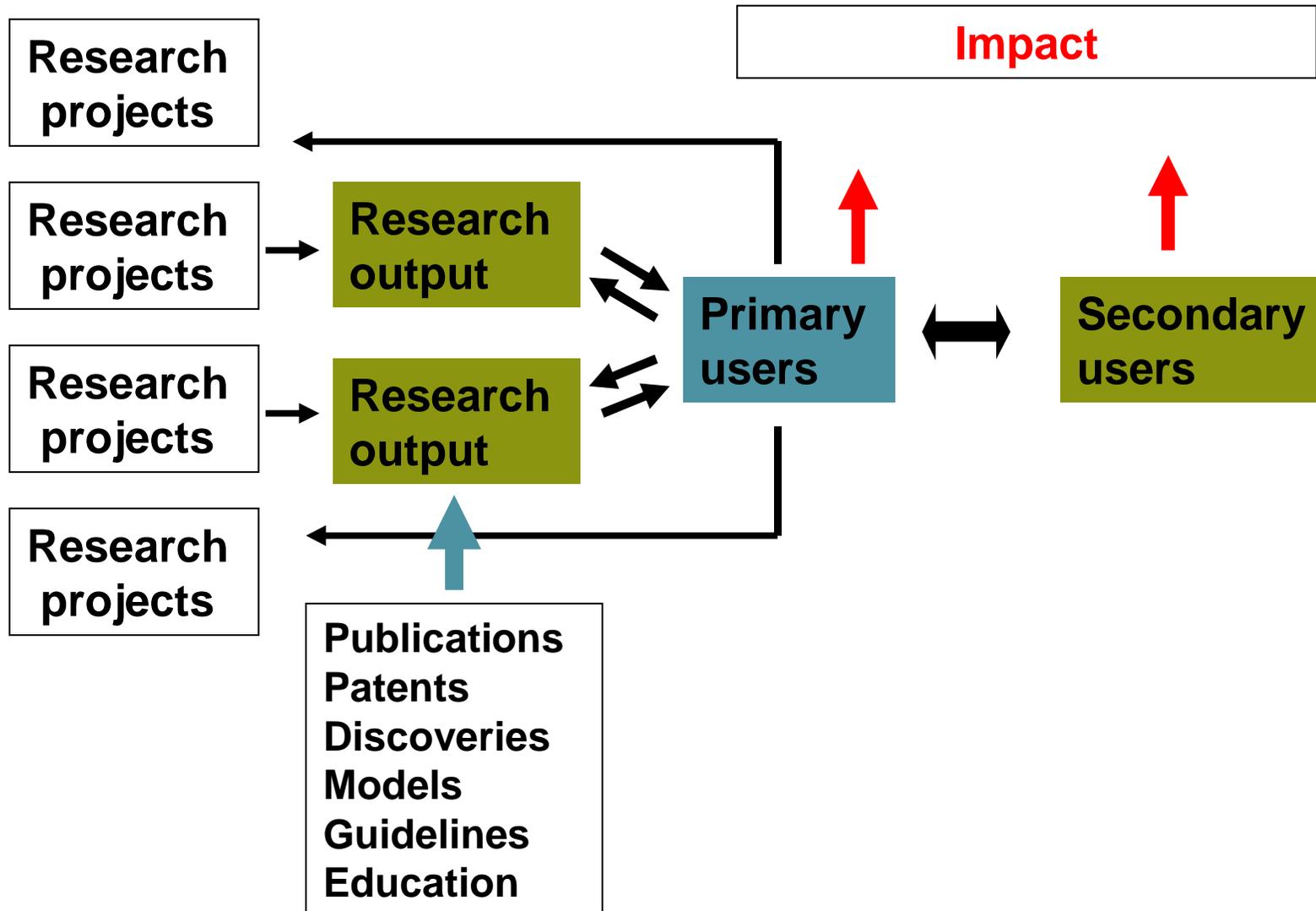


Using indicators

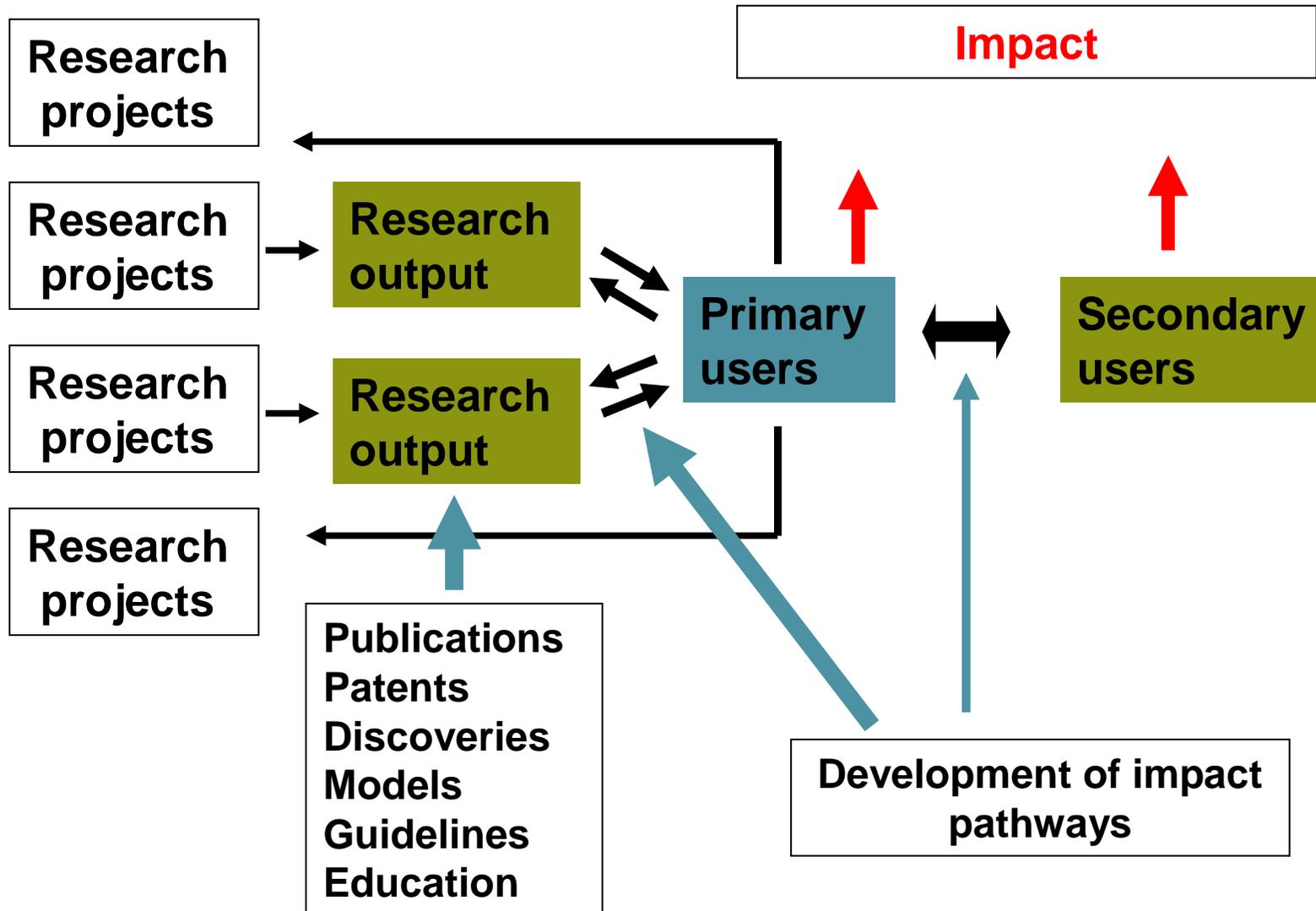
The European Commission made a wide range of analyses of indicators available to us, including bibliographic analyses and searches of references to FP research in EU legislation. There were also data from a survey of project coordinators.

It was quickly clear to us that this was not adequate for our purposes. Patents are relatively rare in this research area and there are other outputs relevant to innovation. Bibliographic analysis was weak in identifying publications from projects because many publications fail to precisely acknowledge the funding source. Legislation texts also rarely refer precisely to the source of underpinning evidence.

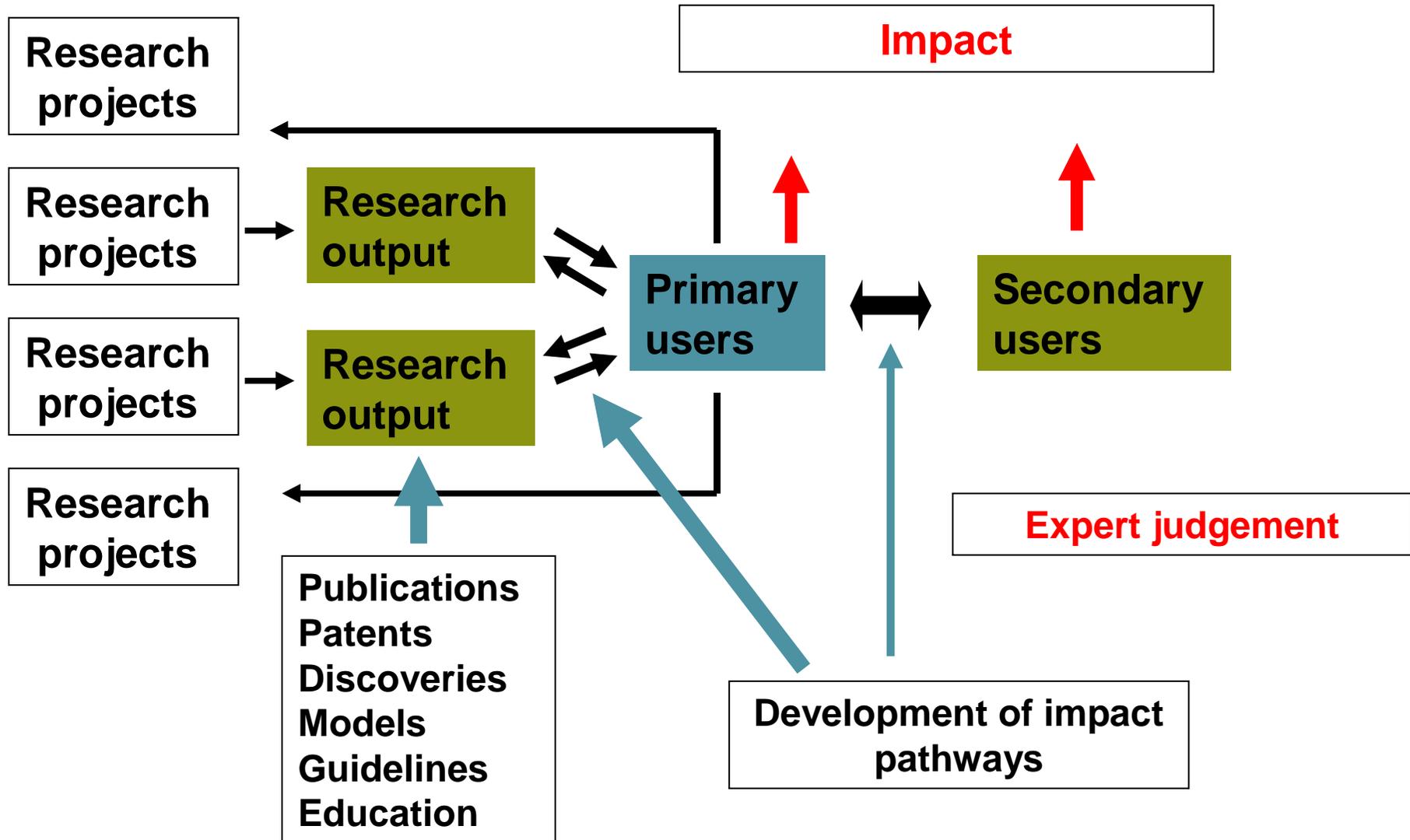
Using direct observation



Using direct observation



Using direct observation



Using direct observation

Our approach was to use direct analysis of project outputs. We focused on two key aspects: the project outputs and the use of impact ways by the researchers. This was as quantitative as possible using a standard project audit form developed by the panel.

The membership of our panel provided a diversity of expertise and experience. This means that in addition to generating primary quantitative evidence, we were also able to use judgement in assessing this evidence. This is in contrast to some impact assessment procedures where analysis of project outputs and the assessment of the implications at the programme level are separated.

Results

Impacts – science and technology

Consistently good to excellent

Conscientious research teams

Projects are well managed

‘Balanced excellence’



Taking samples of air above crops for emission assessments, Fundulea in Romania

Good to excellent science

This is a very positive result. It might seem like a given that public research should perform to high international scientific standards. However, getting this consistency of performance across such a broad programme which includes strategic and highly applied research is quite an achievement.

This balanced excellence might be unique.

Impacts – innovation

Less clear – agricultural knowledge is often a public good

Some patents (ca 15% in relevant areas)

Few start-ups, but there is a community of academic start-ups linked to FPs



Impacts – economic and social

Large indirect impact through policy

Some good specific direct examples - EuroMARC

Projects with socio-economic objectives generally performed well

Huge indirect social impact through education and training across the whole programme



Photo: EuroMARC

Socio-economic impact

This impact is very difficult to assess as the lag-time is particularly long.

We noted however very good examples of research being used strategically to address political challenges, particularly the enlargement of the EU.

Socio-economic research was used to address key enlargement questions.

Impacts – environmental

Major disruption in FP6

Recovery in FP7 expected

Most impacts are indirect –
which is important in
sustainable development



Environmental impact

Our evaluation was focused on FP6. Agricultural research in FP6 was focused on food safety and quality and used the 'fork-to-farm' adage to guide research policy.

This resulted in a move away from research focused on environmental performance. It caused a collapse in forestry research.

Our report is very critical of this and the associated tendency to base research policy on buzzwords and political slogans. There is also a tendency to link research policy to the political and career cycles operating in Brussels.

Impacts – European Research Area

Very large impact throughout the programme

Collaboration, collaboration, collaboration

Education and training

The agricultural science profession is truly European

ERANETS

Impacts – European value-added

Collaboration

Critical mass

Transnational problems

Leverage? Some good but isolated examples

Impact pathways – well used

Scientific publications

Policy development

Models, guidelines, vaccines etc.

Education and training

Internal pathways – SMEs, policy partners
(e.g. REBECA)

Effective impact pathways

The analysis of projects reveals the breadth of impact pathways used. Project consortia engaged actively with a wide range of users. In some cases, especially in the Integrated Projects, there was extensive public outreach, for example through schools in EU Sol.

Overall, we conclude that the FP research used traditional science orientated impact pathways well. Some areas, particularly animal health and forestry, used direct engagement of experts informing policy well. The use of the education and training impact pathway is excellent.

The challenge of raising impact is not about more 'dissemination' per se. It might actually be about less but more focused strategic impact management in some cases.

Impact pathways – not so well used

Access to primary outputs – project reports

Ad-hoc knowledge interaction embedded in projects

Websites - temporary

SMEs

Cost and risk concentrates the mind!

Lack of programme-level follow-through

Ineffective impact pathways

We are struck by the *ad-hoc* approach to impact pathway planning. This is indicated by the many *ad hoc* ‘dissemination’ products, workshops, and stakeholder interactions, particularly in reaching farmers. An underlying problem is the project specific nature of these activities. Regardless of the quality, few research projects deliver a complete and coherent answer to practice challenges and in any case the project-based interaction with farmers ends when the project ends.

Provision of free public access to project reports is poor. We are frankly shocked by the poor documentation of research outputs through final reporting placed in the public domain.

Impact strengths

Impact strengths

The quality of the science

Collaboration

Critical mass

Education

European Research Area

Relevance

Weaknesses

Weaknesses

Reporting and access to results

Project structure – SMEs

ERANETS – excellent idea but implementation problematic

IPs integrated along the supply chain but
fragmentation in core science still a risk

Programming

Is the programme more than the sum of the parts?

Is there coherent programme structure
to extract impact from individual projects?

Answer: No – but!

Programming

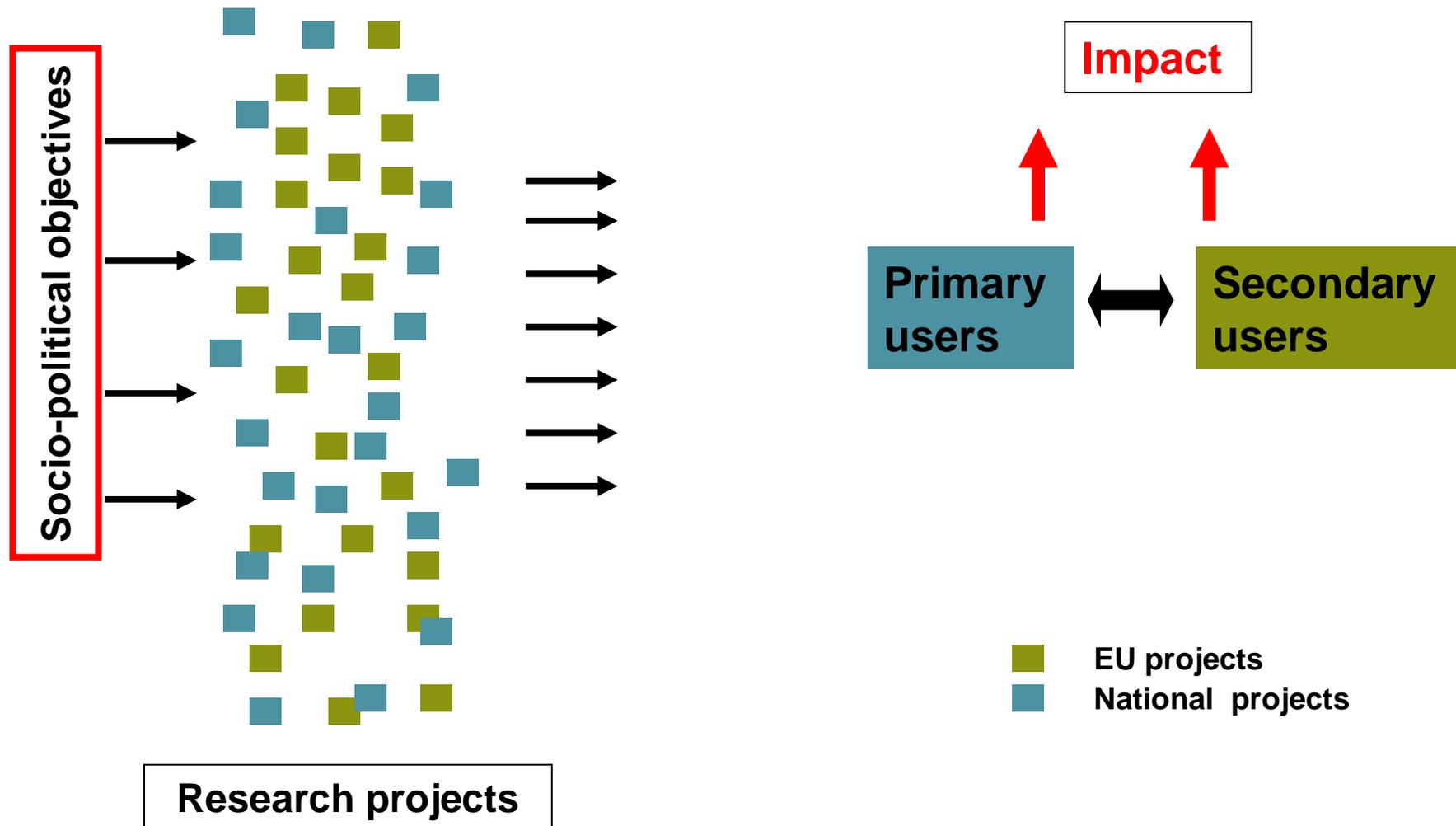
There is a lack of consistent sub-programme (portfolio) structure and long-term strategies for investing in high-level research goals. There is an almost complete lack of programme structure above the level of the project. This makes it very difficult to develop impact above the level of the individual project.

But there are exceptions which have been developed either by stealth and good luck or because of the urgent nature of the work.

These are found in animal health in particular and in the socio-economic research. Examples include the coherent commitment to swine flu research over FP5, FP6 and FP7. Another example is the commitment to CAPRI, and a degree of coherence in organic farming research.

The underlying driver in the animal health and CAPRI examples is the urgency and direct relevance of the research to key policy areas.

FP 6 Developing coherence for impact



The default 'response mode' situation

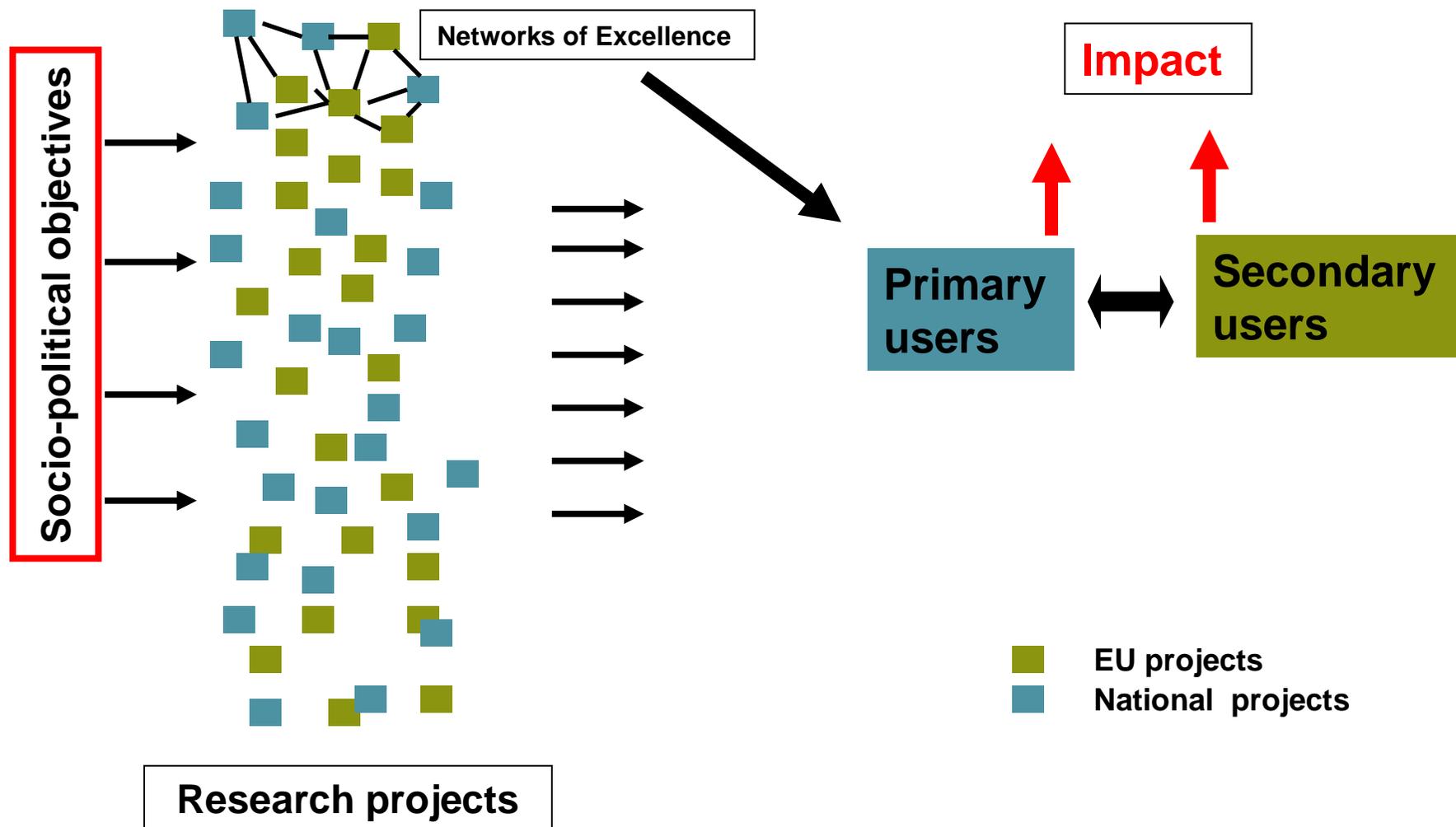
“the country’s needs are not so trivial as to be left to the mercies of a form of scientific roulette” (Lord Rothschild, 1972)

The same applies now, but a great deal of the forming of the FP research themes is down to a form of scientific roulette, in response to key interest groups. The result is “a pile of projects”, each set up by a bottom-up process and each individually but separately linked to some socio-political aspiration.

‘Transfer’ or ‘dissemination’ is embedded in projects with each delivering outputs separately to users.

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FP 6 Developing coherence for impact



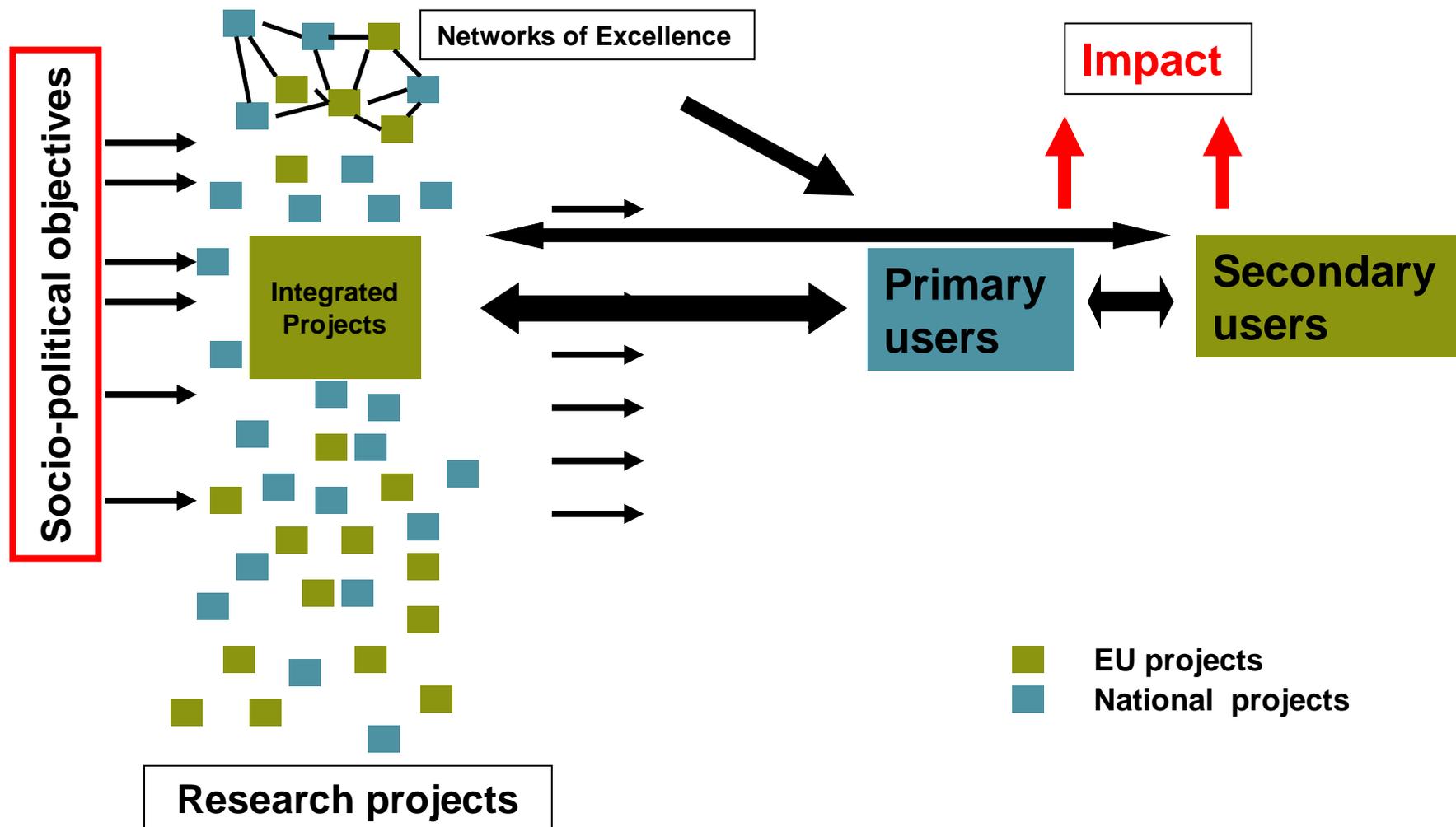
Networks of Excellence

FP6 introduced several mechanisms to bring some coherence. The first was Networks of Excellence.

These projects networked existing EU and national research projects and funded additional synergy work such as publications, training, and temporary working in collaborating laboratories.

These were successful in raising the efficiency and output of the existing but fragmented research base. The added-value was very high – for example in Med Vet Net.

FP 6 Developing coherence for impact



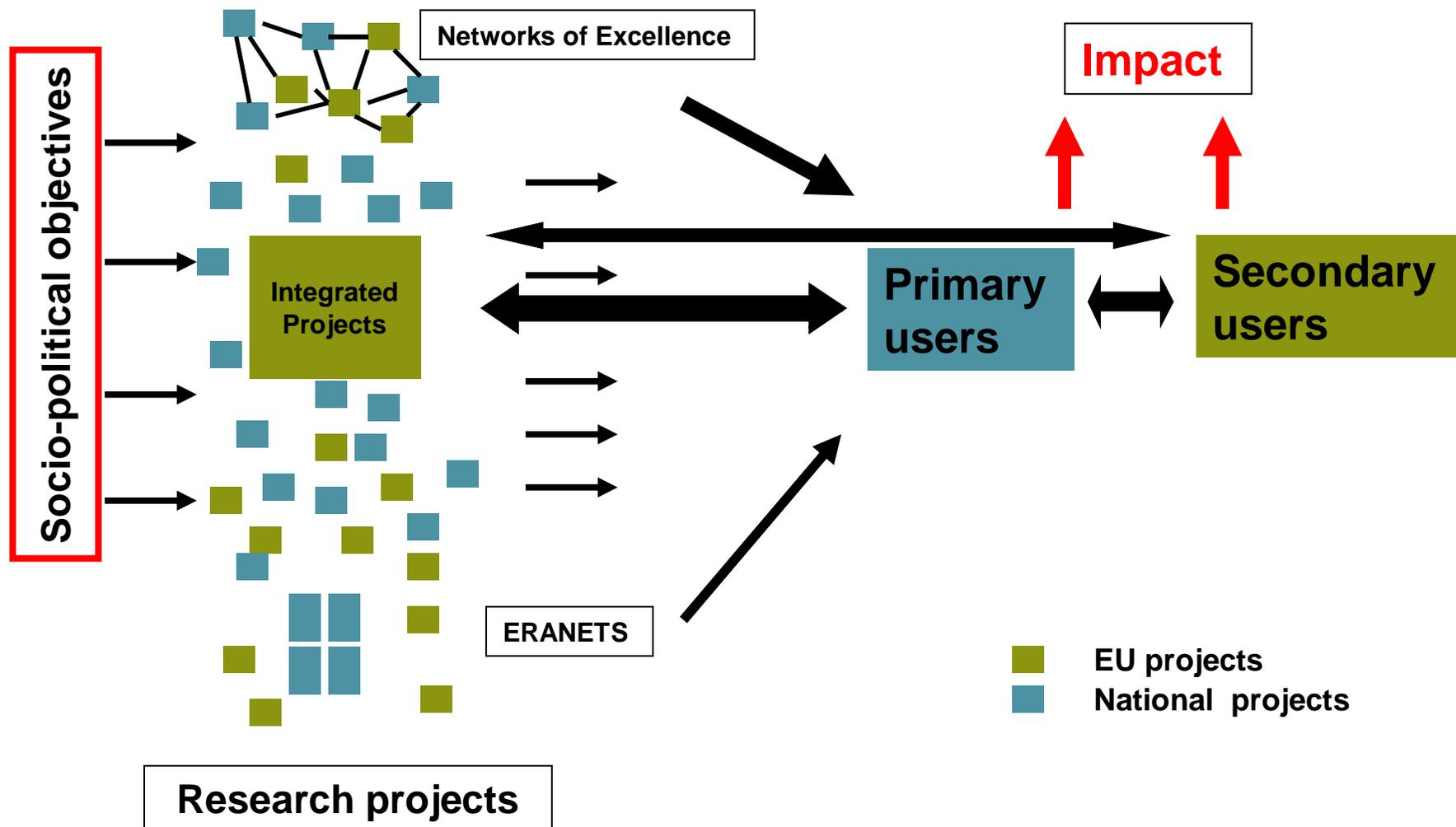
Integrated projects (IPs)

Integrated projects were large projects, typically 15 to 20 million Euros of EU funding. They had many partners. There are examples of IPs enabling 'big science' of global significance (e.g. EU Sol).

The thinking behind integrated projects was that by integrating actors along supply chains – for example from researchers working at the molecular genetic level through to processors and consumers, the entire value chain is covered thereby raising impact.

The result seems to be mixed. While these projects allowed a type of supply-chain integration this was project specific and often fragile related to the funding available to partners. At the same time, a coherent approach to core scientific challenges was not necessarily supported, especially as FP6 was so strongly focused on food quality and safety. So for example, genetic analysis was focused on parts of the genome directly relevant to related traits leaving yield, environmental and input traits aside. This is not efficient in the long run. The result is a fragmented science base unless the researchers mitigate this – which they did.

FP 6 Developing coherence for impact



ERANETs

The ERANET instrument was introduced to foster cooperation in research investment between the owners (funders) of national and regional research programmes. A total of 11 ERANETs were established in FP6 and 7 in the agriculture area . In assessing these we are very mindful of their unique purpose which is to raise the performance of national research programmes within the ERA through cooperation between national funders, for example between national ministries that invest in agricultural research. The idea of investing in the identification of common research needs across national programme and the establishment of mechanism to share the cost of this research is excellent, and one of the most innovative aspects of FP6.

However, significant difficulties in implementing this are evident in agriculture. These difficulties are rooted in the semi-state nature of agricultural research providers in many countries, unclear boundaries between research programme owners and research providers, and misunderstanding about the purpose of ERANETs.

Of the 11 ERA-NETs we examined, only one is coordinated by national research programme owner (ERA-NET EMIDA coordinated by Defra). One other is coordinated by a professional independent research management organisation based in the Netherlands (ERA-NET PLANT GENOMICS). Therefore more than 80% of the agriculture ERANETs are coordinated by research institutions acting on behalf of the coordinating programme owner. In addition, many of the ERANET programme owning partners delegate their representation in ERANET projects to researchers. So there is a real risk that ERANETs are dominated by the ethos in research institutions rather than the ethos of programme owners seeking efficiencies. The conflicts of interest between programme owners and research providers running or participating in ERANETs on their behalf have been poorly managed and we are aware of significant past difficulties as result.

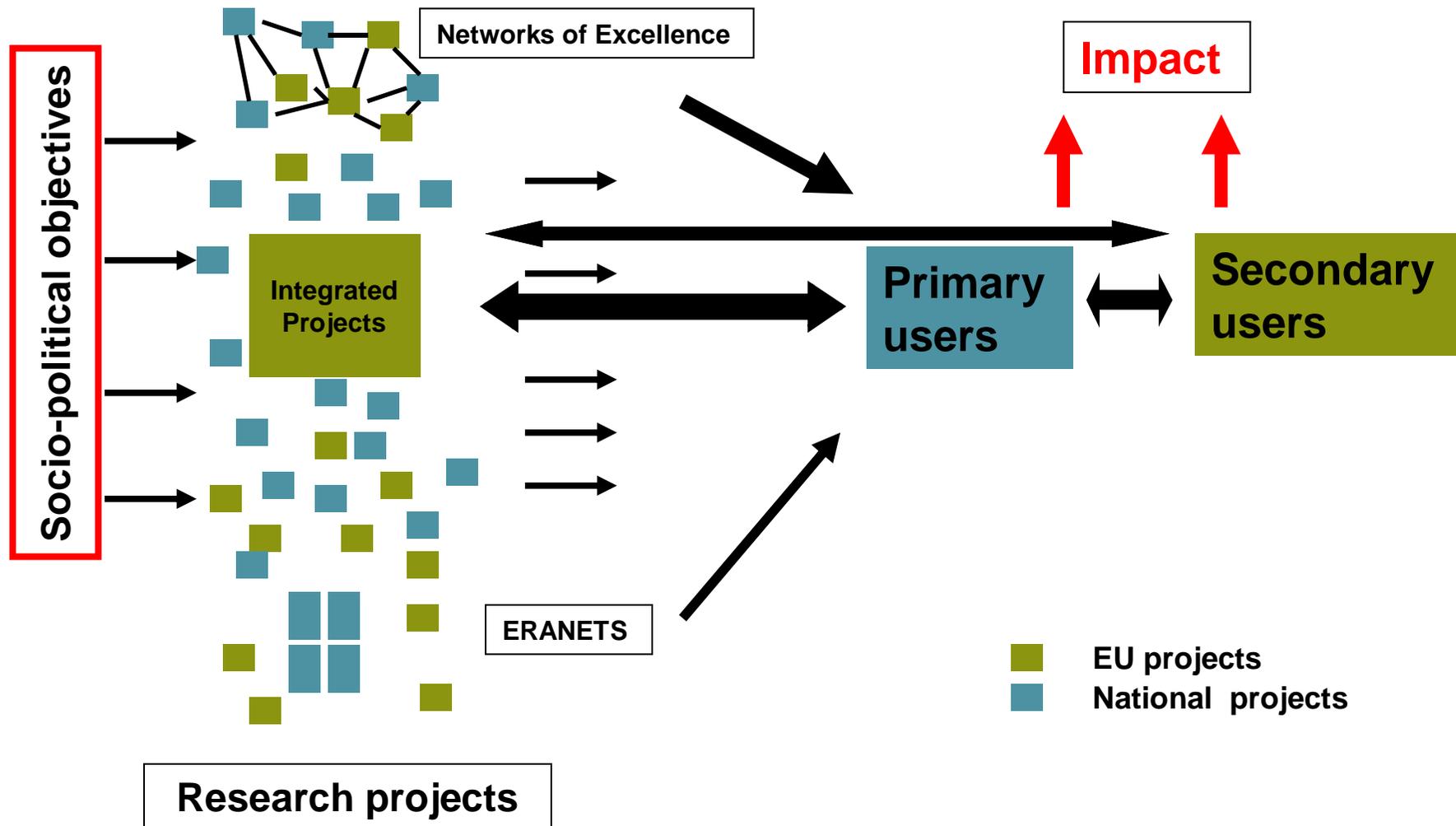
ERANETs

The original goal of ERANETs was to pool national funds and establish common research funding mechanisms. None of the agriculture ERANETs has established common funding pots from which research is procured to meet common research needs. This is even where some ERANETs clearly undertook to do so at the outset in their original proposals. Many ERANET partner organisations cannot or will not allow their national funds to be combined with other partners' funds to procure research from outside their countries. To overcome this, virtual pots have been established in which international research projects funded by several national bodies are broken down into their respective national contributions, with each national research funding contribution agreed and administered separately at national level, aligned to the part of the research project being delivered in that country. This adds huge complexity. We are also aware of difficulties where partners in ERANET projects (i.e. national funding bodies) have not collectively followed the recommendations of independent proposal evaluation panels, who have unilaterally subjected research applicants to multiple and extended application procedures after project approval. There is even one case known to us of a funder unilaterally withdrawn funding from their agreed part of projects after research had commenced. These are serious weaknesses in how the ERANET concept is being implemented.

The data provided to us on the EC investment in ERANETs and the research funding actually delivered show that ERANET research is so far characterised by large administrative overheads – for example ERANET BIOENERGY spent 2.6 million Euro of EC funds to administer an investment of 7.3 million Euro in just 14 projects. These ERANETs are drawing on significant EC funds and we think more should be done to ensure there is a common understanding of what is expected of ERANET partners if the benefits for the ERA sought are to be achieved.

In general ERANETs have enabled cooperative priority setting by sharing strategic intelligence. They have encouraged the synchronisation of national research programs. However, the introduction of ERANETs has added further complexity to the funding system, although overall it is recognised a great deal has been achieved. National EU policy and ERA strategies have been strengthened or written in many countries and the principles and benefits of joint funding are increasingly recognised by Member States.

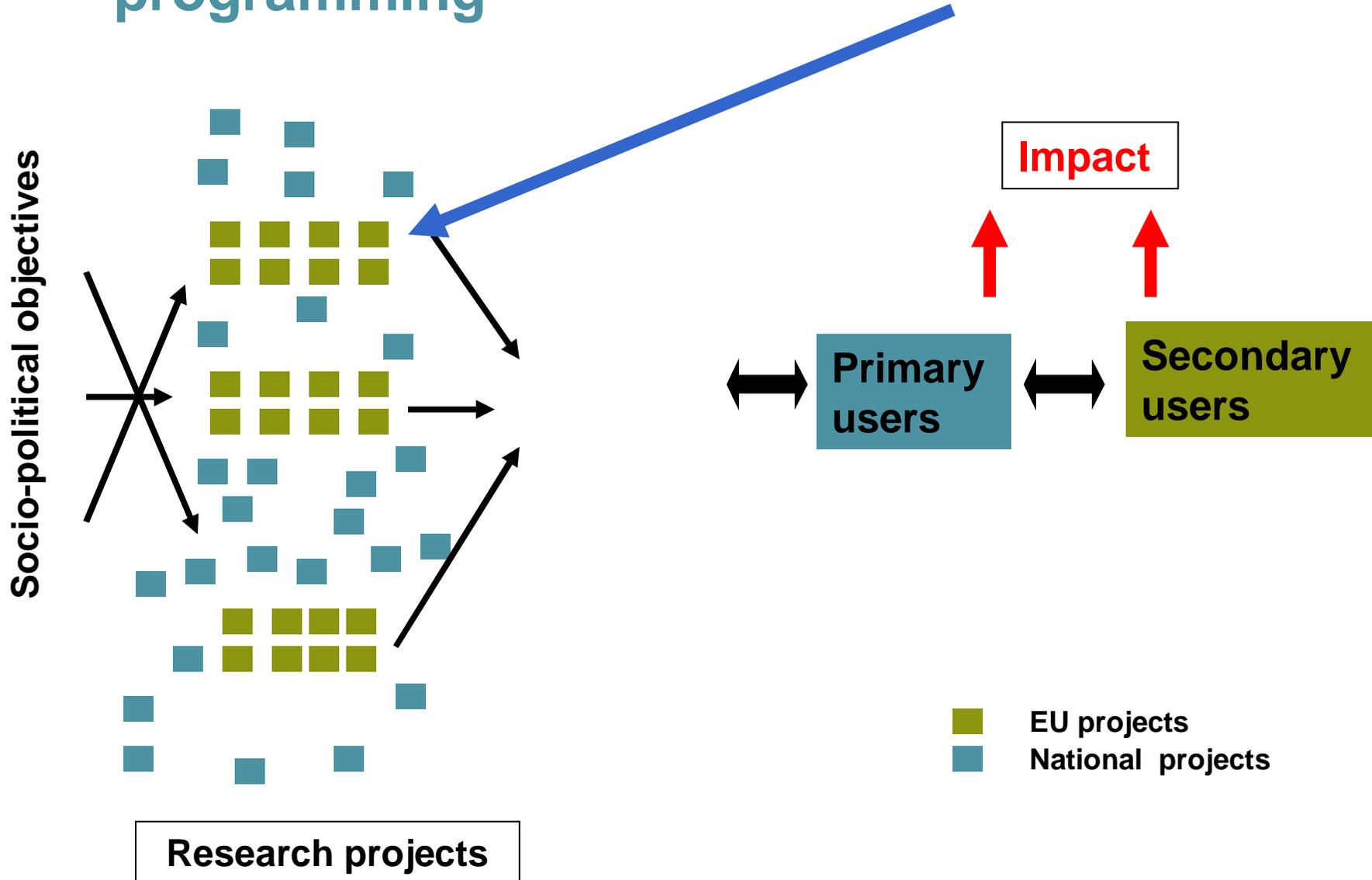
'breaking with the past' – 'fork-to-farm'



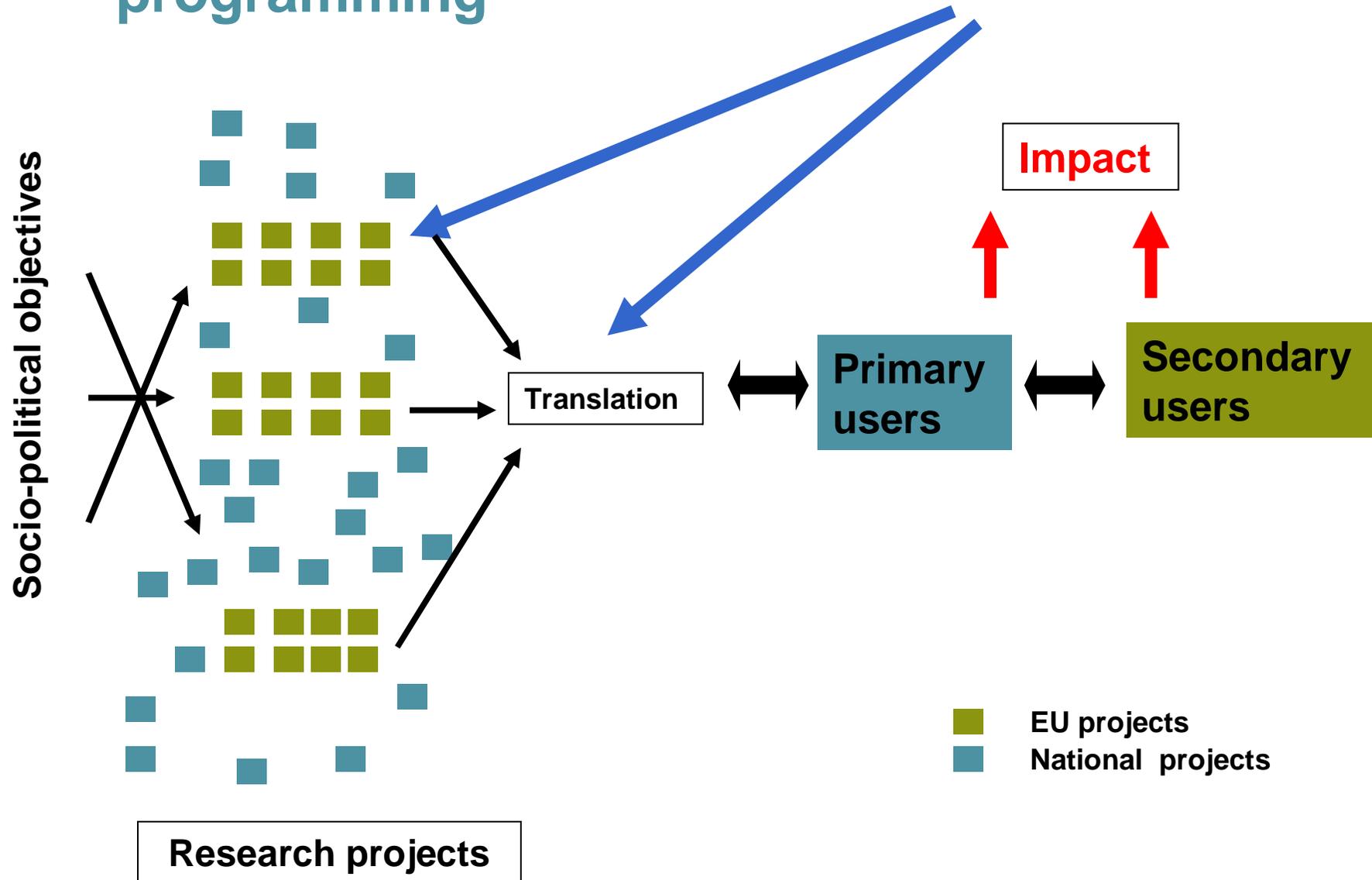
Breaking with the past

Short-term political priorities have reduced impact. Impact has been compromised by the miss-match between research investment cycles and the political cycle operating in the European Commission. Successive 4 - 5 year programmes have been developed with insufficient consideration of past outputs. Research policy has guided too much by buzzwords and political slogans ('fork-to-farm'). This has hindered the impact overall. Delivering impact for 'Europe 2020' and 'Innovation Union' and 'Resource efficient Europe' will depend on how the EC now focuses research coherently on the real long-term knowledge needed to address political visions, working within well-managed portfolios of projects that deliver impact key to those policy outcomes.

Developing coherence for impact - programming



Developing coherence for impact - programming



Programming

There are two key principles to keep in mind:

Very differing futures, scenarios and stakeholders' agendas often have common and overlapping research and innovation needs. This was clearly shown by the EU EUROCCROP project which is a useful resource in planning research.

Researchers and innovators deliver knowledge, understanding and new approaches; they do not deliver socio-political outcomes or complete solutions to Grand Challenges.

The above may seem obvious, but these two principles are not understood or are overlooking in developing research programmes and strategy. The result is research and innovation programmes (if they exist as 'programmes' at all) are chopped and changed in relation to the political cycle, stakeholders' new futures and new Grand Challenges. Programmes are fragmented and are not seen through to outcomes. The result is low impact.

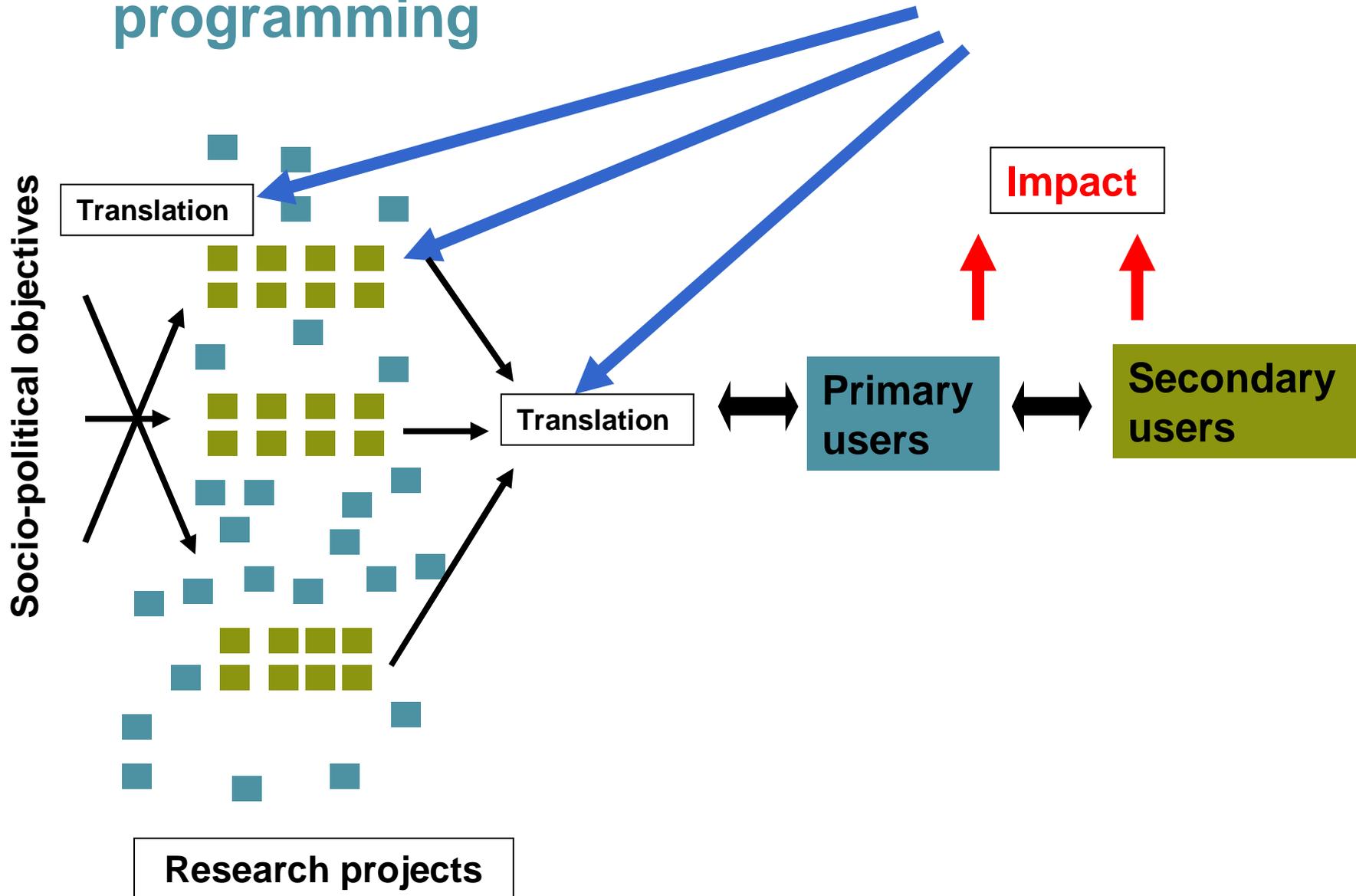
The key is research and innovation programming. When we identify these common research and innovation needs from a wide range of futures, stakeholder aspirations and Grand Challenges, we have a basis for combining focus and stability in terms of science with breadth and agility in terms of policy. This is the ideal. This requires identifying common research and innovation needs.

Programming

The stakeholders largely set out desirable futures and policy scenarios or endorse Grand Challenges rather than identify research and innovation needs to support these. This means it is important that stakeholder needs are translated into coherent and robust research and innovation programmes and targets. This translation process is essential to research and innovation programming that requires great scientific and technical insight.

The current structure of research and innovation management in the EC is actually well suited to this process. Research and Innovation management is centralised in DG RTD. It jointly serves quite diverse needs in other DGs. We have good examples of that centralised facility used well to deliver processes that lead to programming; notably in animal health and welfare, and in modelling of the effects of the CAP. The weakness in the current system is DG RTD has not used its considerable scientific resources to fill the gap between the high level documents describing successive Framework Programmes and the project level documents ('calls').

Developing coherence for impact - programming



Lasting impressions

Prof. Hojka Kraigher Slovenia Forestry Institute

'Fork-to-farm' did damage

Forest research dropped from

82 M Euros in FP5

to

6 M Euros in FP6



Research problems cannot be solved by:

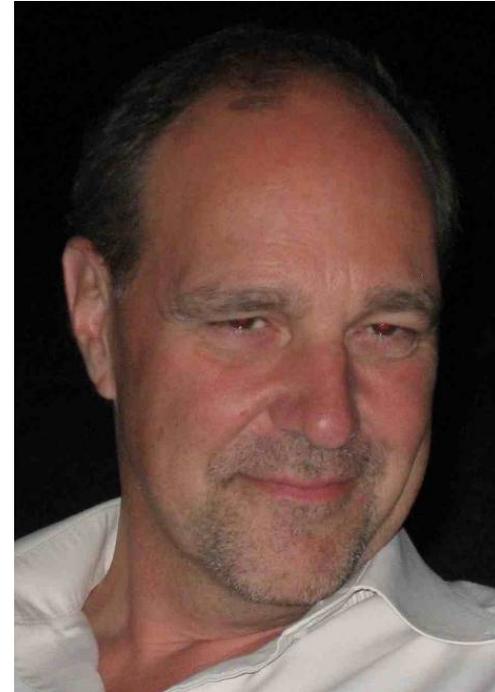
A single project per problem.

A single project per call.

Prof. Alain Peeters

RHEA, Belgium

The Framework Programmes have provided a community of skilled scientists and new research in all countries of the EU on the reduction of environmental impacts of agriculture.



‘Greening’ means public support for public goods. We need to optimize these to restore biodiversity in agriculture, reduce energy use, increase the protein self-sufficiency of the EU and improve public health.

Dr. Joergen M. Westergaard
ADC-Consult, Denmark

Animal health research has had a vital impact on the development of legislative measures and on the adoption of trade standards used at global level.



The future inter- and multidisciplinary research should be strongly linked to disease prevention and animal welfare.

**Dr Paul Lazzari,
Agrasys S.L., Spain**

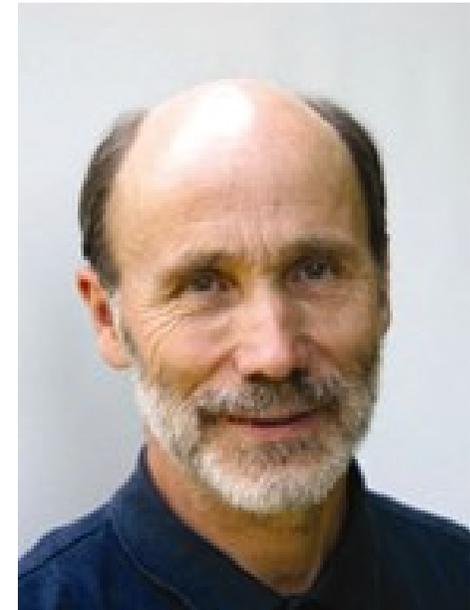
Projects have put Europe in a lead position – FP funding allows “big science” to be done at a level few national programmes can achieve.



The exploitation of this enabling science needs to be improved. This should include funding research analysing why Europe is weak in this area and looking at how technology transfer and exploitation is managed elsewhere.

**Otto Schmid,
FiBL Switzerland**

Socio-economic research projects supported policy makers (CAP, Rural Development) particular when end-users were involved relatively early.



The public interest in resource efficiency relates to how it enables resource conservation. We need more emphasise on resource conservation.

Socio-economic research projects supported policy makers (CAP, Rural Development) particular when end-users are involved relatively early. Farm-focussed and organic farming projects provided tools and better management of knowledge for the transition to a more sustainable agriculture.

Future research should put more emphasis on resource conservation in addition to resource efficiency, e.g. through eco-functional intensification based on eco-system self-regulation functions to increase productivity => low external input systems /high output sufficiency

Preservation of diversity of food production from farm to plate in whole chain
Recognize important connection between the production of (authentic) food and public health (and animal health) => sustainable consumption patterns

Base all strategic actions on an integrative concept of innovation (including social innovation, not just technological, new + traditional knowledge)

Stimulating knowledge partnerships/networks – with more transdisciplinary and participatory research => re-think agriculture knowledge and innovation system (see SCAR 3rd foresight report, IAASTD report)

Dr. Stefan Töpfer

CABI, Hungary

About 90% of plant health research contributed to new and sustainable systems of agricultural production. The diversity of research is impressive. A link between project size and research effectiveness is not evident.



Improved impact requires bottom-up mechanisms with decisive participation from end-users, such as consumers, farmers or policy-makers.

**Dr. Oana Gherghinescu,
University of Craiova, Romania**

The *regional component and approach* reveals an important direction to be followed.



Future research on the social and economic impact of the CAP should consider strengthening the follow-up phase for the exploitation of existing research outputs as well as placing the CAP in a broader context – for example in relation to cohesion policy.

Prof. Jim Scudamore, University of Liverpool, UK

Worldwide research partnerships have ensured there is a critical mass of experts available to the EU. This could not have been developed without EU research funding.

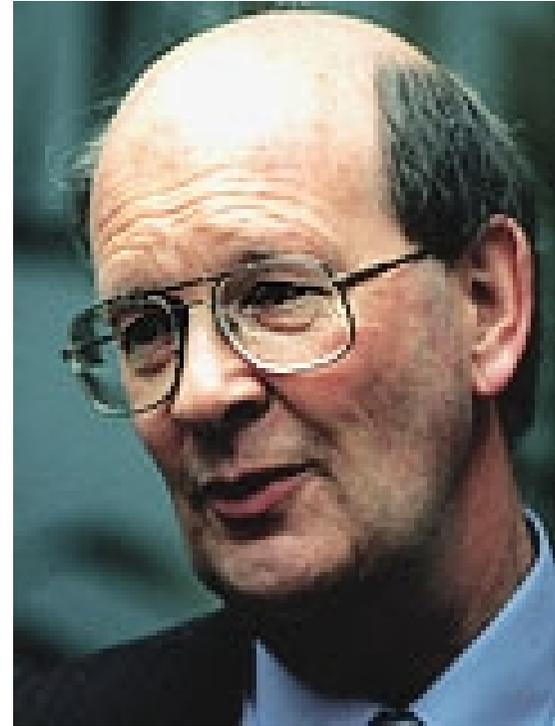


Photo: Times Higher Education

Animals are important and that new or emerging disease can occur at any time e.g. the Schmallenberg virus.

The programme must be capable of anticipating challenges rather than just reacting.

So where does this leave us?

The science is in good shape –
excellent considering the programme scope

Excellent contributions to the European Research Area

Wide range of impact pathways well used
- education and training

High impact research widespread

Full impact potential not being used

Project reporting – get access right first

Lack of follow-up and follow through

Avoid political slogans and buzzwords ('fork-to-farm')

Recognise the programme for what it really is:
agricultural, animal health and forestry research

Programme the research to ensure the whole is
more than the sum of the parts

Our message to the Commission:

Our message to the Commission:

Be proud

Our message to the Commission:

Be proud

Be brave