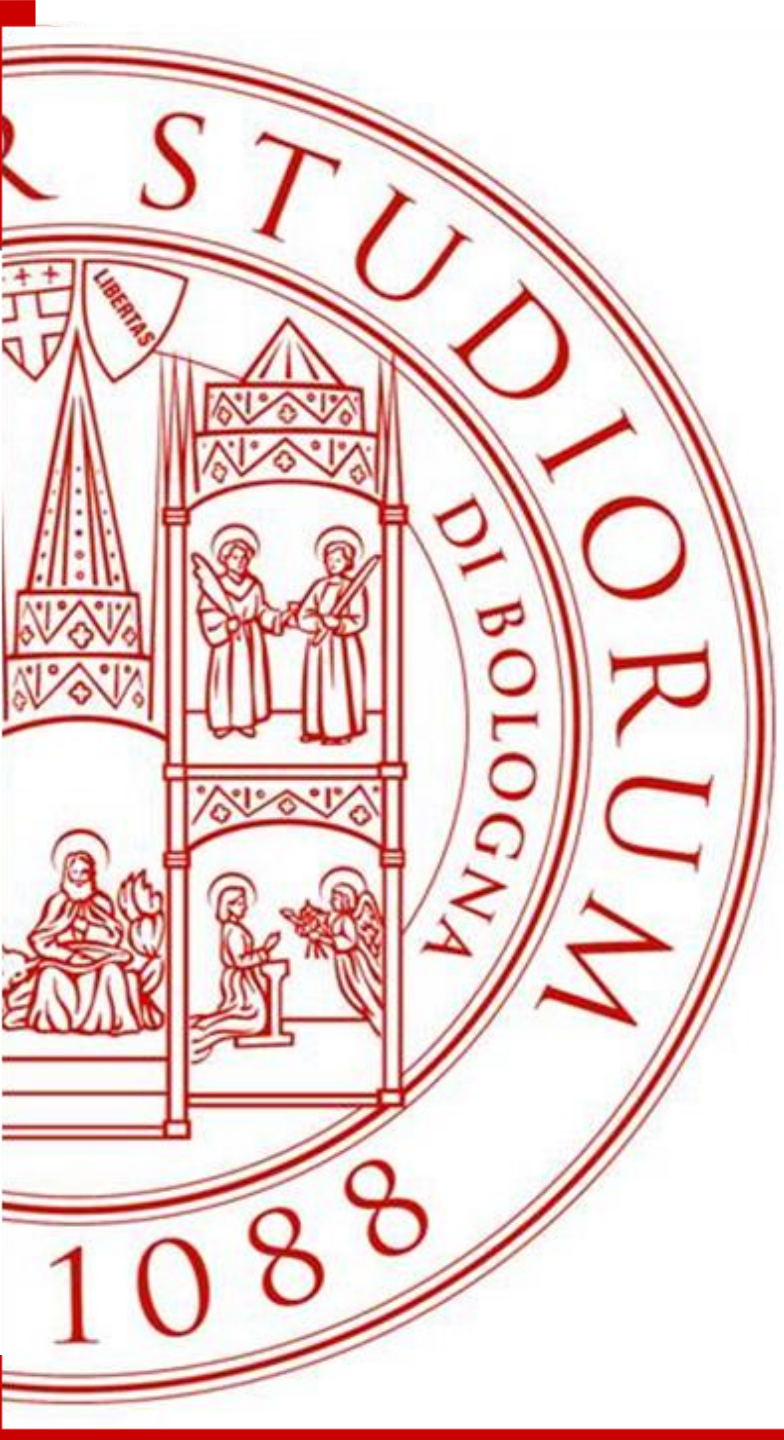


Alma Mater Studiorum Università di Bologna

Andrea Monti

OVERVIEW

A Multicampus University

5 campus in 120 x 30 km
934.000 m² overall surface area

33 Departments
11 Schools

~6.000 permanent staff*
~85.000 students*

* Data 2014

UNIBO-BRAZIL

180+	ACTIVE COOPERATION INITIATIVES: a*greements, joint projects and lab, education and research partnerships*
39	FRAMEWORK AGREEMENTS between Brazilian Institutions and UNIBO
6	RESEARCH PROJECTS involving UNIBO and Brazilian partners funded by EU (5 FP7, 1 H2020)
2	JOINT LABORATORIES (on Coastal Evolution with Universidade Federal do Rio Grande do Sul; on Collective Health with several institutions)
4	UNIBO researchers awarded with Pesquisador Visitante Especial - Ciência Sem Fronteiras
CSF	UNIBO coordinates the network of Italian universities participating in the Brazilian programme "Ciência Sem Fronteiras"

FIBRA: Italian-Brazilian Cultural Foundation (UNIBO + Brazilian Embassy): funded 9 joint projects

FIBRA

IRT BRASIL

- to promote a **multidisciplinary approach** and coordinate a consistent critical mass of researchers, cooperating with **Brazilian partners** and working on themes linked with **Brazilian culture and knowledge production**

  - Agro-food and sustainable development
  - Cultures, immaterial heritage and interdisciplinary networks
  - Health and environment
  - Technology and innovation

http://www.unibo.it/IRTBrasil/default.htm

UNIBO & BRAZIL: Ciência Sem Fronteiras

- In September 2011, UNIBO was chosen by the Brazilian Embassy to **coordinate the network of Italian universities** as potential destinations for Brazilian students and researchers.
- The network includes 25 universities, 10 research Institutions, and a wide network of companies, thus building **a solid platform for Italy-Brazil relations**.
- Mobility has also increased: **4000 exchanges in 4 years!**

UNIBO – BRAZIL IN EU FUNDED PROJECTS

6 **CURRENT UNIBO-Brazil EU PROJECTS**

9 **BRAZILIAN PARTNERS** (INSTITUTO NACIONAL DE PESQUISAS ESPACIAIS; UNIVERSIDADE DE SAO PAULO; UNIVERSIDADE FEDERAL DE SANTA CATARINA; UNIVERSIDADE FEDERAL DO PARANA; EMBRAPA; FUNDAÇAO UNIVERSIDADE DE BRASILIA; Empresa Brasileira De Pesquisa Agropecuaria; UNIVERSIDADE FEDERAL DE VIÇOSA; MINISTERIO DA CIENCIA E TECNOLOGIA

Department of Agricultural Sciences

83 Teaching staff

94 Technicians

9 Scientific areas

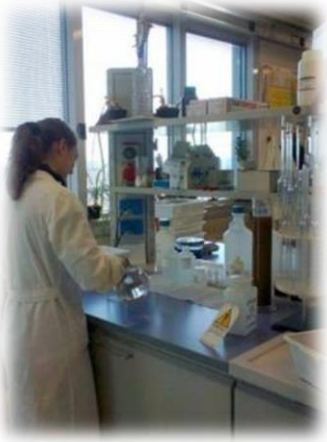
Facilities & infrastructures

Research centers, labs,
growth chambers,
greenhouses, rhizotrons etc…



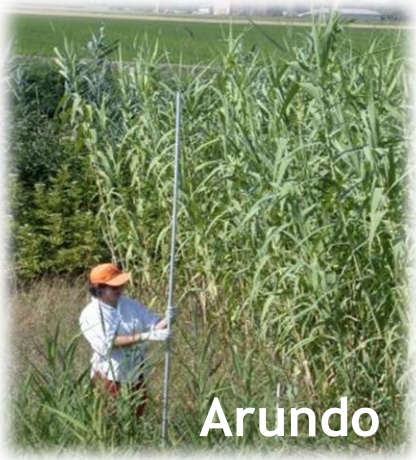





Research farms

10 Research farms



Biofuels & Biorefinery Crops Research Group

12 Researchers

1 Project manager

... Collaborators & students

Field of interest: Annual and Perennial Crops for advanced biofuels and bio-based compounds

Our ongoing/recently concluded EU Projects on Bioethanol and Biorefinery

10 **PROJECTS (9 EU, 1 National)**

WATBIO

Crops Industry

Optimization of Perennial Grasses for Biomass Production
Grant Agreement: 289642
OPTIMA

ALBE

FIBRA

COSMOS
ADDING VALUE TO CAMELINA AND CRAMBE OIL

Water4Crops

4 CROPS FOOD FEED FUEL FIBER

S2Biom

Sweet Fuel

Our ongoing/recently concluded EU Projects on Bioethanol and Biorefinery

PROJECT	Topic	Cost
OPTIMA	Development of high yielding perennial grasses for biofuels in the Mediterranean area	4 M€
WATBIO	Improving drought tolerance of giant reed, miscanthus and polar	11 M€
WATER4CROPS	Better management of water, land and crops to develop viable, stronger and green economy	8 M€
FIBRA	EU and China cooperation project on fibre crops	2 M€
4FCROPS & CROPS2INDUSTRY	Diagnostic of existing food and non-food crop systems for production of biofuels and bio-based products	4 M€
S2BIOM	Support tool for developing biomass crops feedstock roadmaps at local, regional and pan European	4 M€
COSMOS	The project aims at reducing the dependence of Europe's on imported plant oils by turning camelina and crambe into profitable, sustainable, multipurpose, oil crops.	10 M€
ALBE	Development of the entire chain from agricultural protocol to sustainable technologies for the production of new elastomeric materials	10 M€
SWEETFUEL	EU-Brazil: biomass sorghum for 1G and 2G bioethanol production	8 M€

BASIC CONCEPTS BEHIND OUR PROPOSAL:

- **Crop diversification ...** According to CAP's reform (greening) and to provide a large volume of feedstock for advanced biofuels (crops have specific needs). Rationale novel use of food crops residues in rotation with dedicated crops.
- **Valorization of marginal/abandoned/degraded land...** unsuited for food crops is strongly encouraged, but it requires suited crops and appropriate agronomy.
- **Reliable biomass supply chains ...** A lesson learned from existing biofuels and biorefinery plants is that business plans generally failed in the estimation of biomass supply chains, becoming a serious constraint in the production system. Understanding real available biomass is imperative for reliable biomass supply chain, logistics and business plans.

LCE-22-2016 … SUB-CHALLENGE (b): Applied research to biomass production logistics and applied research for feedstock diversification for advanced biofuels

Tentative proposal: optimized & reliable biomass supply chains for advanced biofuels in marginal/abandoned/degraded areas, or in conventional cropping systems by integrating food, feed and lignocellulosic crops: logistics and feedstock diversification.

EUROPE

General concept:

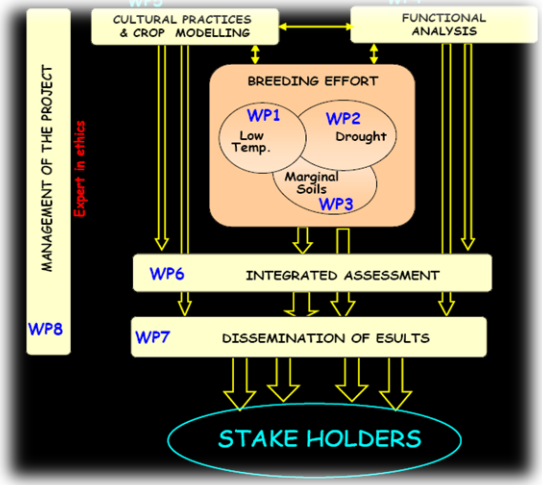
- New cropping systems and logistics with integrated food, feed & lignocell crops (e.g. energy cane) for advanced biofuels: crop residues + dedicated crops; crop diversification (CAP).
- Development of perennial lignocellulosic crops onto marginal/degraded lands

BRAZIL

Possible issues for an aligned project

- Integration of sorghum in sugarcane expansion zones (e.g. Cerrado region, free up land from pasture intensification …)
- New value chains with integrated food/feed and annual lignocell. Crops (e.g. energy cane) in productive areas.
- Perennial lignocell. crops in marginal lands (Miscanthus, Arundo)

A special mention for SWEETFUEL project



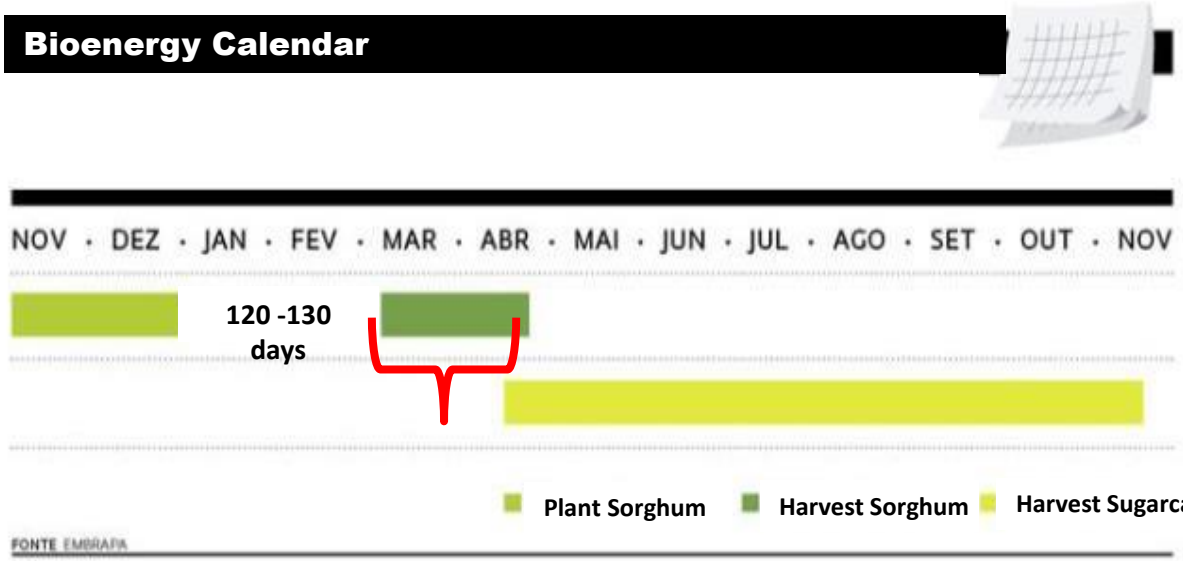
5-year Project on breeding, managing, modeling, integrated assessment … of sweet and biomass sorghum for temperate / arid / marginal land.

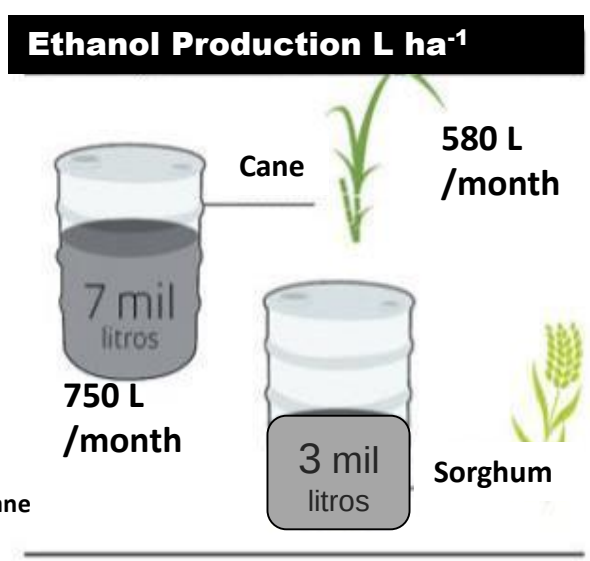
Collaboration with EMBRAPA

Optimizing energy sorghum production systems in the sugarcane - sorghum production systems

Energy Sorghum as a Supplemental Crop to Sugarcane (by Embrapa)

increase the period of industrial operation of large distilleries in Brazil by up to 100 days





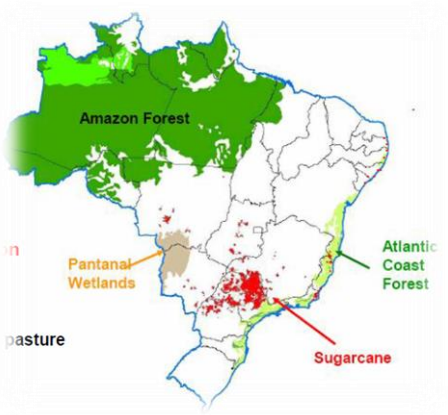
Embrapa

Ministry of Agriculture, Livestock and Food Supply

BRAZILIAN GOVERNMENT BRASIL

Some fine tuning may be necessary, but minimal …

Potential of sorghum as a lignocellulosic feedstock for advanced biofuels in Brazil



Sweet sorghum bagasse

Biomass sorghum (high biomass, low lignin ...e.g. **Bmr 6** by Embrpa)

Up to 50% less lignin, higher 2G etanol yield

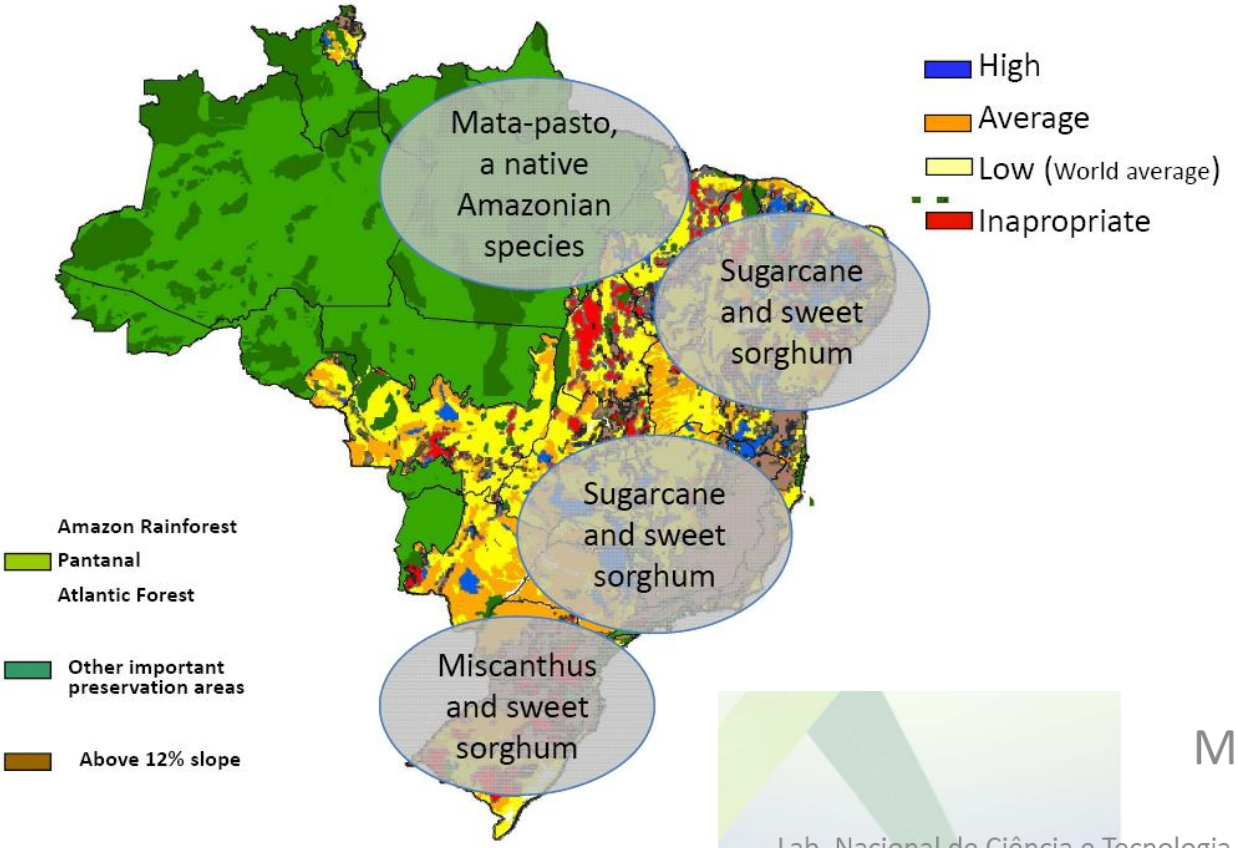
ADVANCED BIOFUELS FROM CELLULOSE BIOMASS

BRAZILIAN GOVERNMENT BRASIL

Embrapa

Ministry of Agriculture, Livestock and Food Supply

Energy cane and perennial crops …

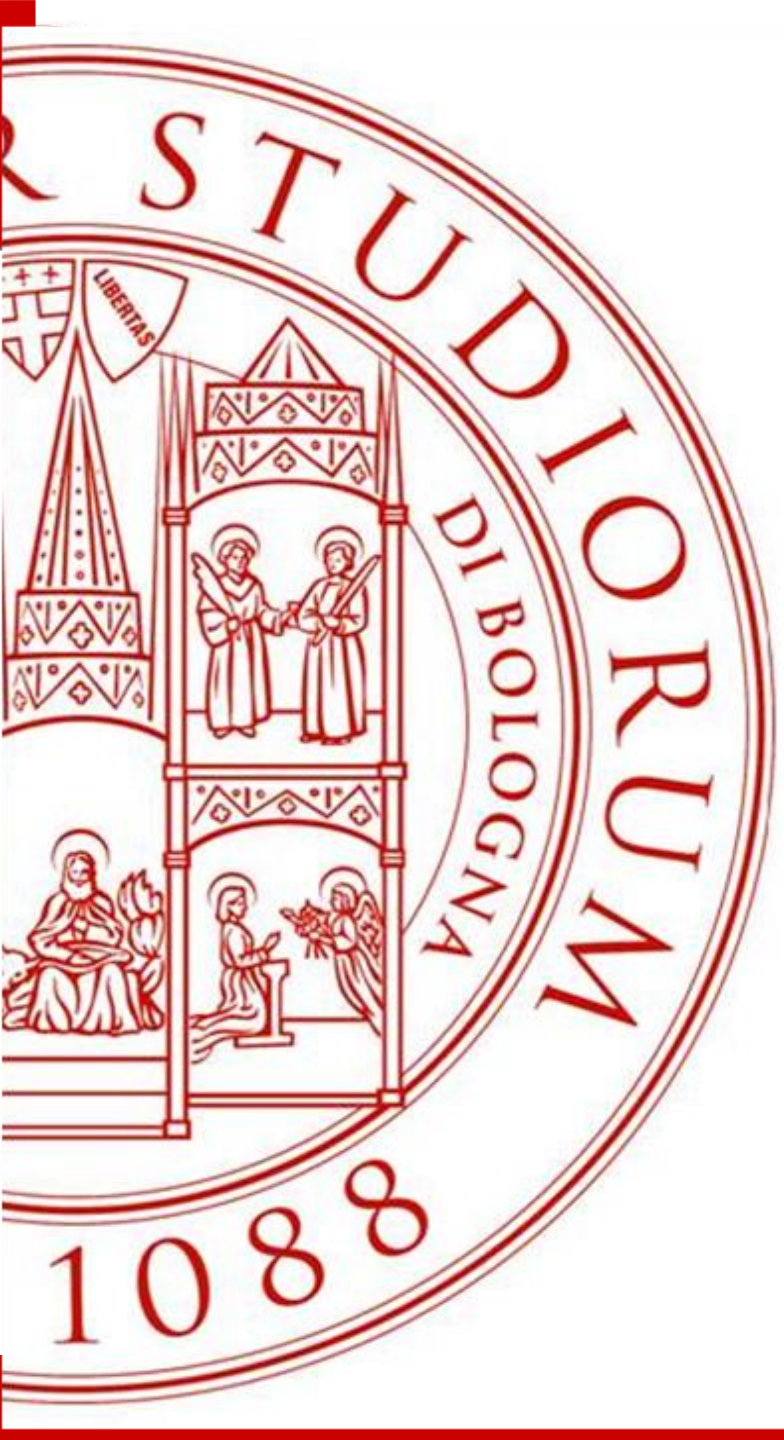


Marcos Buckeridge
Universidade de São Paulo
Lab. Nacional de Ciência e Tecnologia do Bioetanol, CTBE, Campinas
msbuck@usp.br

POTENTIAL EU-BRAZIL SYNERGIES OF THE PROPOSAL

SUB-CHALLENGE (b): Applied research to biomass production logistics and applied research for feedstock diversification for advanced biofuels

- **Two hemispheres:** speeding up field tests ... 4-year project = 8 growing seasons!
- **Interchangeable know-how** on lignocell crops in EU (i.e. *miscanthus, arundo, red canary grass*) and Brazil (i.e. *sorghum, eucalyptus, napier grass* …);
- **Identification of innovative farming routes** for feedstock diversification (new rotational schemes, rely/intercropping, reuse of industrial wastes in agriculture (e.g. sludge, fertilizers, amendments ..)
- **More robust predictive models** on land use, biomass availability, socio-economic, logistics, and environmental effects (e.g. S2BIOM or Brazilian tools…)
- Scale up the fidelity (**from TRL 3 to 5**) of newly identified cropping systems and supply schemes and logistics in existing EU and Brazil advanced biofuels plants (e.g. Biochemtex plants in Brazil and Italy)
- ... others



Alma Mater Studiorum
Università di Bologna

Contact:
a.monti@unibo.it
(Andrea Monti)