



# ***"Schiaparelli and its legacy"***

***Celebration on centenary of death***

**G. Chiocchia – E. Vallerani**

**Five years of the  
International Master  
SEEDS: Contributions to  
Space Exploration**

***Robotic and human space exploration  
Torino – Oct. 21<sup>st</sup>, 2010***



## Contents

**SEEDS (Space Exploration and Development Systems) is a postgraduate Master Programme enrolling owners of a MSc in Engineering and Physics**

- **Presentation of the original SEEDS idea**
- **The history of SEEDS: outline**
- **Critical issues of an innovative project**
- **Present stand, perspectives and conclusion**



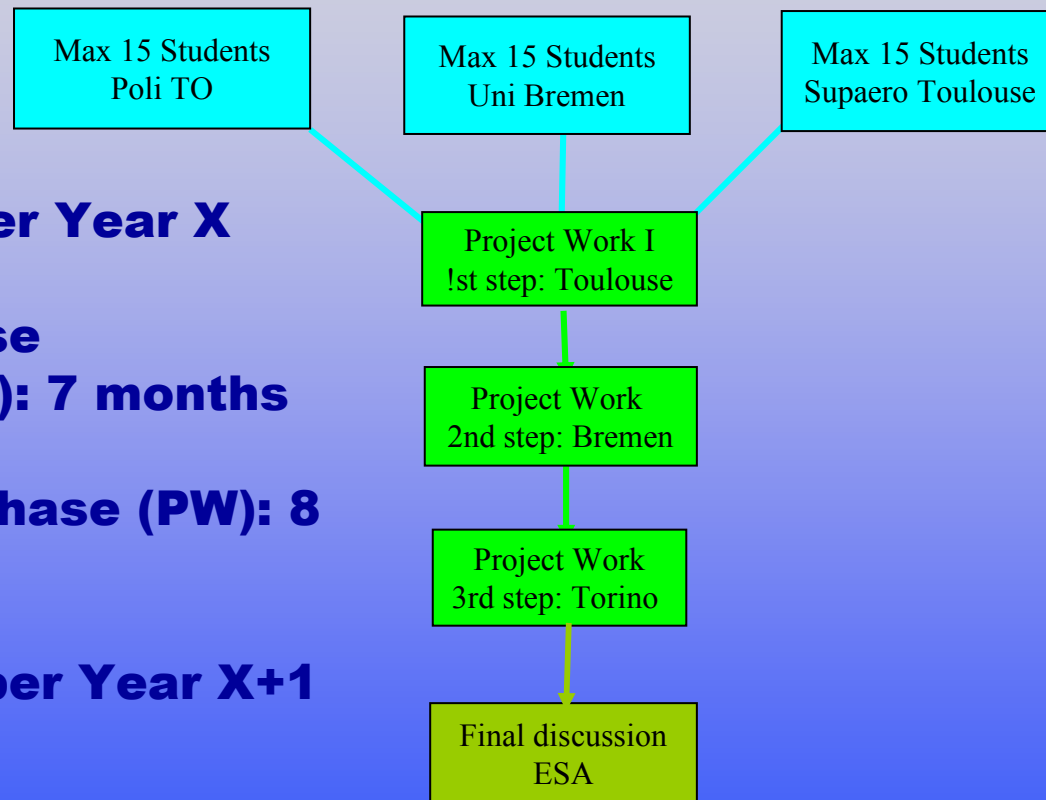
## The SEEDS Structure (original concept)

**Start: October Year X**

**Parallel Phase  
(Lectures): 7 months**

**Sequential Phase (PW): 8  
Months**

**End: December Year X+1**





## **SEEDS' Unique Features:**

### **1) Space Exploration, not Utilization**

**SEEDS focuses on (Human) Space Exploration and the Systems for its Development, rather than on Space Utilization:**

- other European Master Course are either focused on Space Sciences or, if on Space Engineering, general or concentrated on aspects related to Utilization**
- SEEDS aims to safeguard the European knowledge and skills in Space Exploration in the perspective of a renewed emphasis on it in US and EU**



## **SEEDS' Unique Features:**

### **2) European, but not in a general way**

**The true international nature of SEEDS perfectly matches that of the Space Exploration activities in Europe:**

- it has been originated from three Institutions *selected why located* in three town (Bremen, Torino and Toulouse) already linked by old dating industrial relations in Space, thus providing an exceptional environment for students education and training**
- most other Master Courses originate solely from academic collaborations (with possible later industrial involvement)**



## **SEEDS' Unique Features:**

### **3) The very special Project Work Activity**

**SEEDS puts major emphasis on a large Project Work to be sequentially performed through three successive internships in Companies and Centres of all three towns:**

- the time allocated to the Project Work and to the related Master Thesis dominates over that allocated to the lectures and the exercises (8 months vs. 6)**
- the Project Work itself is a high quality coordinated activity, leading to reports to be discussed in ESA**
- No existing Master provides this opportunity (only shorter internships in a unique Company and Country)**



## **SEEDS' Unique Features:**

### **4) A system engineering approach, not discipline focussed as in the academic tradition**

**Differently as in the existing academic MSc programmes on Space Engineering, SEEDS emphasizes the system vision:**

- individual disciplines are not deepened beyond the minimum necessary level;**
- graduates from different branches of engineering and physics are recruited, resulting in a class provided with a manifold of knowledge and potential competences**
- SEEDS shows them how to work together !**



## **SEEDS' Most Unique Feature: the Blend of Four Unique Features !**

### **Each one of the four SEEDS characteristics**

- **Space Human Exploration**
- **Rooted in three European towns already linked by industrial Space Activities**
- **Dominant role of ambitious Project Works performed on EU scale**
- **System Engineering approach**

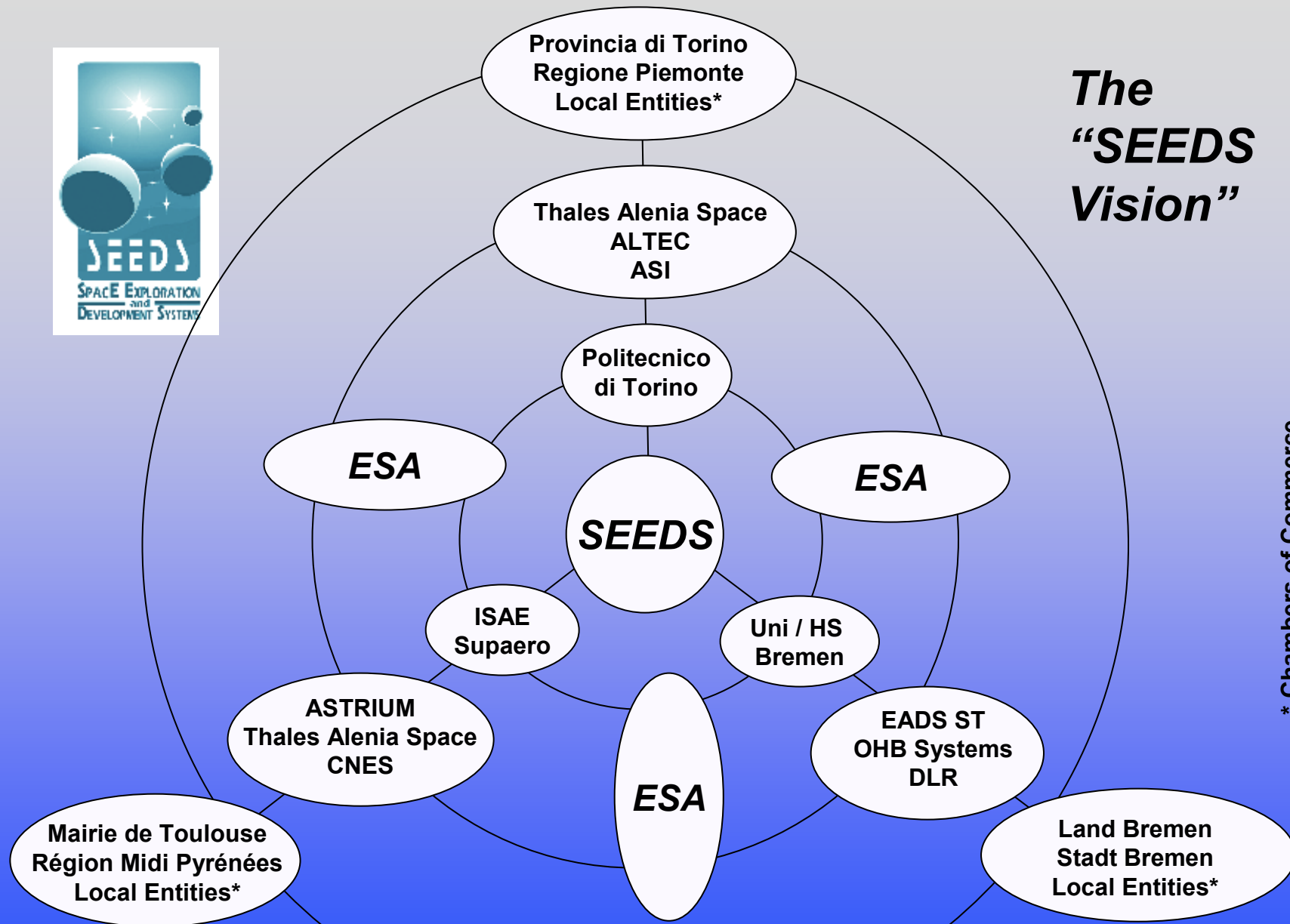
**is by itself very special.**

**The combination of the four is absolutely unique**





# The “SEEDS Vision”



\* Chambers of Commerce,  
Foundations, Aerospace Clusters..



## **SEEDS Graduates' expected skills**

- **Experience to work in international teams, open to the world, ready to “cross the borders”**
- **Multidisciplinary, non – specialized approach**
- **Integrated vision of the Space Exploration, attitude to reason in terms of systems**
- **Knowledge “from inside” of more than one European environment active in Space (Companies, Agencies and Research Centres)**
- **Experience in dealing with borderline problems through challenging Project Works activities confronted in an international environment**



## **SEEDS' historical outline (1)**

**2004: Torino proposes SEEDS to Bremen and Toulouse (personal engagement of prof. Vallerani)**

**2005: meeting in Bremen on SEEDS (Uni & ZARM, EADS ST, OHB, Senat Bremen, Faser Inst., ...). Agreement on a MoU on SEEDS**

**2005: Supaero (now: ISAE) associates to SEEDS through its existing TAS-Astro post MSc programme**

**2005: SEEDS starts in Torino ("0 year") with 60 applications and 15 selected students. All are Italian.**



## **SEEDS' historical outline (2)**

**2005: Uni Bremen establishes a SEEDS MSc programme for 3 years under the condition that it be self-financed**

**SEEDS situation at the begin of 2006:**

- ESA D/HSF is supporting SEEDS (opening and closing week at ESTEC, initial grant, lecturers ...)**
- Tutors for the first Project Work are made available in all three towns, particularly by the TAS-I in Torino, EADS and OHS in Bremen**



## **SEEDS' historical outline (3)**

**2006: signature of a “Trilateral Agreement” on SEEDS by PoliTO, Uni Bremen and Supaero**

**Solution adopted for the degrees:**

- Students enrolled in the three countries are awarded with their national degrees**
- All together receive also the SEEDS Certificate, actually a label without a legal value, however subscribed by all three partner institutions**



## **SEEDS' historical outline (4)**

**Since 2005 five SEEDS editions have been started (the last one is underway). Project Works have been developed on the following themes:**

- “Human Lunar Initial Settlement for Space Exploration” (SEEDS 1)**
- “Permanent Human Moon Base (SEEDS 2)**
- “Lunar Orbiting Space Operation Centre” (SEEDS 3)**
- “Lunar Itinerant Caravans” (SEEDS 4)**
- “Mission to Asteroids” (SEEDS 5, running)**



## **SEEDS' historical outline (5)**

**All 46 graduates from the first 4 SEEDS editions are employed (only 2 to 4 in non-space activities). The majority in TAS-I, but the other are spread in EU.**

**SEEDS has an excellent image:**

- Results from the PWs have been presented at the IAF Conferences and also to other world events**
- SEEDS has been invited to join a few other post-MSc programmes in proposals to EU (e.g. “Virtual Space Academy” ...)**



## **Critical issues of an innovative project**

**Only 5 out of the 46 graduates are non Italian (2 from France, 1 from Germany, 1 from Spain, 1 from Romania)**

**In 2008 the University of Bremen withdrew from SEEDS due to the impossibility to recruit students in Germany (what does “post MSc course” mean in Germany?)**

**This situation is regarded as very critical by ESA. In spite of a grant accorded in 2008 to encourage the enrolment of non Italian students from ESA (or ESA candidate) countries, the recruitment of SEEDS-5 did not improve.**





## **Critical issues of an innovative project**

**Also the Bremen Space Industry cannot further support SEEDS without:**

- **an academic SEEDS Partner in Bremen**
- **a sufficient outflow of German SEEDS graduates looking for a local employment**

**But without industrial and academic partners in Bremen SEEDS would collapse to little more than a national initiative and both its outstanding features and its positive image would be lost.**



## **Present stand**

**After completing 5 editions and providing the European Space Exploration with more than 50 highly qualified specialists, a “pause of reflection” had been decided. SEEDS-6 will not start before Fall 2011.**

**During this time a new “SEEDS formula” will be sought in order to solve the main problem:**

***“More recruitment of EU students from outside Italy”***



## Perspectives

### Possible paths to be followed:

- **involvement of new EU countries (UK, NL ...)**
- **undergraduate recruitment at BSc instead that at MSc level**
- **more interaction with existing MSc space programmes, exploitation of ERASMUS opportunities**
- **larger ESA involvement in the SEEDS conduction and in the definition of the PW topics**
- .....



## **Conclusion**

**The present moment is not favourable to Human Space Exploration: budgets are cut, the return on the Moon is delayed ...**

**However, a great body of knowledge is owned by expert engineers who are retiring or already retired.**

**If they do not have the possibility to transmit their experience to the young people of today, all this will be lost for the day in which Human Space Exploration will be started again (and, sooner or later, it will).**

**This is maybe the main mission of SEEDS**

**Thank you for your attention !**