



# Hypotheses about OSS in ATM

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This presentation is still at a preliminary R&D stage  
and not related to an official Eurocontrol policy



## Outline

- ◆ OSIFE objective, scope, and method
- ◆ 2005: a year of networking
- ◆ OSIFE: 4 initial hypotheses (dec 2004)
  - [Harmonization] > what was learned
  - [Quality] > what was learned
  - [Business Model] > what was learned
  - [Public Service] > what was learned





## OSIFE objective

- ◆ Given that OSS is regarded as an **accidental revolution** (Raymond1999) or as a **paradigm shift** (O'Reilly2004)
- ◆ **the objective is to understand if, when and how this revolution/paradigm will or could impact the business in ATM.**



## Preliminary R&D project: **OSIFE**

- ◆ **O**pen
- ◆ **S**ource
- ◆ **I**mplications
- ◆ **F**or
- ◆ **E**urocontrol



Not for office administration  
Not for ATM systems infrastructure  
For ATM software itself





## OSS for businesses

1. Administration tools  
(office / backoffice automation)

S { 2. Product infrastructure  
(typically, embedded Linux)

S { 3. Product component  
(business domain) **Scope of OSIFE**



## OSIFE method

- ◆ Review the literature
- ◆ Define major hypotheses (dec. 2004)
- ◆ Gather facts and arguments about hypotheses
- ◆ Do research and case studies
- ◆ Provide recommendations about policy, migration and implementation





## 2005: a year of networking

- ◆ Within Eurocontrol
  - (re)visit ATM projects
  - discover a deep lack of awareness
- ◆ Within OSS world
  - LinuxSolutions, Novell
  - CALIBRE project...
- ◆ With ATM partners
  - Round Table



## Open Source in Air Traffic Mgt Summary of the hypotheses: through Open Source Software

- 1) **ATM quality** will be improved,
- 2) **ATM harmonization** will be facilitated,
- 3) **ATM industry** will change but continue,
- 4) **ATM public service** obligation will be met better.

These 4 main hypotheses were proposed by Jean-Luc Hardy and Marc Bourgois at the 3rd Eurocontrol Innovative Workshop & Exhibition, 9-10 December 2004, Brétigny-Sur-Orge, France.



## OSIFE, hyp. on “Harmonization”

- ◆ **Fact**  
Harmonization has been tackled in different ways:
  - Standardization... limited success (ex: ASTERIX)
  - Common development... monopoly (ex: ARTAS)
  - Multiple developments... not conclusive (ex: eFDP)
- ◆ **Hypothesis (20041209)**  
Open Source could be a means of injecting common application kernels into the ATM system, thereby greatly facilitating the inter-operability and the harmonization.



## OSIFE, hyp. on “Harmonization”

### What we learned in 2005

- ◆ Wrong name: Inter-operability
- ◆ Trajectory Predictor « White Box »
- ◆ SESAR: OSS could be between
  - Market Domination
  - Hard Core standardization





## OSIFE, hypothesis on “Quality”

- ◆ **Fact**  
Many complex OSS demonstrate high quality (a condition for safety).
- ◆ **Hypothesis (20041209)**  
The quality of complex ATM software could be maintained, if not improved, through OSS development method.
- ◆ **Issues**
  - **Safety**
  - **Security**



## OSIFE, hypothesis on “Quality”

### What we learned in 2005

- ◆ **OSS quality: not black/white** to be studied
- ◆ **Strongly related to Safety and Security:**  
2 new hypotheses (CALIBRE, Krakow, 18<sup>th</sup> Oct.)
- ◆ **Confusion about safety life critical:**
  - **ATC: NO (1%)**
  - **Avionics: YES**  
... nevertheless TCAS made using OS methodology





## ATM: not considered safety life critical

- ◆ **Fact**  
In case of a total failure of ATC software, the probability of an accident is less than 0.01
- ◆ **Reasons**
  - 1) the air traffic is organized as conflict free
  - 2) the avionics include an anti-collision system
- ◆ **Consequence**  
ATM software is not life critical:  
a failure does not cause an accident



## OSIFE, hypothesis on “Safety”

- ◆ **Fact**  
In ATM, safety is a systemic issue where
  - the weakness/failure of one sub-system is (designed to be) compensated by the strength of another.
  - the subsystems must co-operate (not compete).
- ◆ **Hypothesis (20051015)**  
An Open Source Software approach could improve the detailed understanding of each subsystem by all the safety designers involved.





## OSIFE, hypothesis on “Security”

- ◆ **Fact**

- A tool is not secure/insecure in itself, but security depends on use of that tool (ex. knife, « Flight Simulator »)
- For software, the security threat is caused by the access to the running software.

- ◆ **Hypothesis (20051015)**

Given that the access to ATM running software is (hopefully) impossible, opening the source of ATM software will not create (but could avoid) security threats.



## OSIFE, hyp. on “Business Model”

- ◆ **Fact**

Nowadays, OSS development is financed by some companies looking for revenues in hardware or services.

- ◆ **Hypothesis (20041209)**

OSS development would change the business model, but companies would continue (or could start) to get revenue from ATM.







## OSIFE, hyp. on “Business Model”

### What we learned in 2005

- ◆ « Free Software » counter-productive (seen as marginal, non-profit activity).
- ◆ Evidence from other domains: IBM,... Adacore.
- ◆ Commercial packaging of OSS: Novell...
- ◆ Outsourcing ==> danger of appropriation + lock-in: RAMS, ARTAS
- ◆ Major ATM revenues already from hardware and services? ==> Fake OSS revolution?



## OSIFE, hyp. on “Public Service”

- ◆ **Fact**
  - OSS = opening sources to the users is useful, provided that they are able to understand them.
  - There are R&D tools developed by Eurocontrol that simply disappear at the end of a project.
- ◆ **Hypothesis (20041209)**  
Many of the tools developed at Eurocontrol could be mutually beneficial to a wider research community, in ways we cannot think of today and by researchers we do not even interact with today.





## OSIFE, hyp. on “Public Service”

### What we learned in 2005

- ◆ Pioneer web site [www.OpenATC.org](http://www.OpenATC.org)
- ◆ Small GPL precedent at Eurocontrol
- ◆ Request to revisit HIPS as an OSS
- ◆ Interest in industrialisation without lock-in
- ◆ Evidence from other public services (ex: BBC)
- ◆ Exposing only quality / finished products ?  
... for a research center ?



## OSIFE, next step:

# Round Table

jointly organized  
with the support of

## CALIBRE

7<sup>th</sup> Dec 2005

