

# COTS, FLOSS, and Market Freedom In Safety-Centric Industries

**Franco Gasperoni**  
gasperoni@adacore.com

## **Potential of OSS in ATM**

7<sup>th</sup> December, 2005

Eurcontrol

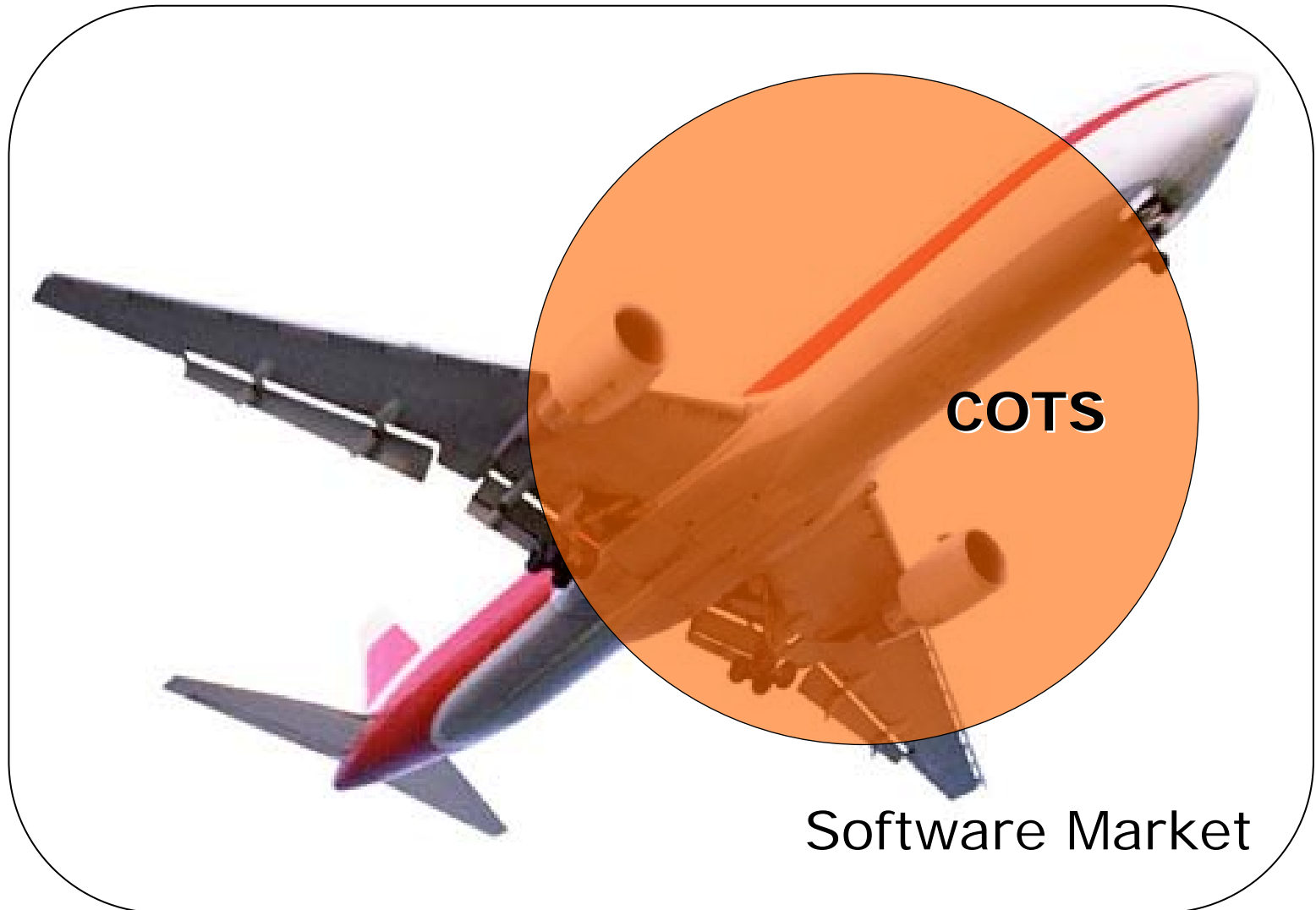
Bretigny-sur-Orge

## Focus of This Talk

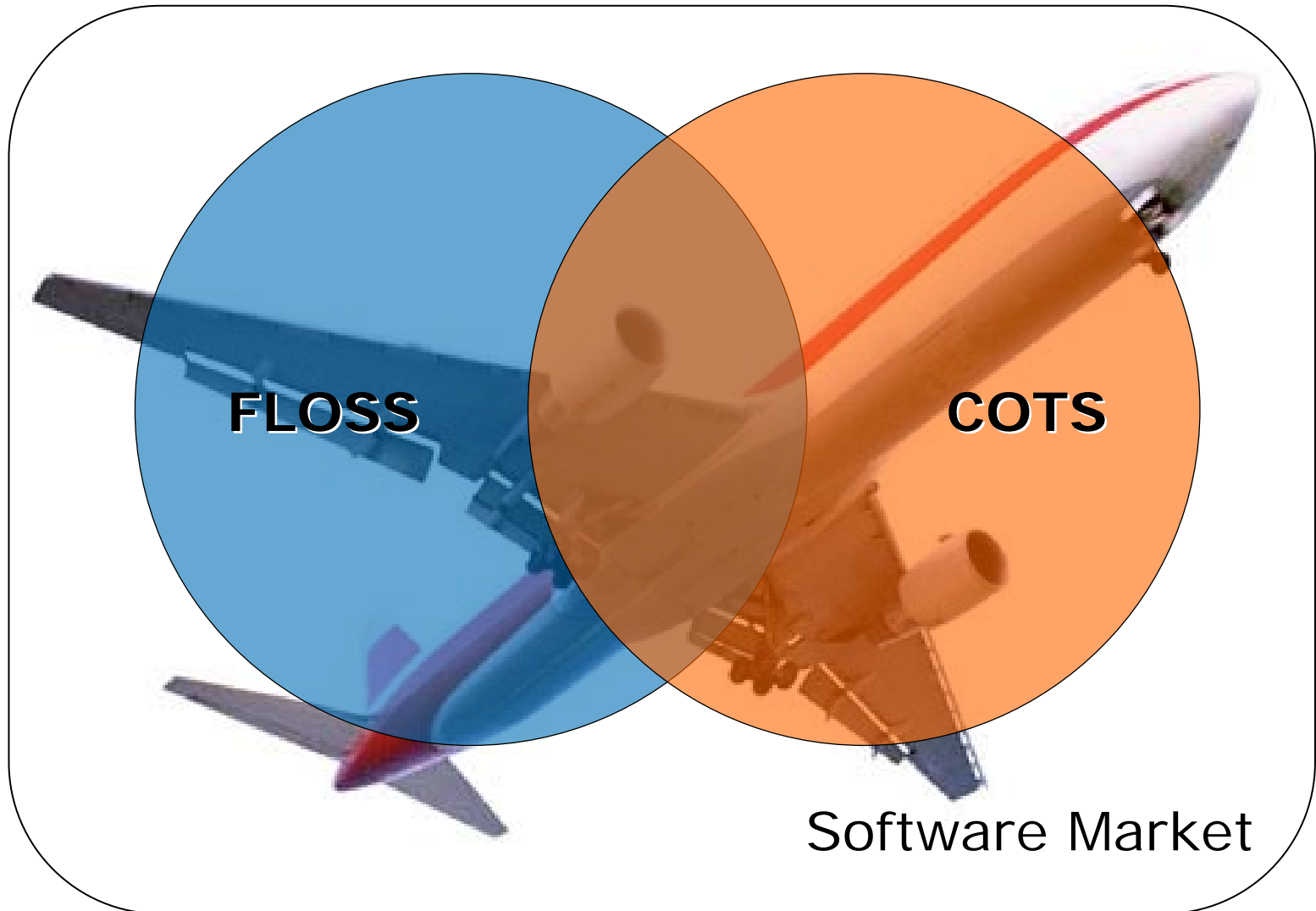


Software Market

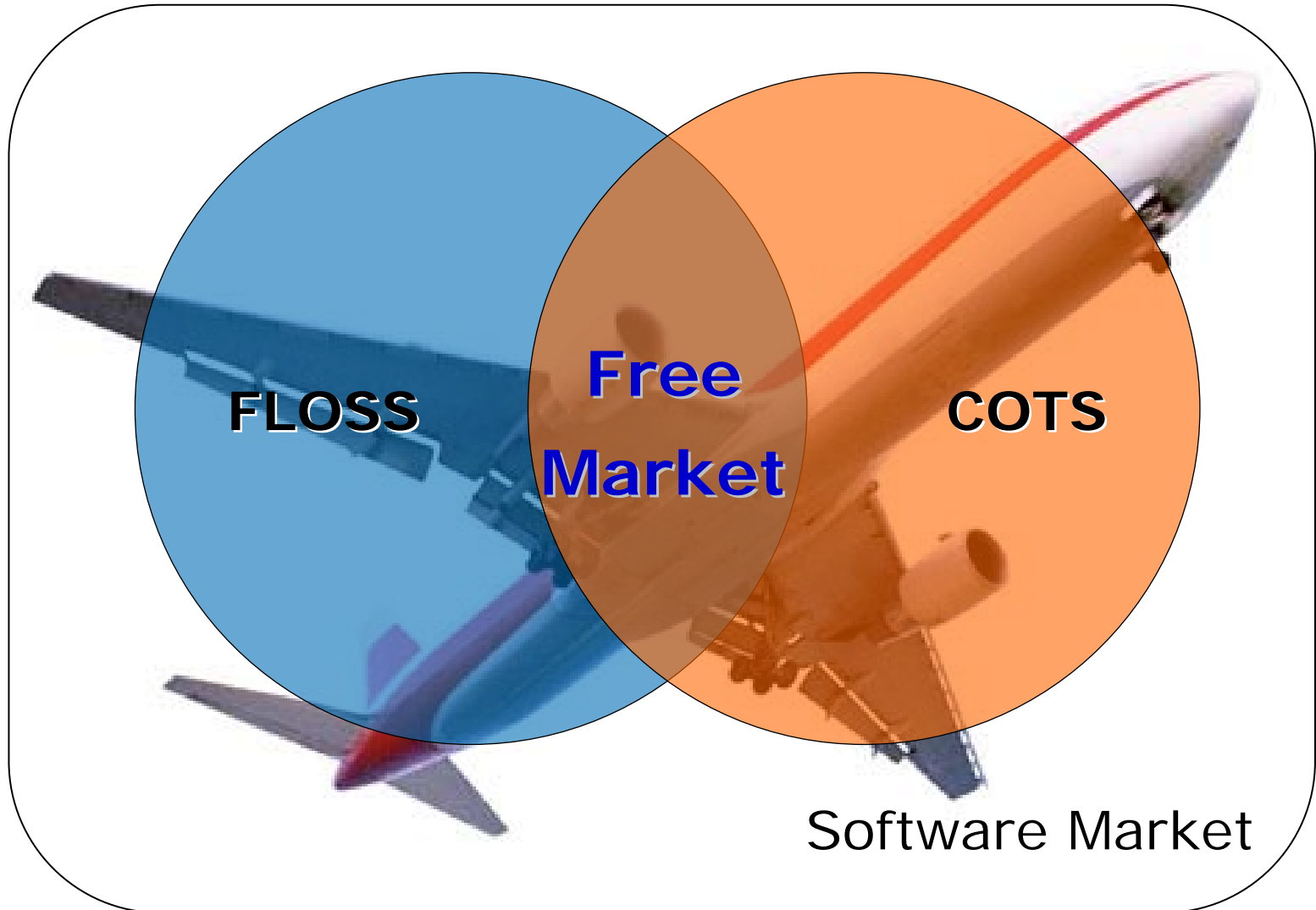
## Focus of This Talk



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# AdaCore & GNAT Pro

## Who Are We?

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- **Engineering organization focused on Ada** (Ada 83, 95, 2005)
- **100% FLOSS** (Freely Licensed Open Source Software)
- **100% COTS**
- **Strong ATM presence**
- **Worldwide presence**

### **NewYork and Paris HQ**

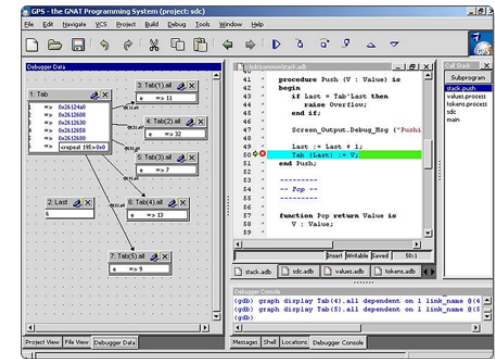
Branch offices in  
California, Sweden,  
Japan and Australia



# Ada Software Development Solutions

- **GNAT Pro**

*Full-featured Ada development environment  
(Ada 83, 95, 2005)*



- **GNAT Pro High-integrity Edition**

*For developing Safety Critical Applications in Ada*





## AdaCore & ATM

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**Belgocontrol (be)**

**CENA (fr)**

**DTI/STNA (fr)**

**Eurocontrol (be, fr, nl)**

**INDRA (es)**

**Loockheed ATM (us)**

**Luchtverkeersleiding (nl)**

**National Air Traffic Services (uk)**

**SkyGuide (ch)**

**THALES ATM (fr, au)**

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## **AdaCore Business Model: Leveraged Service**

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- **COTS product with FLOSS license**
- **COTS bundled with expertise-based service**
- **Provided by the developers of the FLOSS COTS**
- **Quality by aligning AdaCore interests with customer's**
  - Not by OSD

## Aligned with Customer Interests

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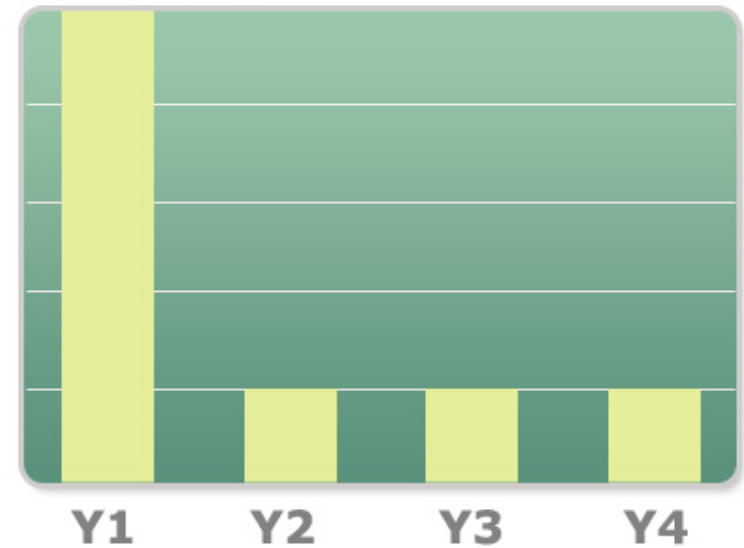
- **Our development solutions are sold as a subscription**
- **Our development solutions are FLOSS**
- **Direct access to AdaCore experts**

# Our Yearly Subscription Model

**AdaCore Subscription Model**



**PUF - Pay up front Model**



## Advantages

- Less financial risk
- Consistent quality of support every year

# The FLOSS Advantage

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- **Source code included**
- **Lock-free, no monopoly**
- **All developers can use it at any time**

# A Comprehensive Solution

The GNAT Pro subscription package includes:

**Powerful Tool Suite**



**Support & Online Consulting**



## Tool Suite Support

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- **Help with installation procedures**
- **Explanations regarding implementation dependant features**
- **Correction of problems encountered in the use of tools**
- **Workaround provided if a problem is encountered**
- **Pre-releases provided for high priority compiler problems**

## Online Ada Consulting

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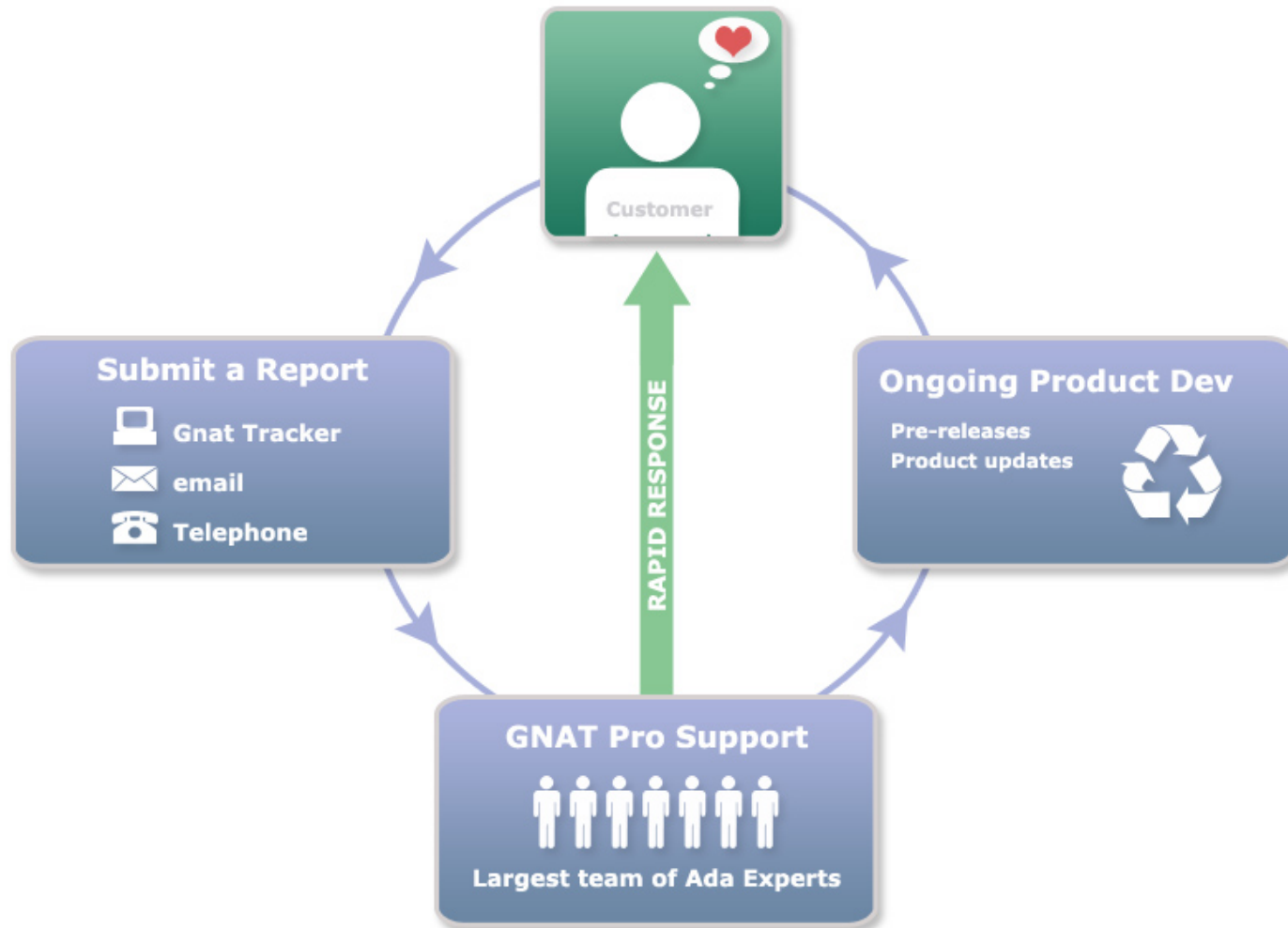
- **Expert answers to questions about Ada 83 and Ada95**
- **Suggestions for the effective use of Ada 95 in your project**
- **Advice on ways to structure your project using GNAT Pro**
- **Suggestions on best use of GNAT tools for your project**
- **Suggestions on how to migrate from other Ada technologies**
- **Help with all aspects of Ada 95 software development**



# Support + Online Consulting: How it Works



# Support + Online Consulting: How it Works



# Guaranteed Response Time

- 80% of requests are addressed in less than a day



## GNAT Tracker - Customer Web Server

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- **Secure Access**
- **Easy download of GNAT Pro tool suite and components**
- **Complete online version of GNAT Pro documentation**
- **Submit toolset support or online consulting requests**
- **Easy download of GNAT Pro releases**
- **Access of up-to-date versions of known-issues and features**
- **Browse/search all request exchanges for your account**

## AdaCore Value Proposition

**Reduce Risk**  
**Improve Productivity**  
**Build Quality Software**

**AdaCore** Reliable Tools, Ada Expertise and Rapid Support

## AdaCore and Software Coops

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- **AdaCore business model can be extended to Coops**
  - Eurocontrol
  - Airbus & TopCased
- **Software Coop to share resources and know how**
- **To develop software**
- **To develop certification material**
- **More generally to guarantee quality**
- **For the members of the coop**



# Free Market & Monopoly

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## Free Market

Market where economic exchanges

- Voluntary
- Unconstrained

Prices set by

- Supply & Demand





## Monopoly

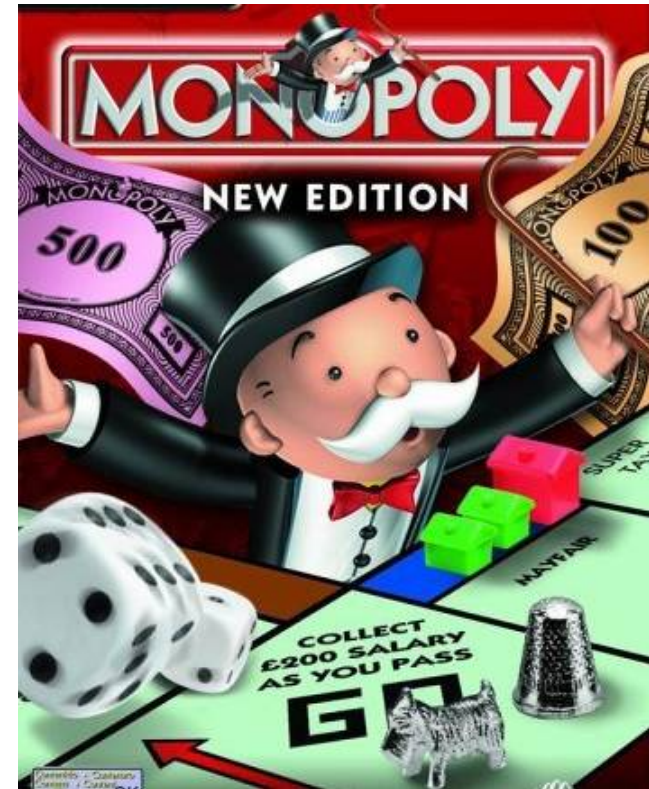
Only one provider of a good  
No one else can provide that good  
Lack of substitutes

Examples:

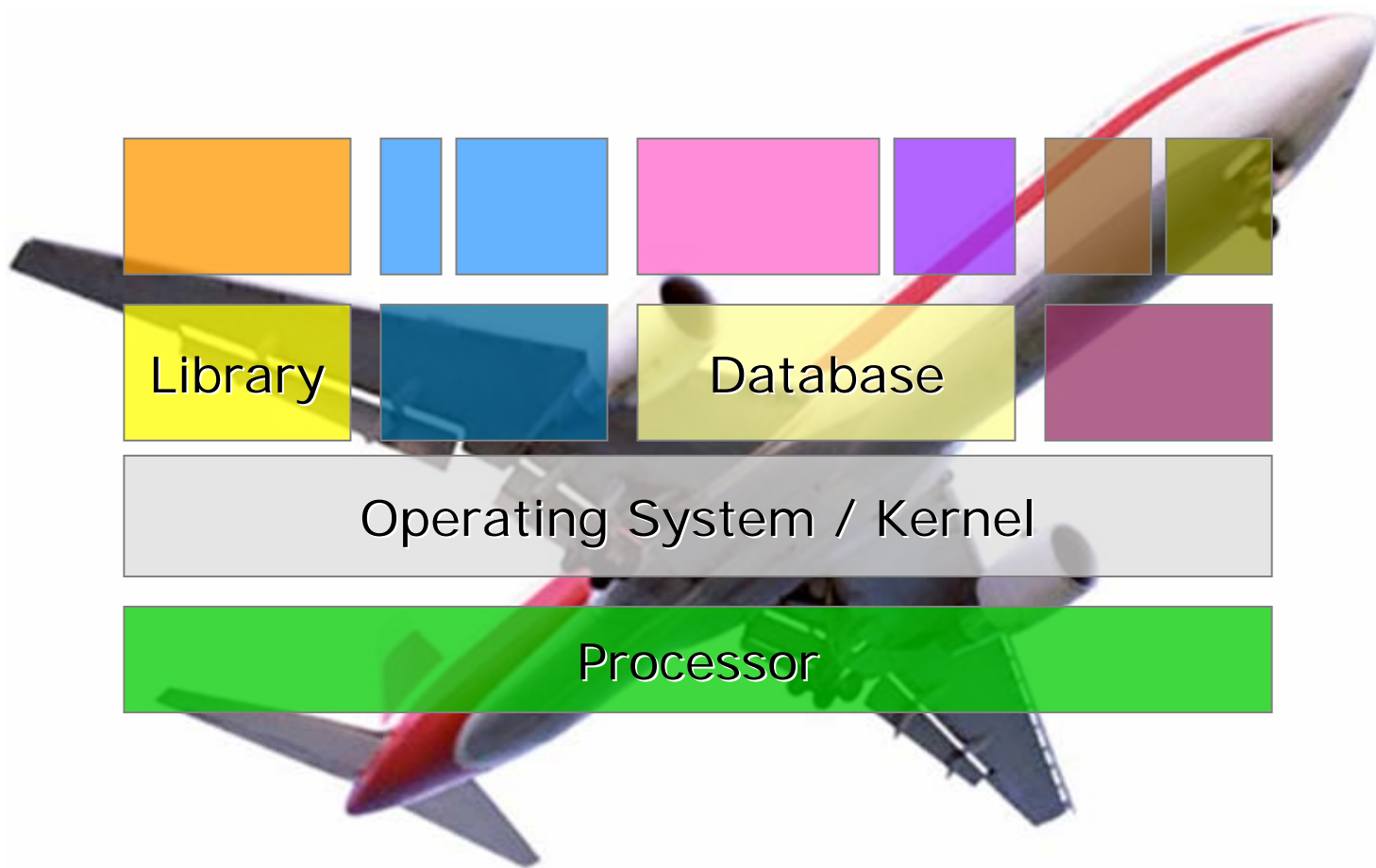
Telephony not so long ago  
Tobacco in the EU

## Free Market

Does NOT require systematic competition  
But freedom to compete



## Software and the Market

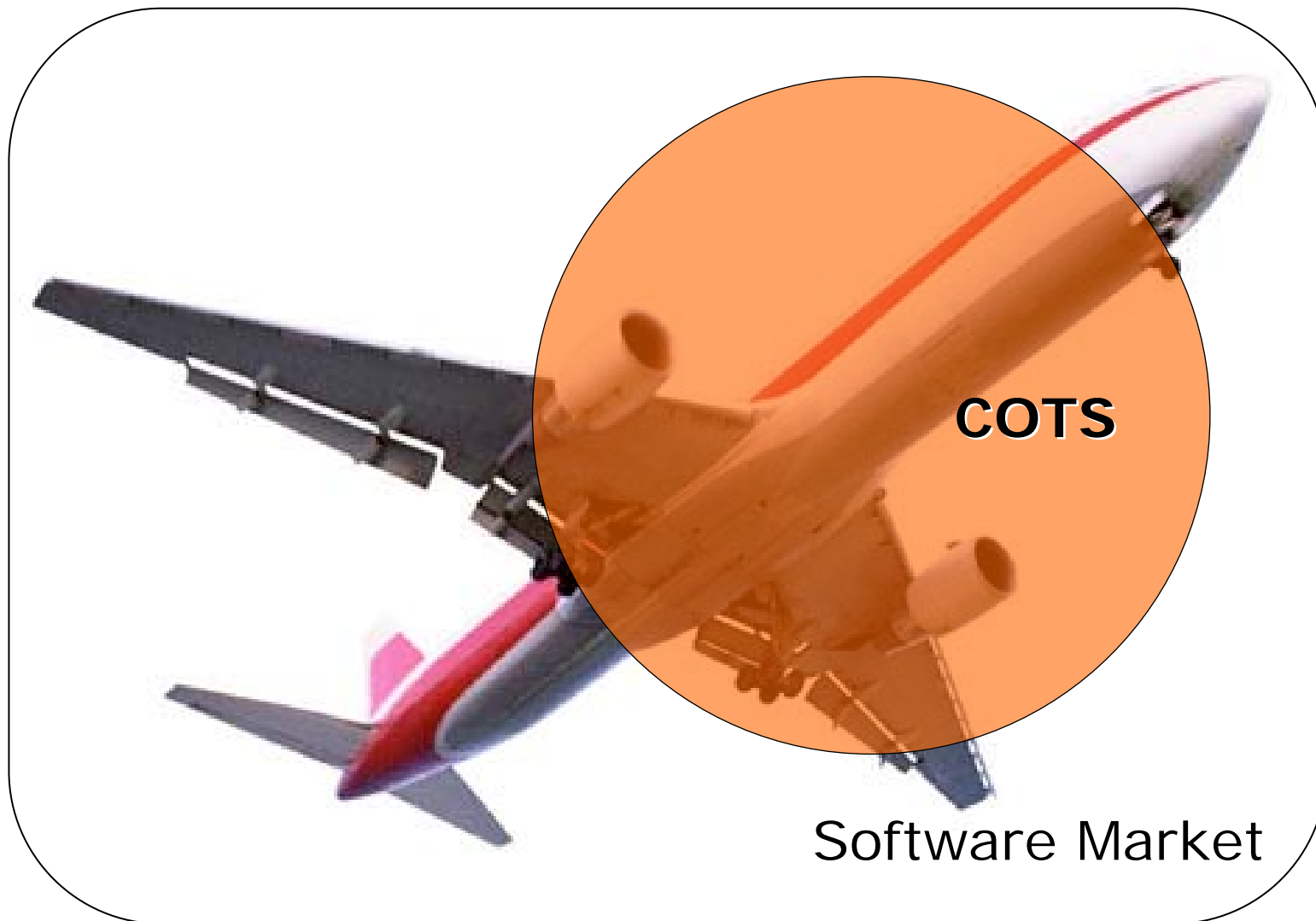


Reuse?

Build?

Subcontract?

Buy COTS?



## What is COTS?

The market answer for **sharing cost** for the

**Creation**

**Industrialization**

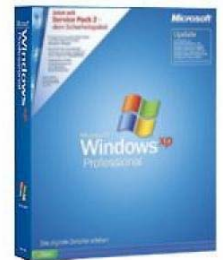
**Support**

**Maintenance**

**Repair**

**Evolution**

of software among **users** having **similar needs**



## The COTS Vendor

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**What does a COTS vendor provide/sell?**

- 1. The COTS**
- 2. Support over the entire COTS life-cycle**

## COTS Support

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(1 of 2)

**Happy with COTS/vendor support but high prices wrt:**

**Competing COTS of equivalent quality**

**AND**

**Equivalent quality support**

**What are your options?**

## COTS Support

(2 of 2)

**If happy with the COTS & unhappy with vendor support for:**

**Fixes**

**Customization**

**Updates**

**Maintenance**

.....

**What are your options?**

## Your Options in a Free Market

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### **1. Get help from additional organization**

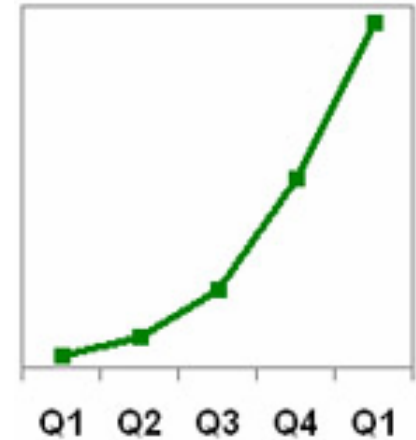
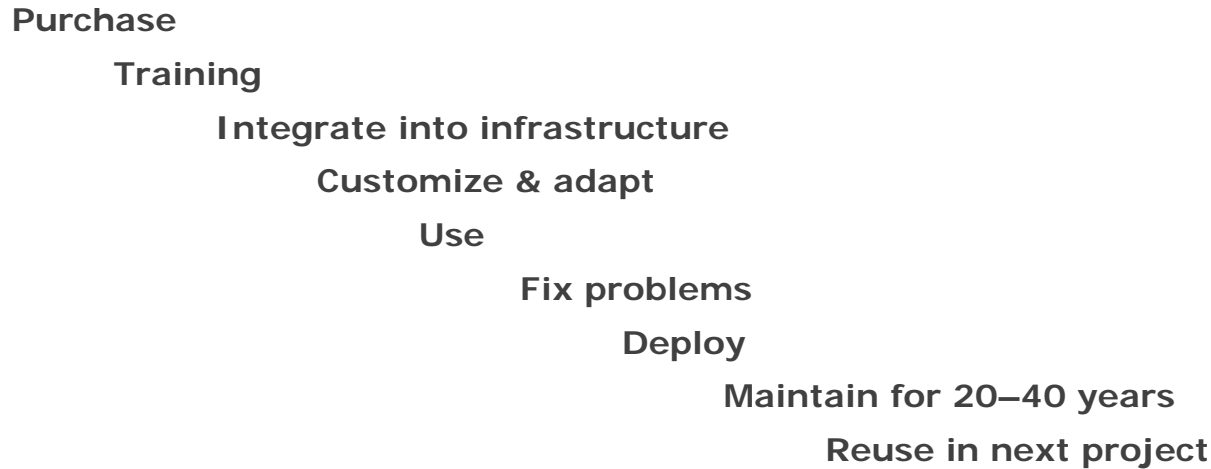
e.g. for advice on how best to use the COTS

### **2. Keep the COTS and switch support organization**

### **3. Switch COTS**



## Switching COTS



**Switching costs of COTS in safety-centric industries are high**

**Cannot switch if COTS has been deployed**

- life-cycle of 20 to 40 years



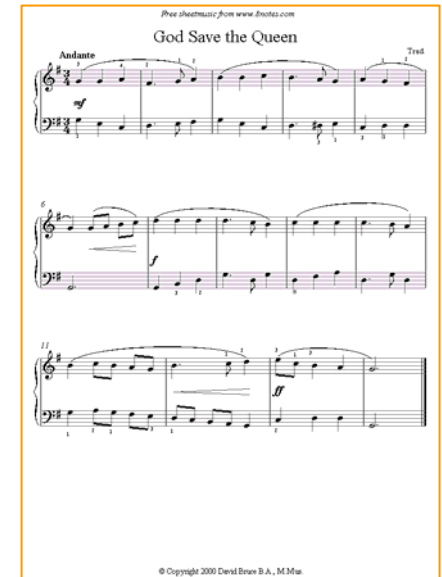
## COTS and Monopoly

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# Legal Background: Copyright

## Exclusive legal right of copyright holder to

- Copy
- Distribute
- Modify
- Display
- Perform
- Exploit a work





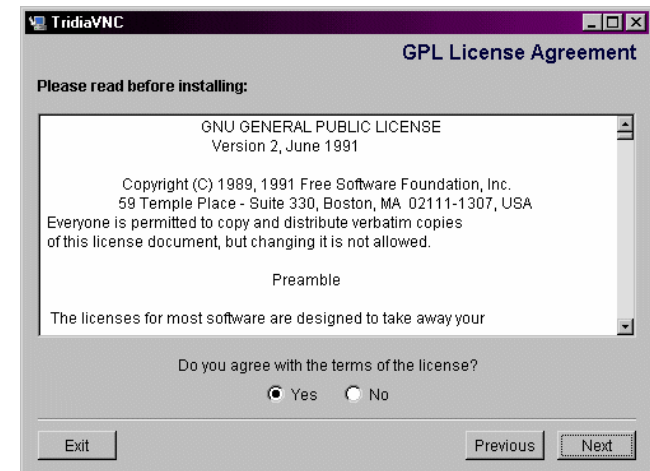
# Copyright & Licensing

**A copyrighted work cannot be copied unless...**

... the copyright holder grants you a license ...

... permitting copies under specified circumstances

**Virtually all software today is sold with a license**

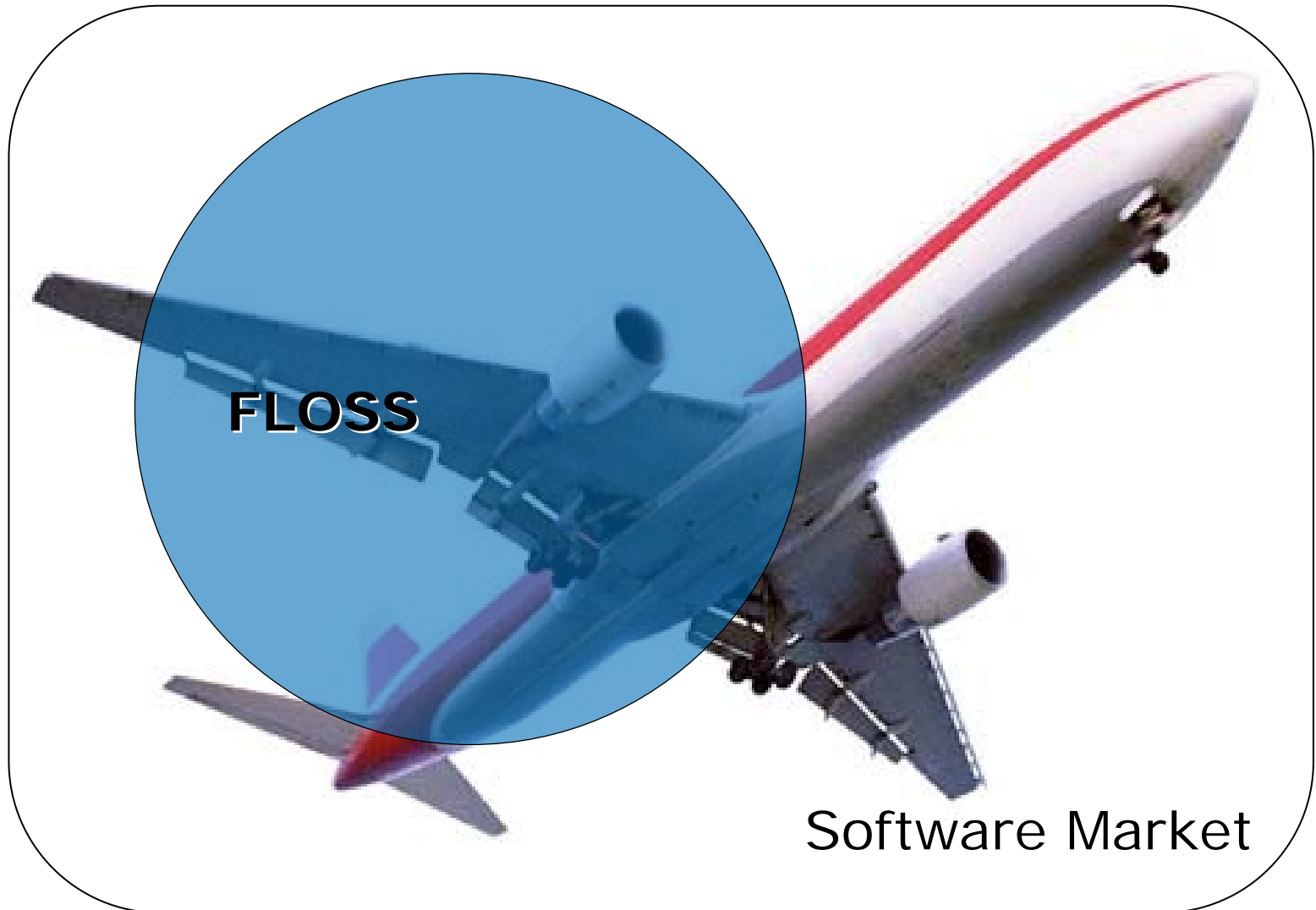




# FLOSS

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## Freely Licensed Open Source Software





# The Free Software Movement

Term coined in 80s by Richard Stallman

- *Freedom* to run
- *Freedom* to redistribute copies
- *Freedom* to study and adapt
- *Freedom* to improve the software and release improvements

Access to the sources is a precondition for the last 2 items



**Emphasis on User Freedom**



## Open Source Software / Open Source Development

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**Providing the sources (under some license)**

**Encouraging wide community to participate in development**

# Open Source Initiative (OSI)

OpenSource.Org

- **Abuses in the licenses used**
  - Apple Public Source License (APSL), version 1.x
- **Open Source Initiative (OSI) created to**
  - Define what software and associated licenses qualify as “Open Source”
- **Example of open source licenses:**
  - The GPL (also a Free Software license)
  - The BSD or Apache licenses (also Free Software license)
  - The Reciprocal Public License (NOT a Free Software license)

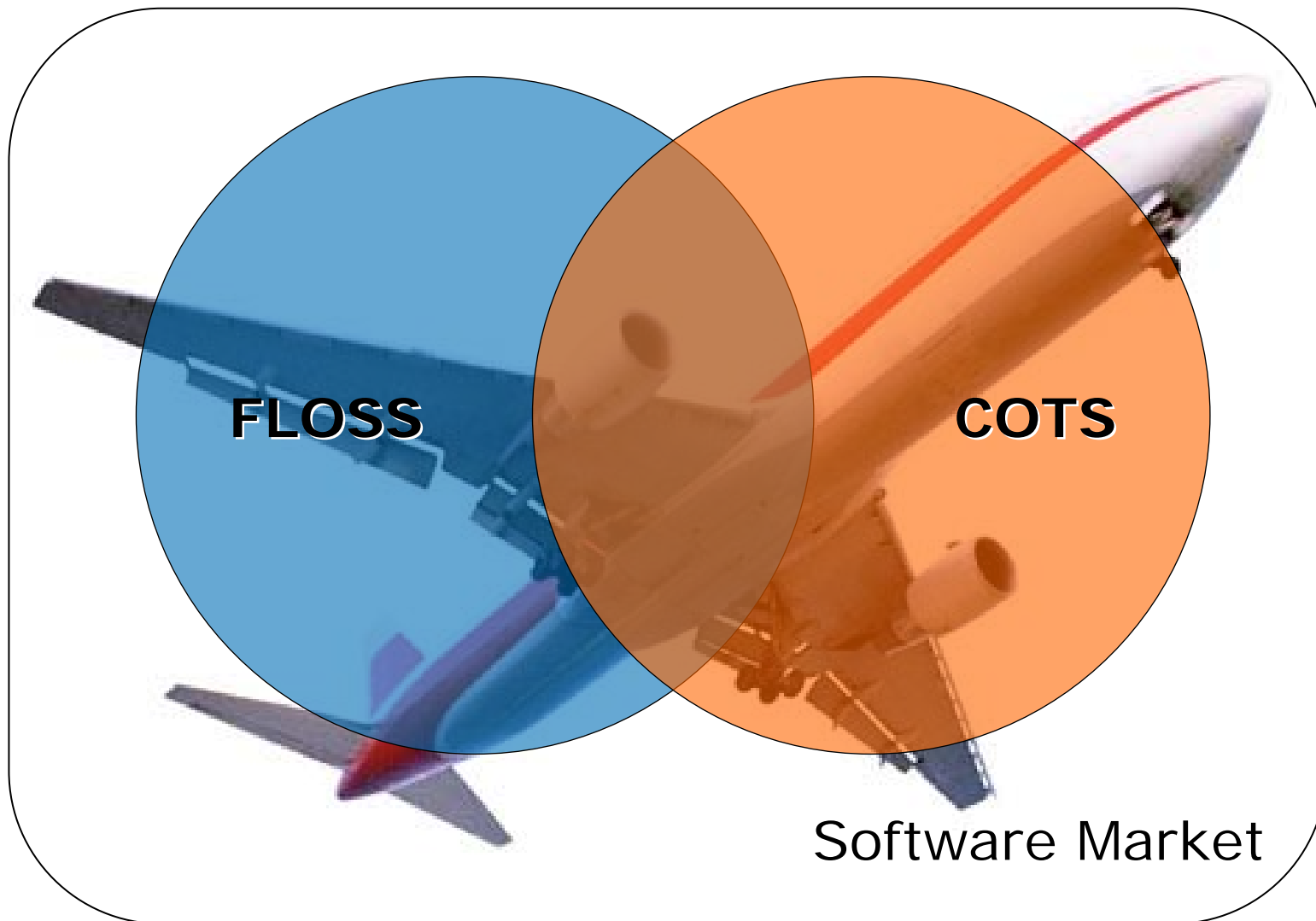
# FLOSS

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- Today most OSS licenses are also FS licenses
- Conversely all FS licenses are OSS
- Common set of licenses is referred to as FLOSS



# COTS, FLOSS, and Licensing



## Two Types of COTS

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- **RL-COTS: Restrictively licensed COTS (Microsoft)**
- **FL-COTS: FLOSS licensed COTS (AdaCore)**

## COTS License

- **Microsoft and AdaCore both sell COTS**
  - The software is copyrighted
  - It cannot be copied or used without a license
  - The license allows certain rights to copy and use the software
  - Customers pay for the combination of: software, support, and license

**From this point of view there is NO DIFFERENCE between**



# Restrictive vs FLOSS License

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**The difference is all in the license terms**

- Big difference because license conditions are very different
- MS license strictly limits usage and copying
- AdaCore FLOSS license is far more liberal and has few restrictions



## Copyright and Monopoly (Vendor Lock-in)

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- **Copyright CAN be used to establish:**
- **Monopoly for**
  - COTS Software customization
  - COTS Changes
  - COTS Evolution
- **Monopoly for support**
- **Monopoly for certification material**

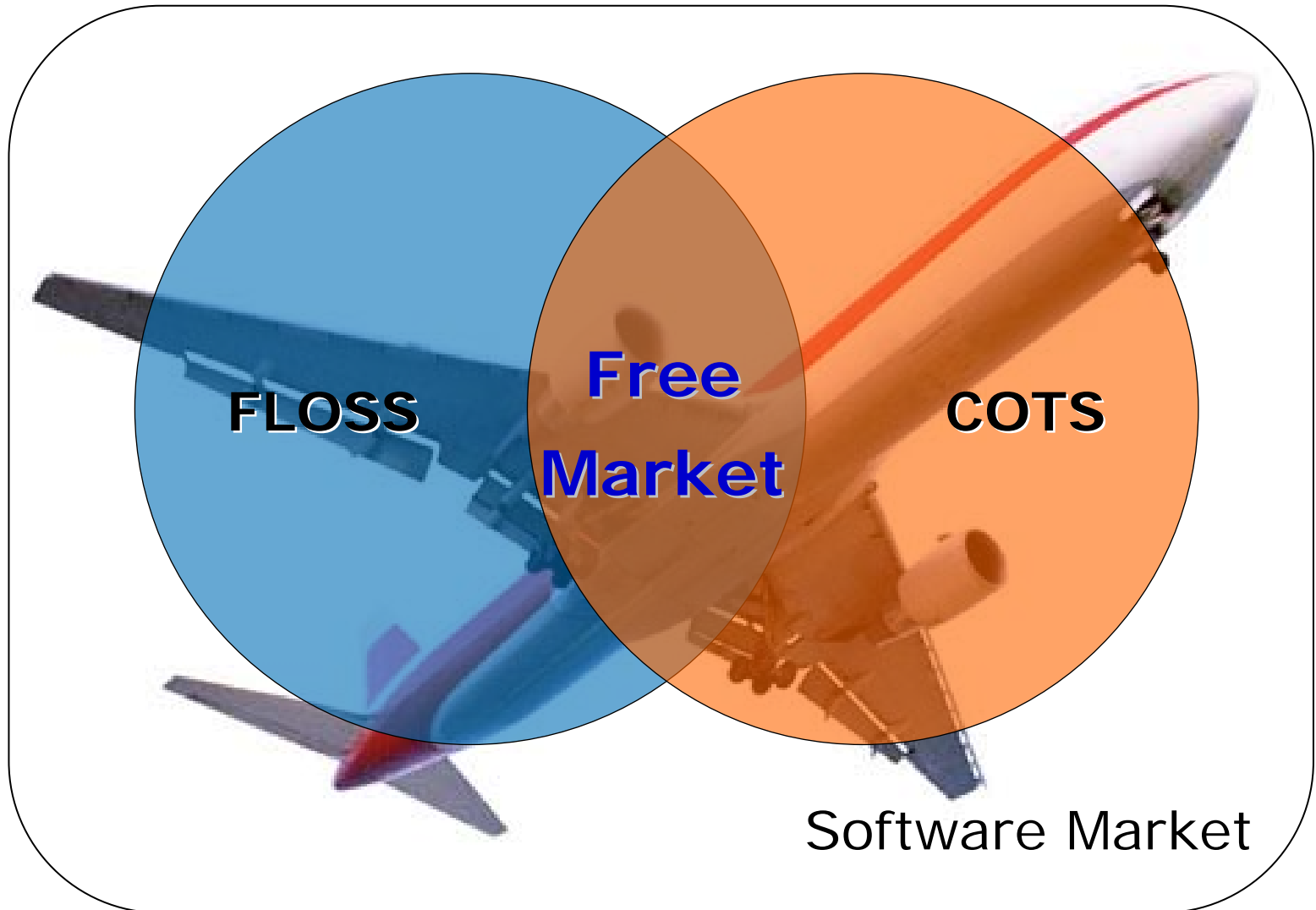
## Duration of the Monopoly

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- **Life + 70 years (humans)**
- **70 years after first publication (corporations)**
- **95 years in the US (corporations)**

## RL-COTS and Monopoly

- **Monopoly for support, customization, and evolution**
  - Only the vendor can provide support
  - If the vendor goes bankrupt, too bad
  - Source escrows are not much help
- **Monopoly for customization & modifications**
  - If the software does almost what you want, but not quite, you have to ask the vendor for changes
  - This can be arbitrarily expensive
- **Monopoly for certification material**
  - E.g. RTCA/EUROCAE DO-178B/ED-12B



## FL-COTS: Free as in Free Market

- **NO vendor lock in for support**
  - Customers have access to the sources
  - Anyone can provide support
  - Customers can build their internal support team
  - If there is a demand other companies will compete
- **NO vendor lock in for modifications**
  - Customer has access to the sources
  - Anyone can do modifications
  - Customers can do modifications if they like
- **NO vendor lock in for Certification material**

**FLOSS + COTS = Free Market**

## No Monopoly: The GNAT Pro Example

1 of 4

- Third party uses our compiler technology to do a specialized version for a rad-hardened 32-bit chip
- AdaCore has recently entered this market
- ... and are competing with our own technology 😊

## No Monopoly: The GNAT Pro Example

2 of 4

- Independent tool vendor uses our compiler technology for a tool to automatically detect run-time errors at compile time
- They built in-house expertise
- They support it themselves

## No Monopoly: The GNAT Pro Example

3 of 4

- GNAT Pro library contains: GNAT.Sockets
- An API for use of sockets
- The VxWorks version was limited to 32 sockets
- One customer needed more, and simply recompiled the unit
- And suggested we “fix” this, which we have
  - Customer did not have to wait for a new qualified release



## No Monopoly: The GNAT Pro Example

4 of 4

- Eurocontrol needed a project-specific tool on top of our compiler technology
- It did a call for tender
- We bid and Eurocontrol chose an independent service provider to demonstrate that with GNAT Pro there is no vendor lock-in 😊

## Conclusion

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## **FL-COTS: Freedom for the Entire COTS Life-Cycle**

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- **NO monopoly on COTS changes**
- **NO monopoly for COTS support**
- **NO monopoly for COTS certification material**

**Aligns COTS vendor & customer interests around**

High-quality products and services

At competitive prices

**FLOSS + COTS = 100% Free Market**

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**FLOSS is an unqualified plus  
for the COTS customer**

## Lobby with your RL-COTS Vendors

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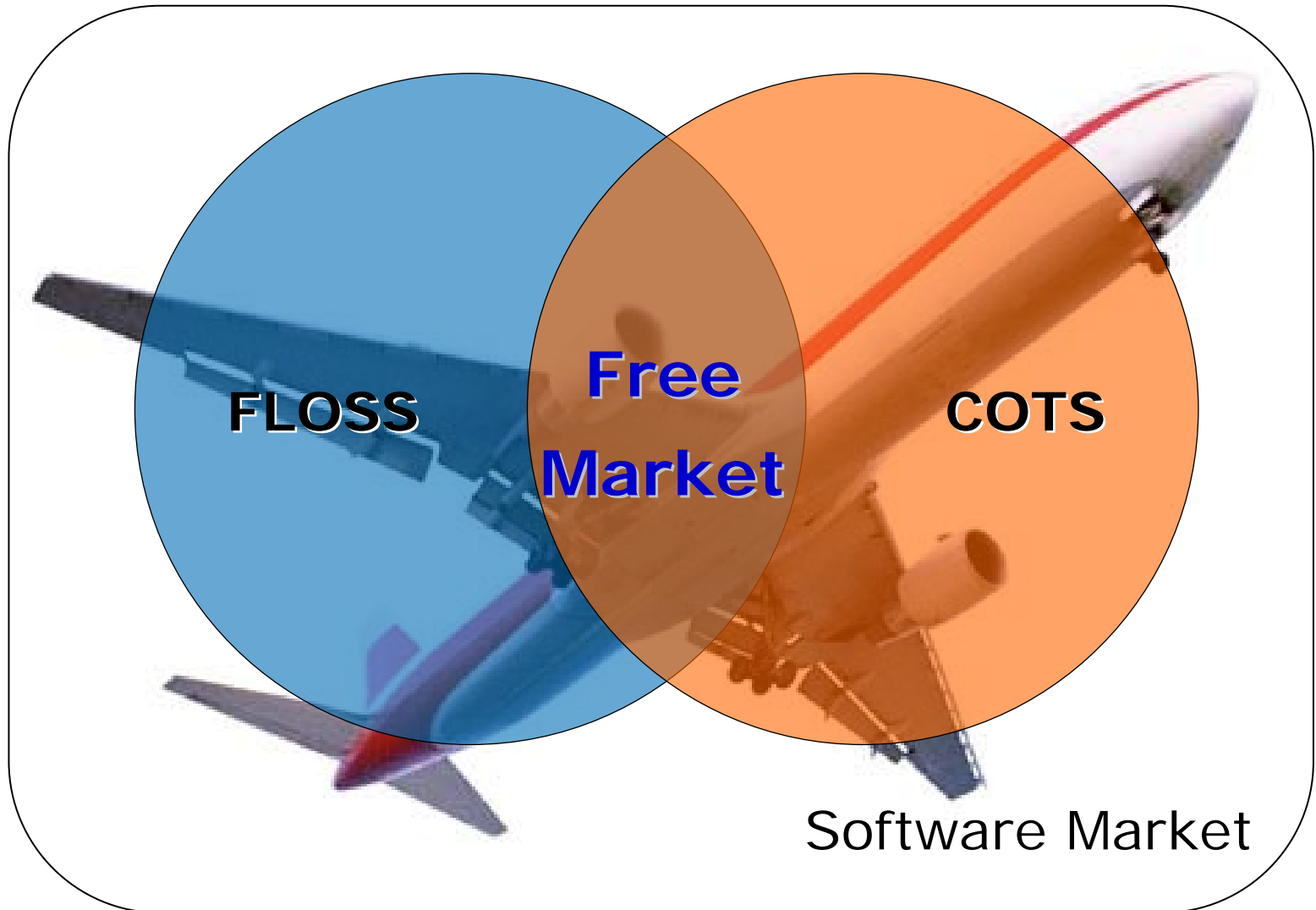
YOU can lobby with your COTS vendors so that

**when it is of value**

the vendor make their COTS available

**to YOU**

with a FLOSS-like license



## IPR and Market Freedom

|                                | Copyright |         | US-style<br>Software<br>Patents |
|--------------------------------|-----------|---------|---------------------------------|
|                                | FL-COTS   | RL-COTS |                                 |
| Switch COTS                    | YES       | YES     | NO                              |
| Keep the COTS<br>Switch vendor | YES       | NO      | NO                              |