



Sviluppo di un nuovo modello di collaborazione internazionale sul tema dell'innovazione in ambito energetico-ambientale

Prof. Andrea Contin
18 Maggio 2018

Best practice per lo sviluppo dell'ecosistema
dell'innovazione nell'ambito energetico-ambientale

Sviluppo di un nuovo modello di collaborazione ...

Liberamente tratta dalla presentazione fatta il 29/6/2017 al
SummerSymposium del Fraunhofer UMSICHT,
sede di Sulzbach-Rosenberg

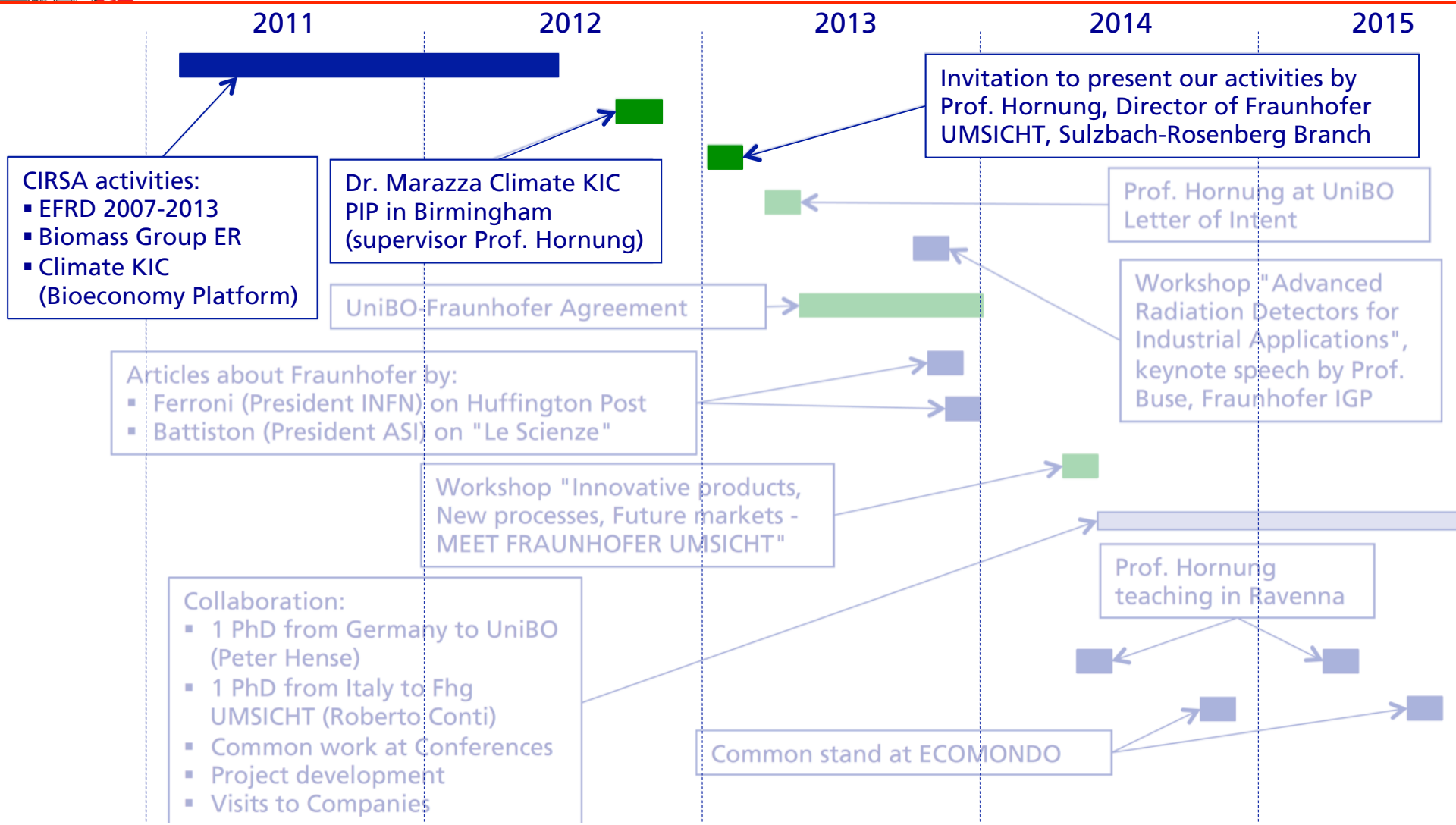
2014-2017: What I have learned by collaborating with Fraunhofer UMSICHT

Prof. Andrea Contin
University of Bologna

Fraunhofer UMSICHT SummerSymposium 2017



Collaboration with Fraunhofer UMSICHT, Su-Ro Branch





Fraunhofer Gesellschaft

What is this?

If you are around in Italy and ask people about Fraunhofer Gesellschaft you will get just starring eyes!

Myself, I didn't know exactly what it was. When at CERN, I had relations mostly with the Max Planck Institute.

Slowly, I found out with admiration that just after Second World War, Germans understood the value of research and imagined how Germany would be in 2017 by starting two Research Foundations:

- Max Planck Gesellschaft
- Fraunhofer Gesellschaft

later joined by

- Helmholtz-Gemeinschaft



MAX-PLANCK-GESELLSCHAFT



Fraunhofer



The **first** thing I learned about was what Fraunhofer is.



Fraunhofer Gesellschaft

Research and development

- International research with focus on direct use for both private and public sector, and for the benefit of society
- Application-oriented fundamental research

Entrepreneurship

- Institutes organized as profit-centers
- A third of the budget are revenues from industrial projects
- Spin-offs are promoted

Contracting parties/ clients

- Industrial and service companies
- Public sector

Facts and figures

- > 22,000 staff members
- > 66 research institutes
- 1.9 bn € annual research budget
- 10 Offices & Project Centers in Asia Pacific





(Industrial) Research in Italy

In Italy we have three large Research Organizations:

- CNR (National Council for Research), founded in 1923
- ENEA (National Agency for New Technologies, Energy and Sustainable Economic Development), founded in 1952 as National Committee for Nuclear Research (CNRN), renamed in 1960 as National Committee for Nuclear Energy (CNEN), renamed in 1982 as National Committee for Research and Development of Nuclear and Alternative Energies (ENEA), redirected in 1991 as Institute for New Technologies, Energy and Environment and in 1998 as National Agency for New Technologies, Energy and Sustainable Economic Development
- INFN (National Institute for Nuclear Physics), founded in 1951



CNR

[...] promotes and organize research with a scientific and industrial goal
[...] and for national defence [...]

- 106+ Institutes, from Sciences of the Atmosphere and Climate, to Science and Technology of Ceramic Materials, to Research on Population and Social Policies, to ...
- total employees: 8000 (2016), out of which 4000 researchers

Budget 2015:

620 M€ from Italian Government (salaries and infrastructures)

100 M€ from publicly founded Projects (incl. EU)

51 M€ from Industrial Contracts



Consiglio Nazionale delle Ricerche



ENEA

Research & Development on Energy Efficiency, Renewable Energy Sources, Nuclear Energy, Climate and the Environment, Safety and Health, New Technologies, Electrical System Research

- 14+ Institutes
- total employees: 2500 (2016), out of which 1500 researchers

Budget 2016:

240 M€ from Italian Government (salaries and infrastructures)

33 M€ from publicly founded Projects (incl. EU)

8 M€ from Industrial Contracts



Agenzia nazionale per le nuove tecnologie, l'energia
e lo sviluppo economico sostenibile



INFN

Coordinating institution for nuclear, particle and astroparticle physics in Italy

- 4 National Laboratories
- 21 Institutes
- 3300 employees (2016), out of which 2300 researchers
- 2000 affiliates (mainly from Universities)

Budget 2016:

230 M€ from Italian Government (salaries, infrastructures and research)

INFN has its own Technology Transfer Office to promote knowledge transfer essentially on particle detectors (for medicine and material studies)





and then there are the Universities ...

... each carrying on (or trying to carry on) its own Industrial Research programme

The **second** thing I learned about was that Industrial Research has to be **focalized**

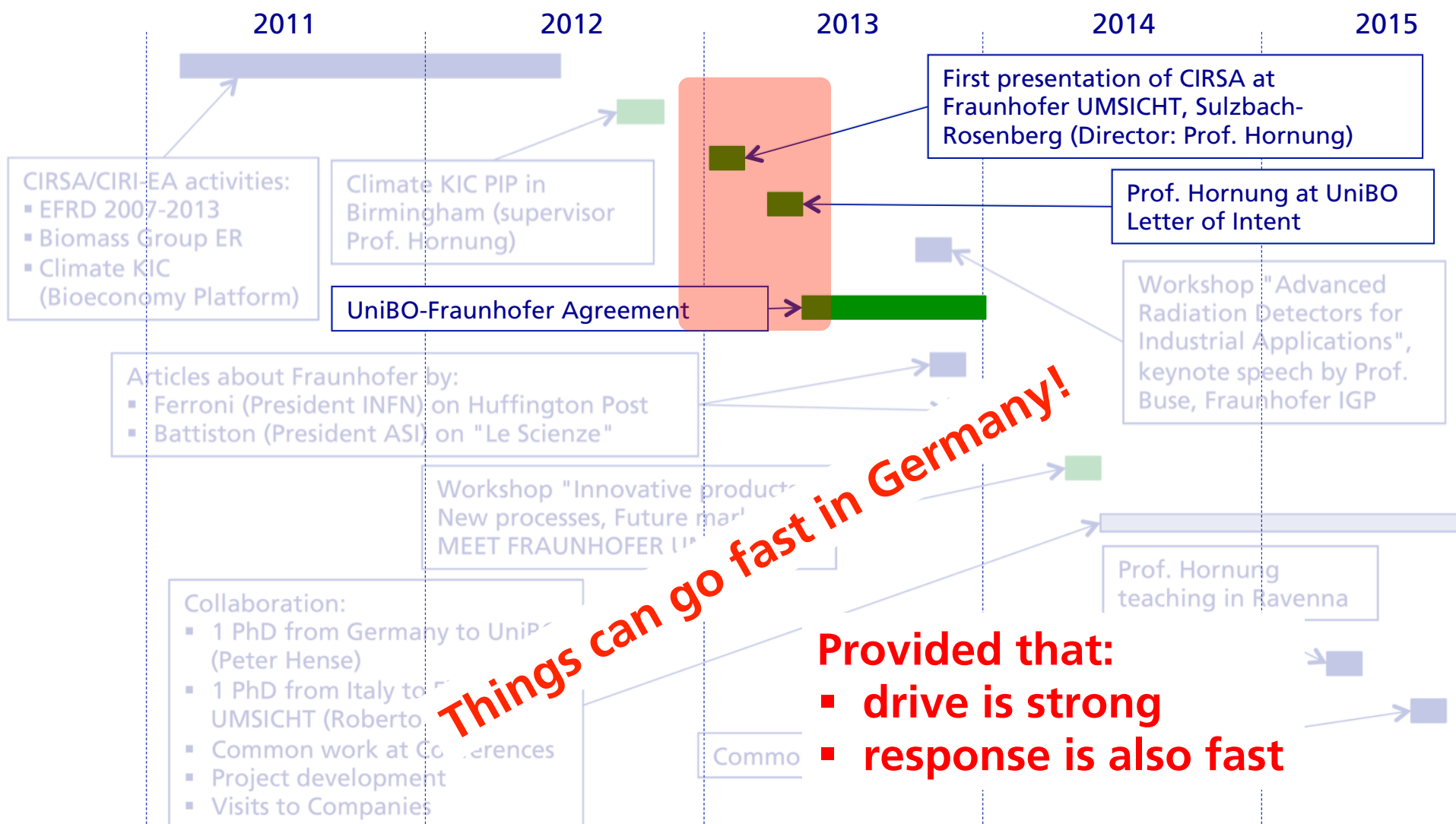
Fraunhofer is exclusively dedicated to Industrial Research

The main asset of Fraunhofer is its brand name

Industries know what to expect when collaborating with Fraunhofer, and this make them willing to invest large money

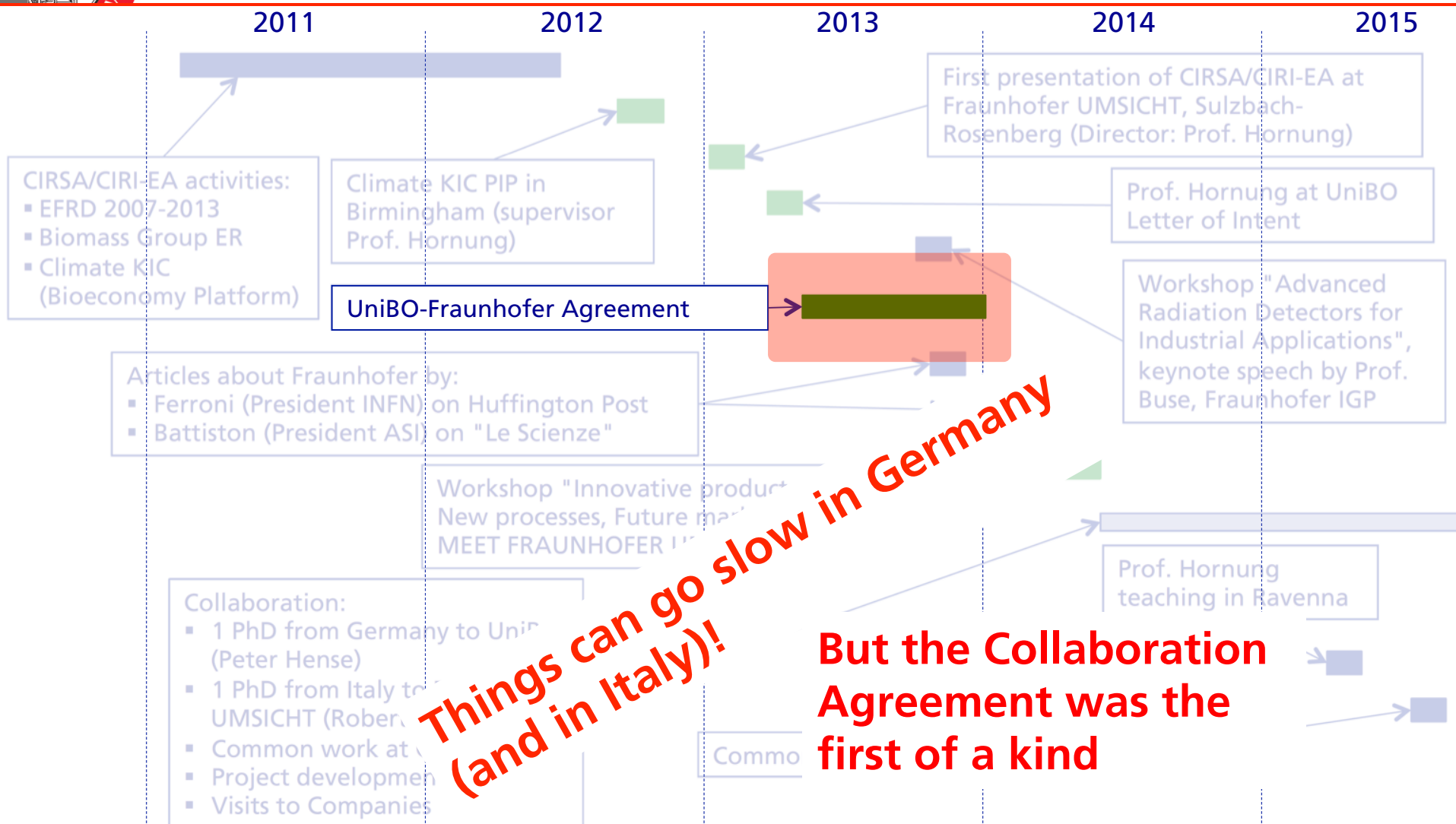


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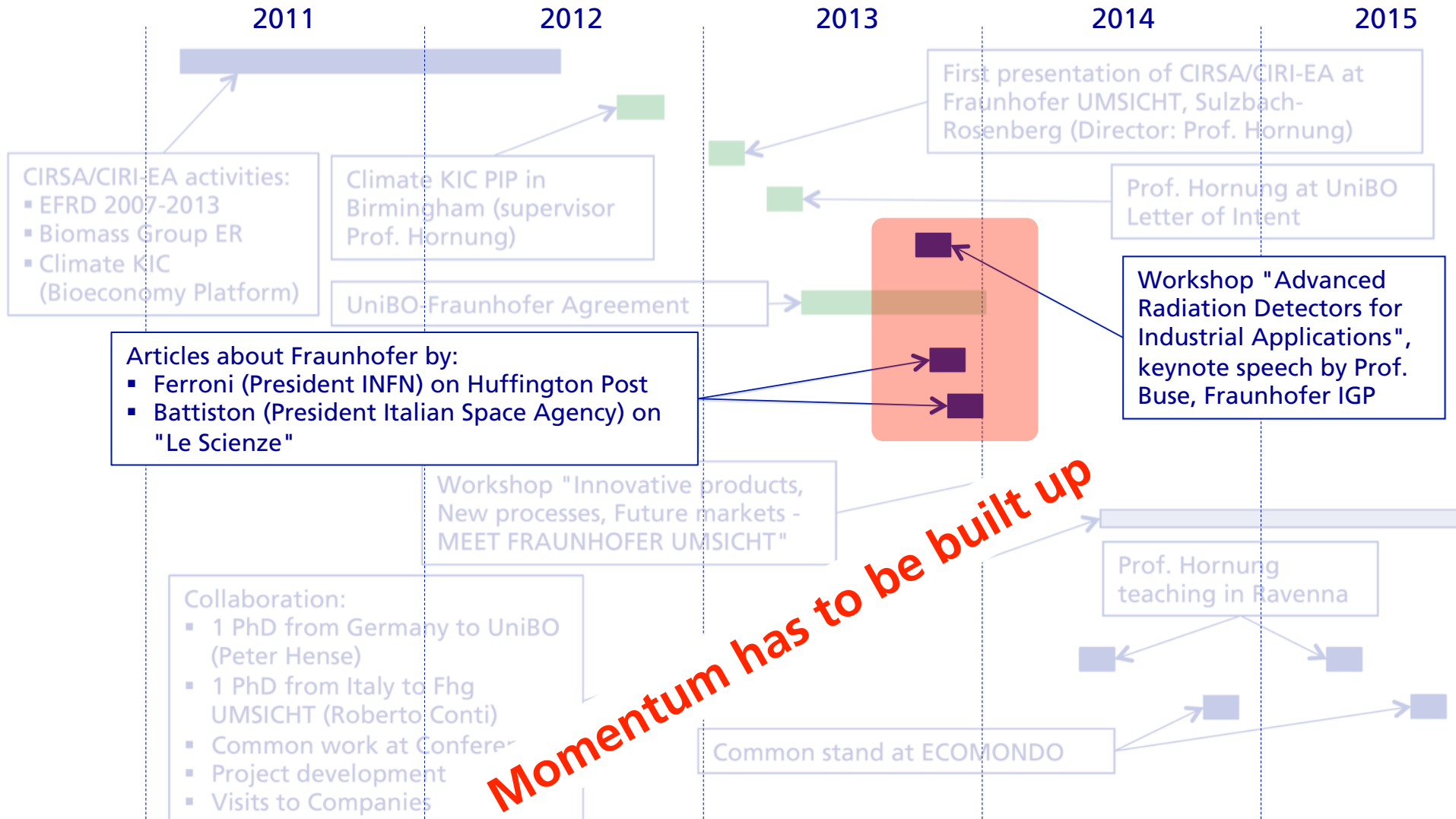


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Things can go slow in Germany (and in Italy)!

In the Collaboration Agreement five pages and a half are dedicated to Intellectual Property

The **third** thing I learned about was the Fraunhofer model of Intellectual Property protection

Fraunhofer:

*Customer can negotiate an exclusive right of usage **in the context of the application**. Fraunhofer maintain the option of developing the technology further outside of the scope of the "customer area"*

UniBO:

*Customer has a **right of first option on the exclusive acquisition of an irrevocable license on UniBO part held in co-ownership***



Goal of the Collaboration Agreement

The original goal of the Collaboration Agreement is to develop the conditions for the establishment of a new Fraunhofer Center in Italy

The **fourth** thing I learned about was the Fraunhofer Financial Model

Fraunhofer Financial Model:

1/3 free Public financing

1/3 Industrial Research

1/3 Industrial Research or other Public Projects

Italian situation:

The free Public financing is at the same level as in Germany, but no requirement on the quote of Industrial Research is set



Remember about CNR

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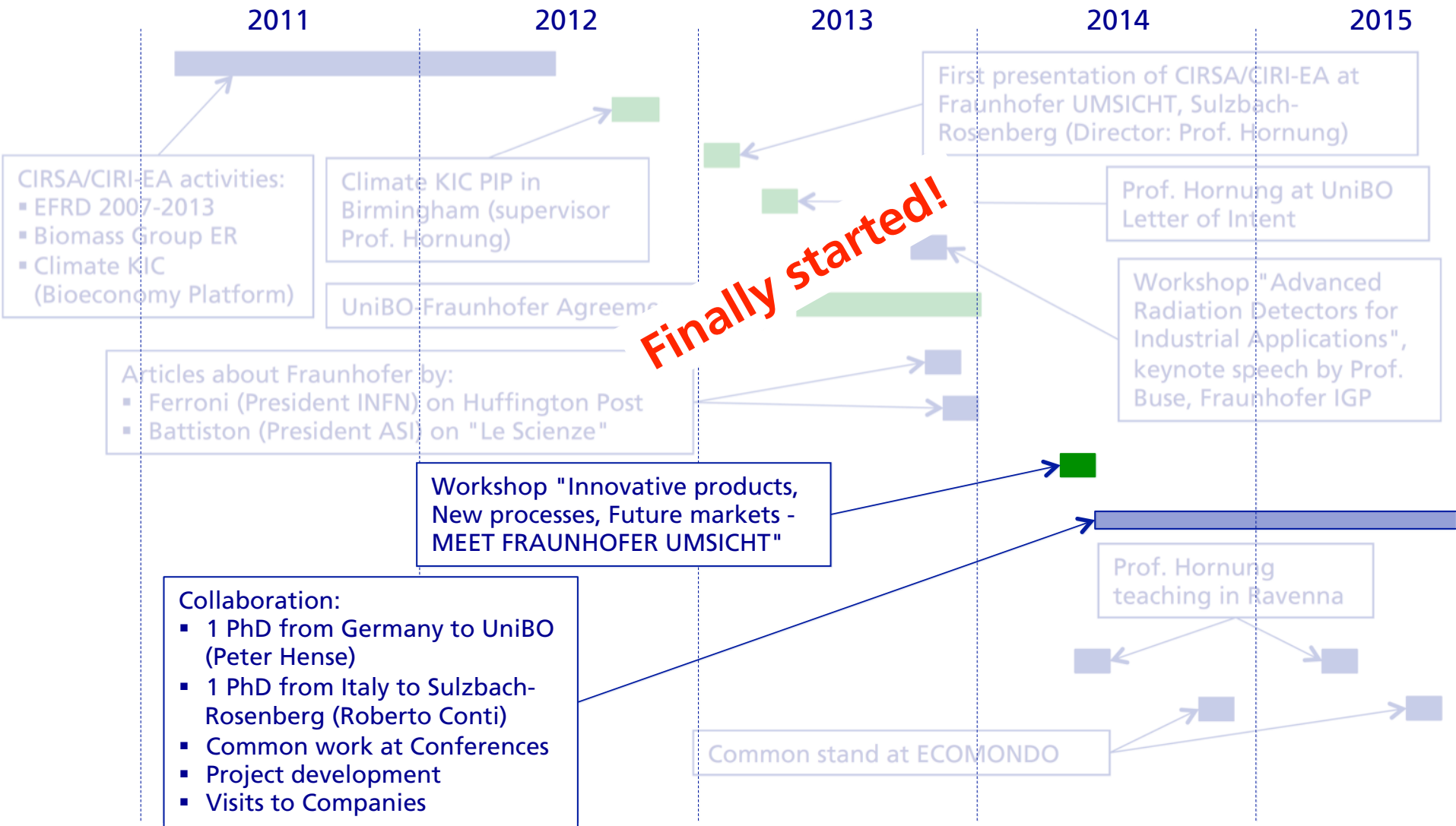
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Consiglio Nazionale delle Ricerche



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My first direct experiences

Fraunhofer
UMSICHT

UNIVERSITÀ DI BOLOGNA
CIRSA CIRI-EA

LABORATORI "R. SARTORI", VIA S. ALBERTO 163, RAVENNA, ITALY

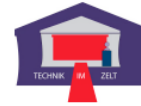
Innovative products
New processes
Future markets

MEET FRAUNHOFER UMSICHT



3RD APRIL 2014

Sommersymposium 2014 Fraunhofer UMSICHT Sulzbach-Rosenberg Branch



Collaboration between
University of Bologna and
Fraunhofer UMSICHT for the
establishment of new energy
and recycling decentralized
solutions in Italy



Prof. Andrea Contin
Director CIRSA

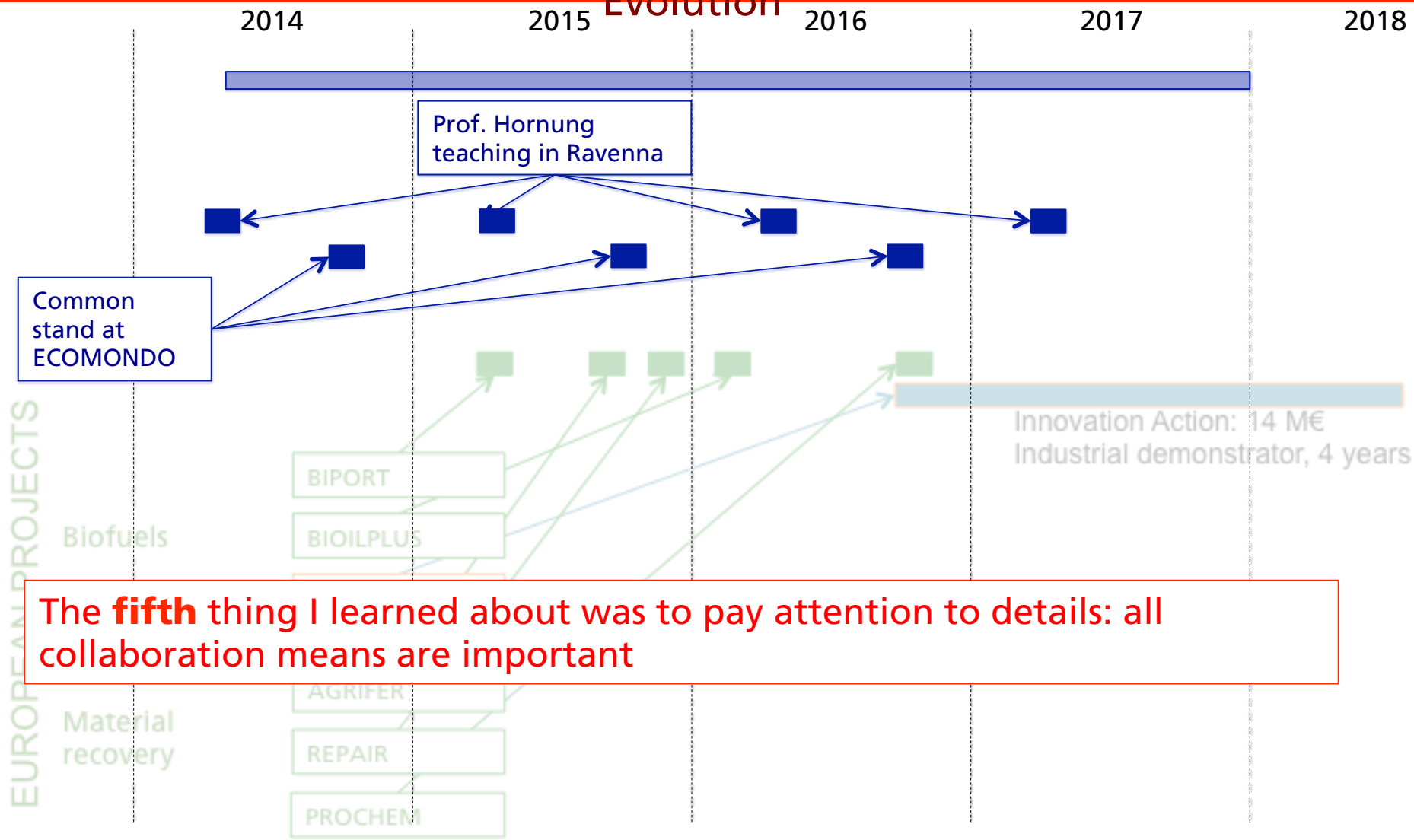
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Sommersymposium 2014
Fraunhofer UMSICHT
Sulzbach-Rosenberg Branch





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Evolution



The **fifth** thing I learned about was to pay attention to details: all collaboration means are important



My first direct experiences

More than 40 meetings organized with 25 Companies and 7 Multipliers

Most recent (focused on Residues and Waste Treatment using the Thermo Catalytic Reformer technology):

- UNIC (Italian Lether Producers Association)
- Burberrys
- Acqua Novara VCO S.p.A. (Wastewater treatment)
- HERA S.p.A. (Waste treatment)

Main problems:

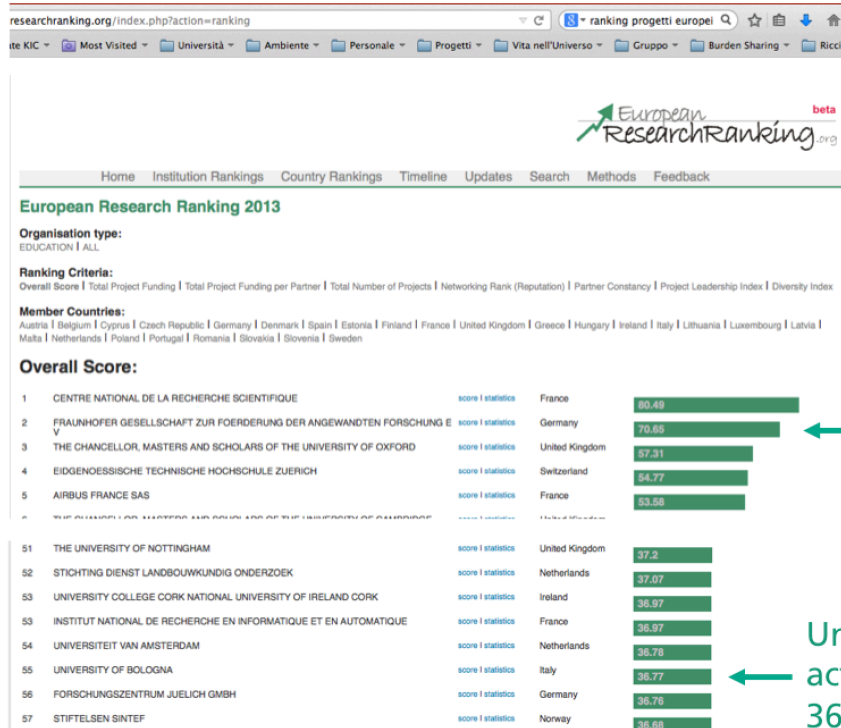
- industries are not keen in investing on research, even if they would like to use innovative instruments
- lack of an industrial demonstrator

The **sixth** thing I learned about was that European funds are necessary (also for Fraunhofer UMSICHT Su-Ro)



European Projects

Slide presented in the SummerSymposium 2014:
7th Framework Program
UniBO Ranking



Research Area (ARIC):

- 27 people dedicated to project development and relations with EU
- more than 40 people for support (accounting, administration, IP protection, etc.)

Fraunhofer Gesellschaft
(22,000 active researchers)
70.65 M€

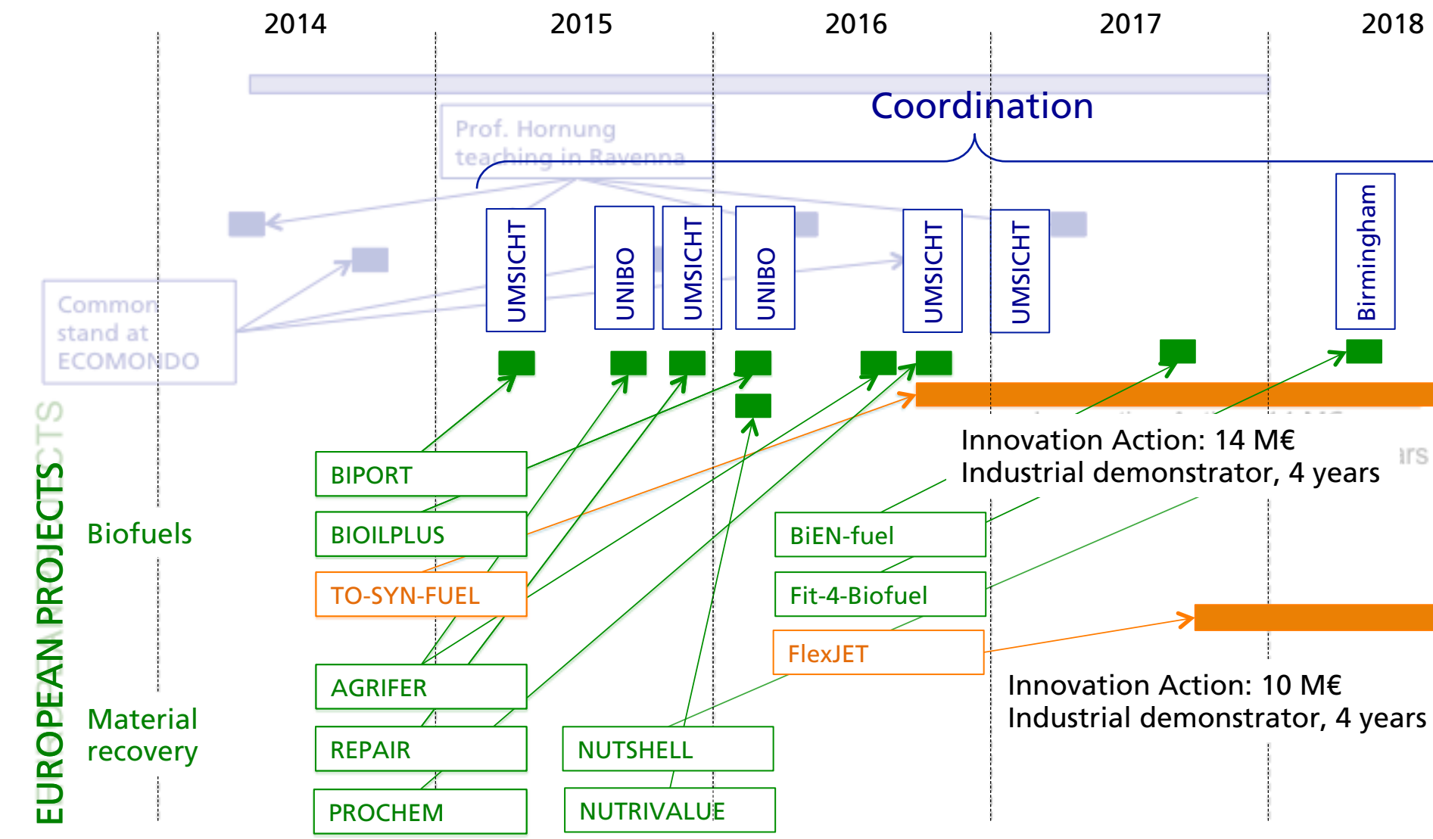
UniBO (less than 2,000 active researchers)
36.77 M€

Fast response:
meeting between Prof. Hornung and UniBO Research Area at end of July 2014

Immediately after we started writing European Projects

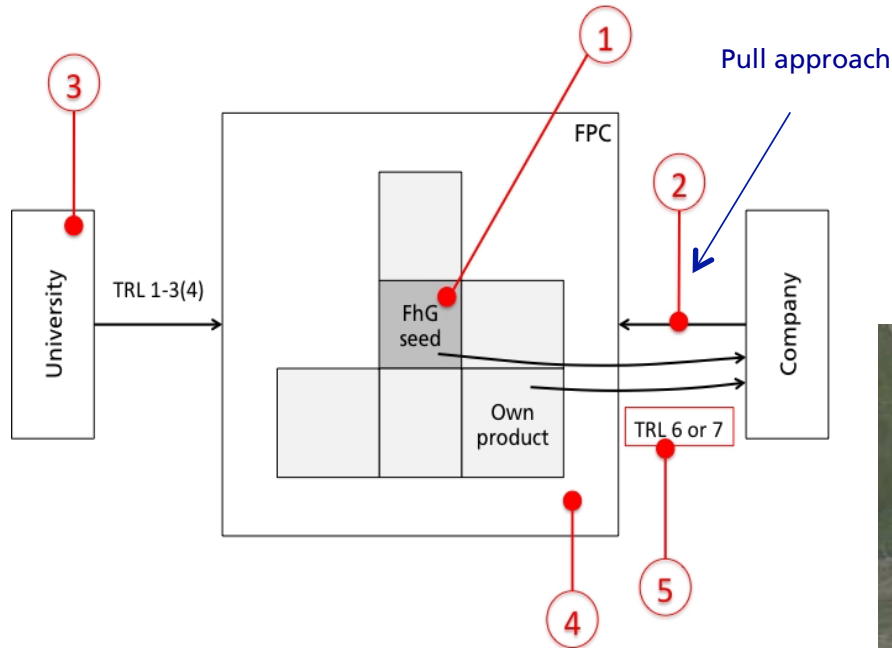


Collaboration with Fraunhofer UMSICHT, Su-Ro Branch - European Projects



following ...

Joint UniBO-Fraunhofer Research Center in Marina di Ravenna To apply new models of collaboration with industry



Activities – based on TCR technology product development

TCR-2:

- 2 kg/h organic feedstock processing
- Prototype built for the TERMOREF Regional Project

Products:

- 0.24 kg/h bio-oil (low tar and acidity)
- 0.85 kg/h syngas (hydrogen rich, $H:CO = 2$)
- 0.48 kg/h bio-char
- 0.43 kg/h water



The TCR process is patented by Fraunhofer, but not the products and the development of improved ways to treat the products



Activities

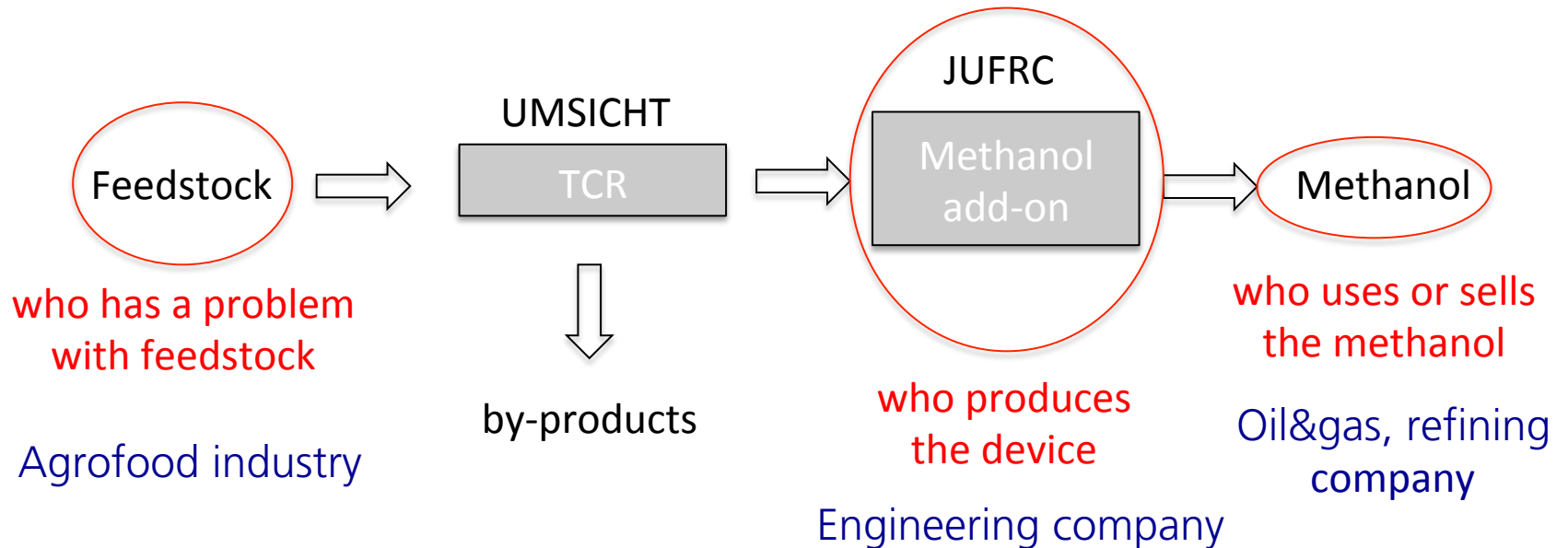
TCR product development:

- TCR bio-oil quality improvement by mixing catalytic substances to input biomasses
- Conversion of TCR syngas to methanol

TCR product applications:

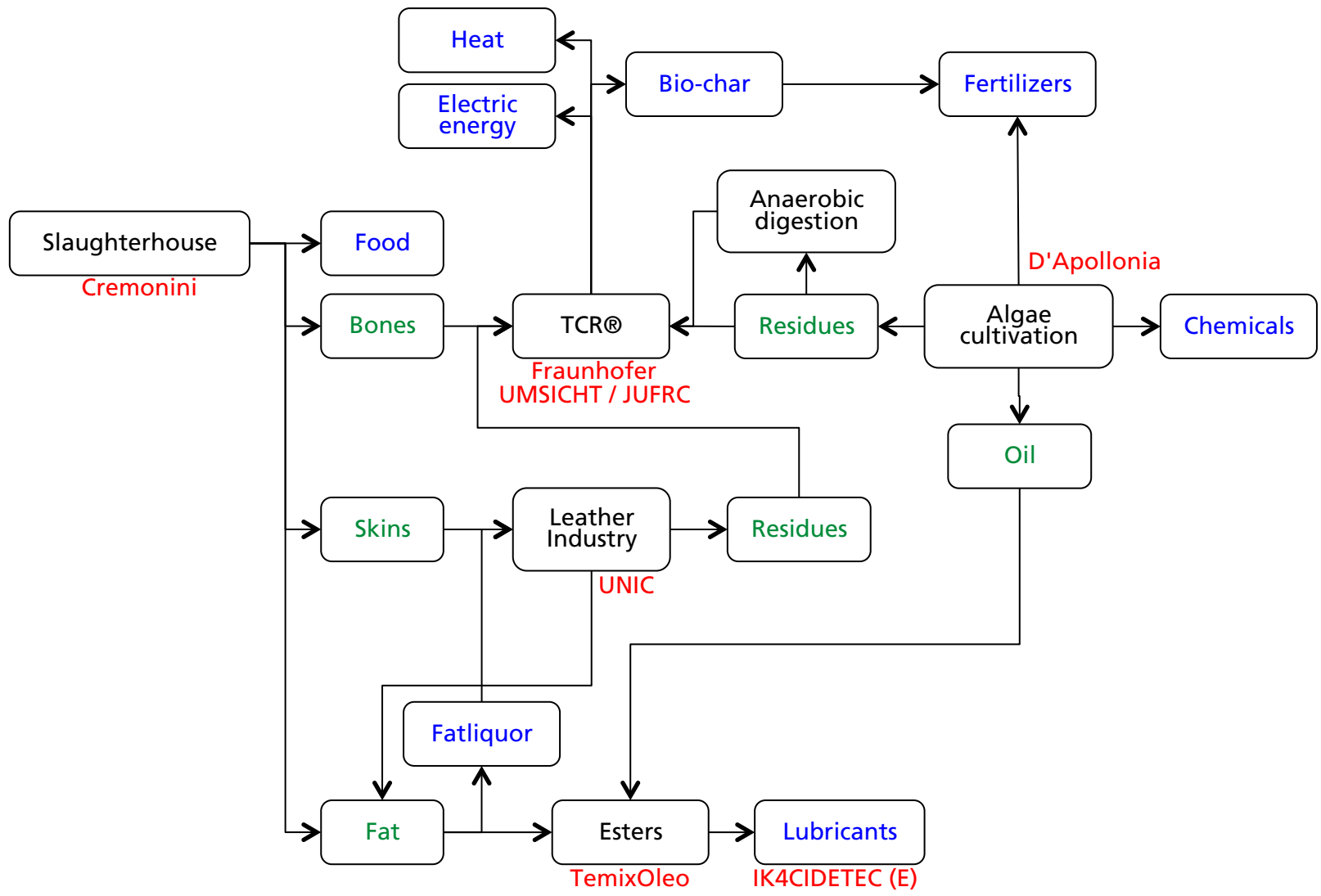
- Biochar as soil improver
- Biochar as a filter for liquids and gases (odours)
- Biochar as a building material to be integrated in bricks

Example: methanol - customers





Example: development of integrated chains with external partners





Conclusions

Personally:

- I enjoyed being exposed to an international environment I essentially didn't know about

At the Collaboration level (i.e., why our collaboration started and continued successfully?):

- The research group in UniBO had reached the right maturity and competence level
- We realized the advantage of complementarities (scientists vs. engineers)
- We both share an european-wide aspiration

At the Country level:

- It is important to have a coherent strategy lasting for a very long period of time shared by the State and by individuals



The final word

TRUST



ALMA MATER STUDIORUM
UNIVERSITÀ DI BOLOGNA
SEDE DI RAVENNA

Prof. Andrea Contin
Director
**Interdepartmental Center for Research
on Environmental Sciences**

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A bit of background

My first life - Physicist

- 1977 I graduated in Physics at the University of Padua
- 1977-1994 I worked at CERN (Geneva, Switzerland) and in DESY (Hamburg, Germany) in the field of High Energy Particle Physics
- 1994 I became Full Professor at the University of Bologna
- 1994-today I still keep strong links with the High Energy Particle Physics community and I am participating with a marginal engagement in an AstroParticle Physics Experiment installed in the ISS





A bit of background

My second life - Administrator

- 1997-2003 Head of Professor Council for the Course in Environmental Sciences
- 2000-2006 Dean of the Ravenna Campus of the University of Bologna
- 2009-today Director of the Interdepartmental Center for Research in Environmental Sciences (CIRSA), Ravenna Campus





A bit of background

My third life - Environmental Scientist

- 2002 Upon request by some of the graduate students of the Environmental Science Course, I have undertaken the hard job of learning the meaning and the potentialities of Environmental Management
- 2002-today Research within the Environmental Management Research Group which I founded with Dr. Diego Marazza and which I am directing since the beginning

- Andrea Contin (Full Professor of Physics, University of Bologna)
- Diego Marazza (PhD Environmental Sciences, Research Fellow)
- Serena Righi (PhD Nuclear Engineering, Researcher, University of Bologna)
- Lucio Quadrani (PhD Physics, Technician, University of Bologna)
- Marta Quaranta (PhD Cultural Heritage, Research Fellow)
- Nicolas Greggio (PhD Environmental Sciences, Research Fellow)
- Stefano Macrelli (PhD Chemical Engineering, Research Fellow)
- Enrico Balugani (PhD Hydrogeology, Research Fellow)
- Luciano Vogli (MSc Environmental Sciences, Research Fellow)
- Roberto Porcelli (Environmental Engineer, Research Fellow)
- Filippo Baioli (MSc Environmental Sciences, Research Fellow)