



Free Software and Business Models

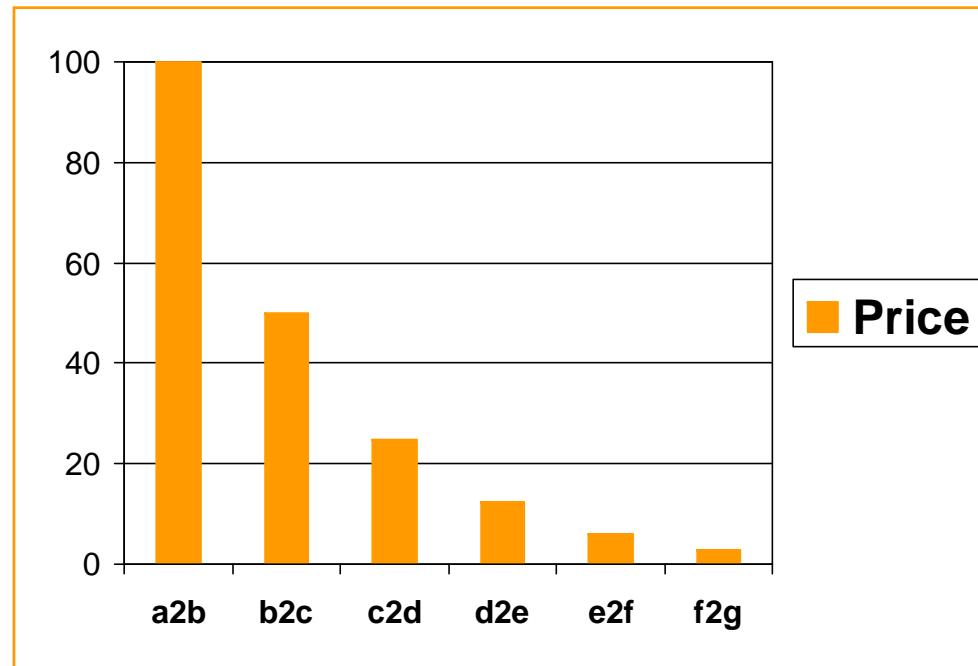
Franco Gasperoni
gasperoni@adacore.com

Free as in Freedom

- You can sell *Free Software*
- You have no obligation to make it available for free
- *Free Software* is a matter of liberty not price

Free Software and Price

- No theoretical restrictions on price
- Practical market limit



Business Models

- **Pure Free Software product**
 - E.g. most commercial GNU/Linux distributions up until 2003
 - Commodity price, little service
- **Dual license**
 - Cannot use this model for tools – only for “libraries”
 - E.g. MySQL, Cygwin
- **Pure Service**
 - Consulting around Free Software
- **Leveraged Service**
 - Expertise-based service on a Free Software product
 - E.g. GNAT Pro
- **Free Software Co-ops**



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

Franco Gasperoni
gasperoni@adacore.com

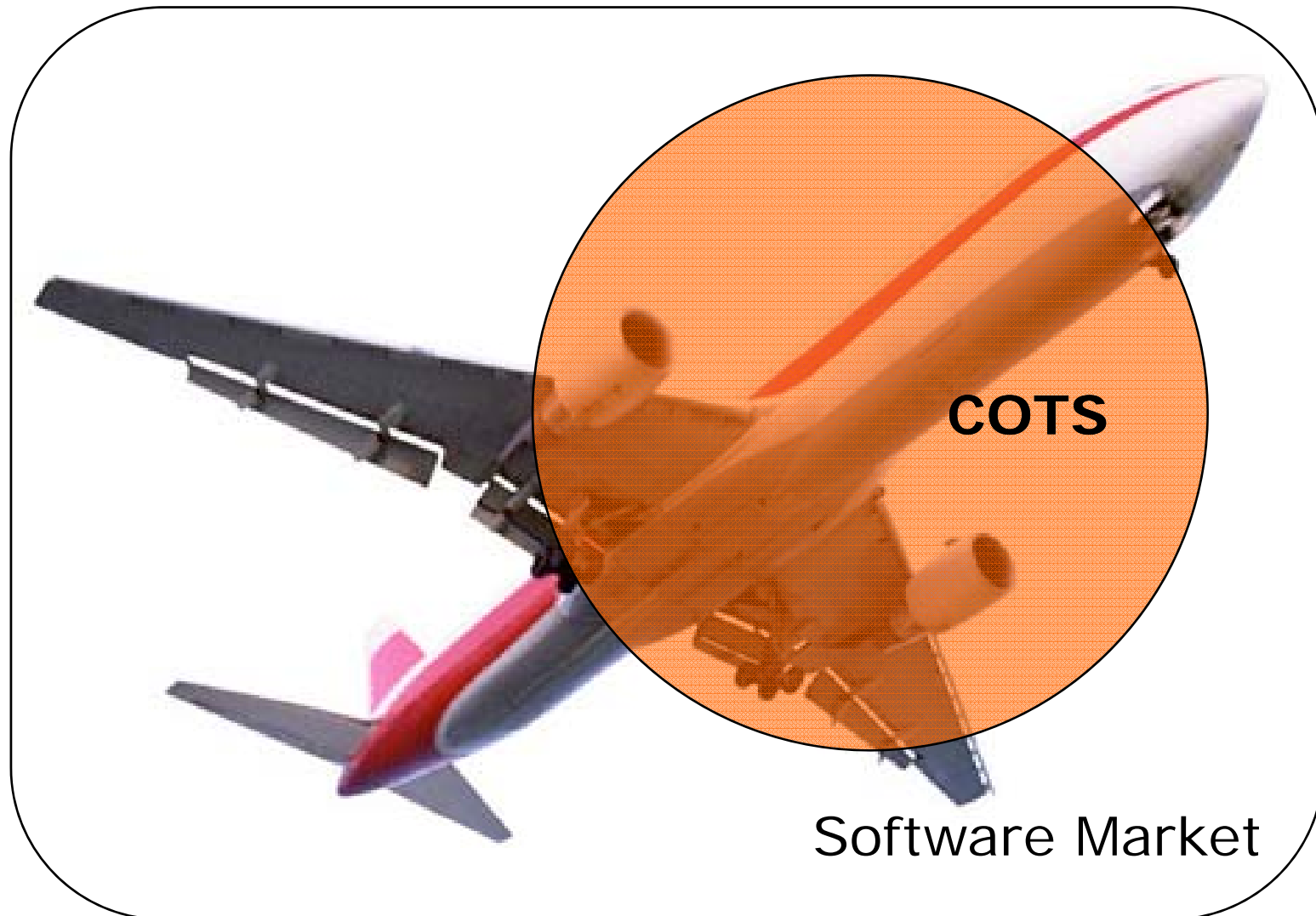
Potential of OSS in ATM
7th December, 2005
Eurcontrol
Bretigny-sur-Orge

Focus of This Talk

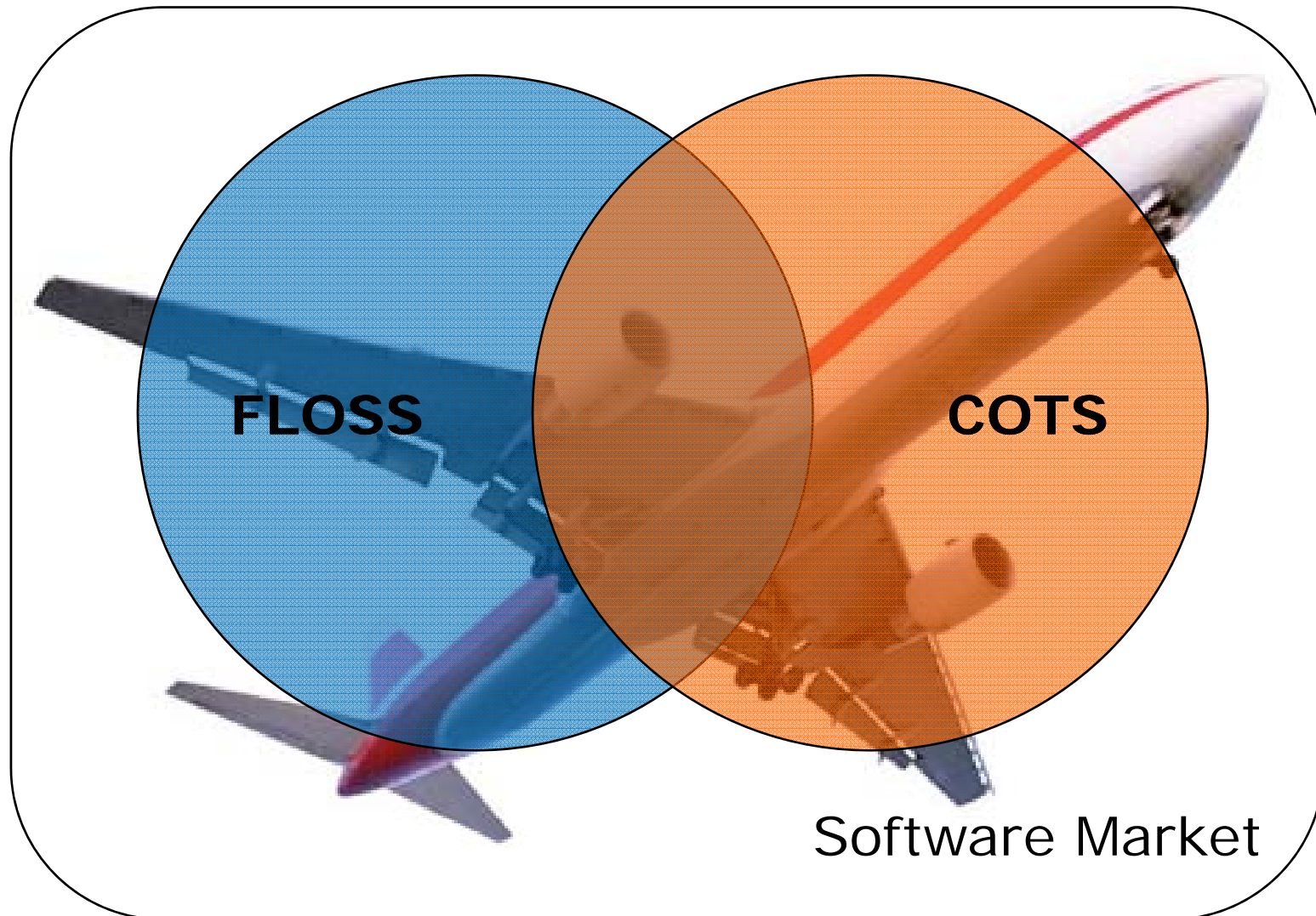


Software Market

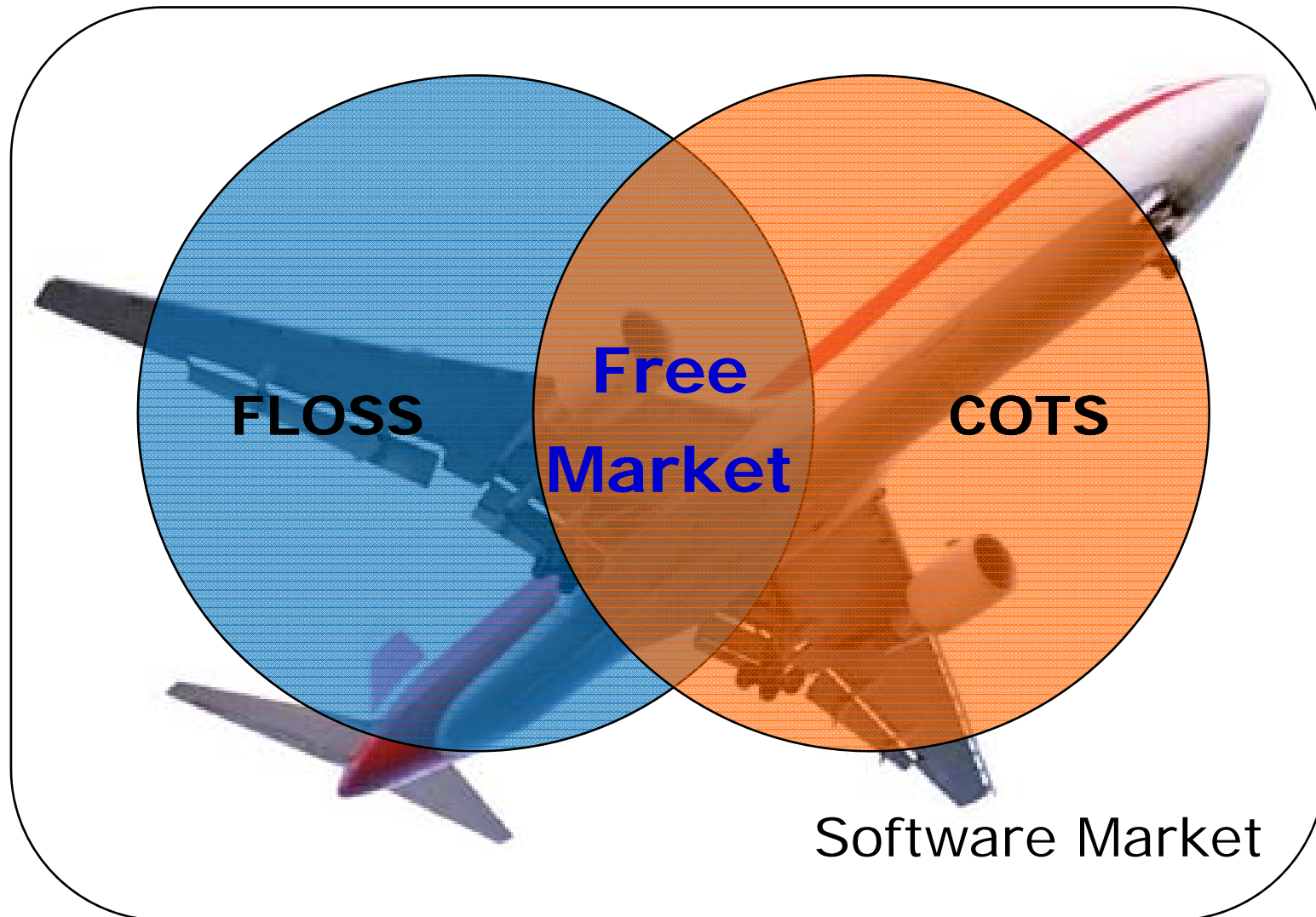
Focus of This Talk



Focus of This Talk



Focus of This Talk



The image features a background of a blue-tinted circuit board with various components and traces. On the left side, there is a white vertical bar containing the AdaCore logo and tagline. The logo consists of the word "AdaCore" in a blue, sans-serif font, with "Ada" in a lighter shade and "Core" in a darker shade. Below it, the tagline "The GNAT Pro Company" is written in a smaller, dark blue font. The main title "AdaCore & GNAT Pro" is centered in the upper right quadrant of the image, underlined, in a white, sans-serif font.

AdaCore
The GNAT Pro Company

AdaCore & GNAT Pro

Who Are We?

- **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

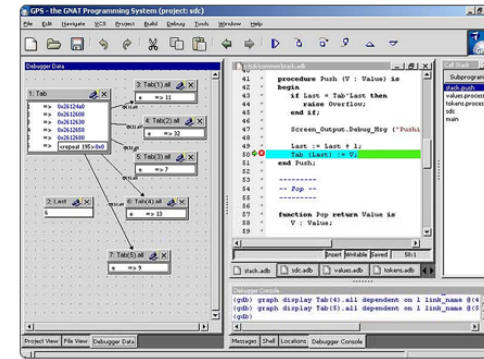
Branch offices in
California, Sweden,
Japan and Australia



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

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)

.....

AdaCore Business Model: Leveraged Service

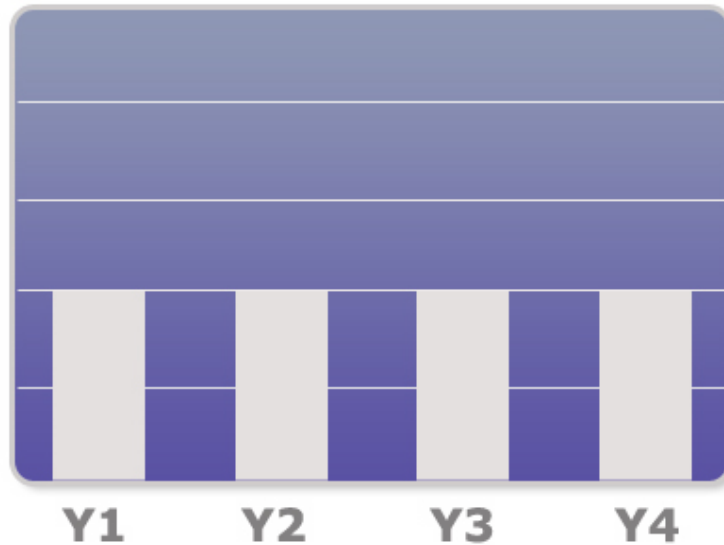
- **COTS product with FLOSS license**
- **COTS bundled with expertise-based service**
- **Provided by the developers of the FLOSS COTS**
- **Quality by aligning AdaCore interests with customer's**
 - Not by OSD

Aligned with Customer Interests

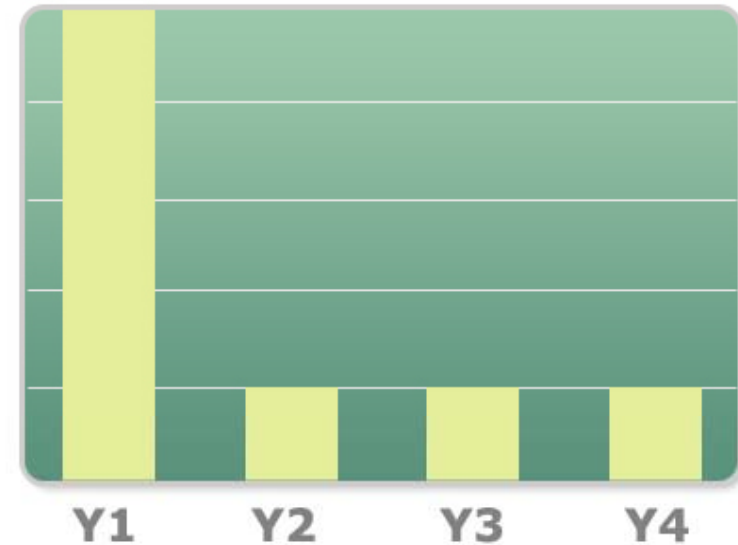
- **Our development solutions are sold as a subscription**
- **Our development solutions are FLOSS**
- **Direct access to AdaCore experts**

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

- **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

- **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**

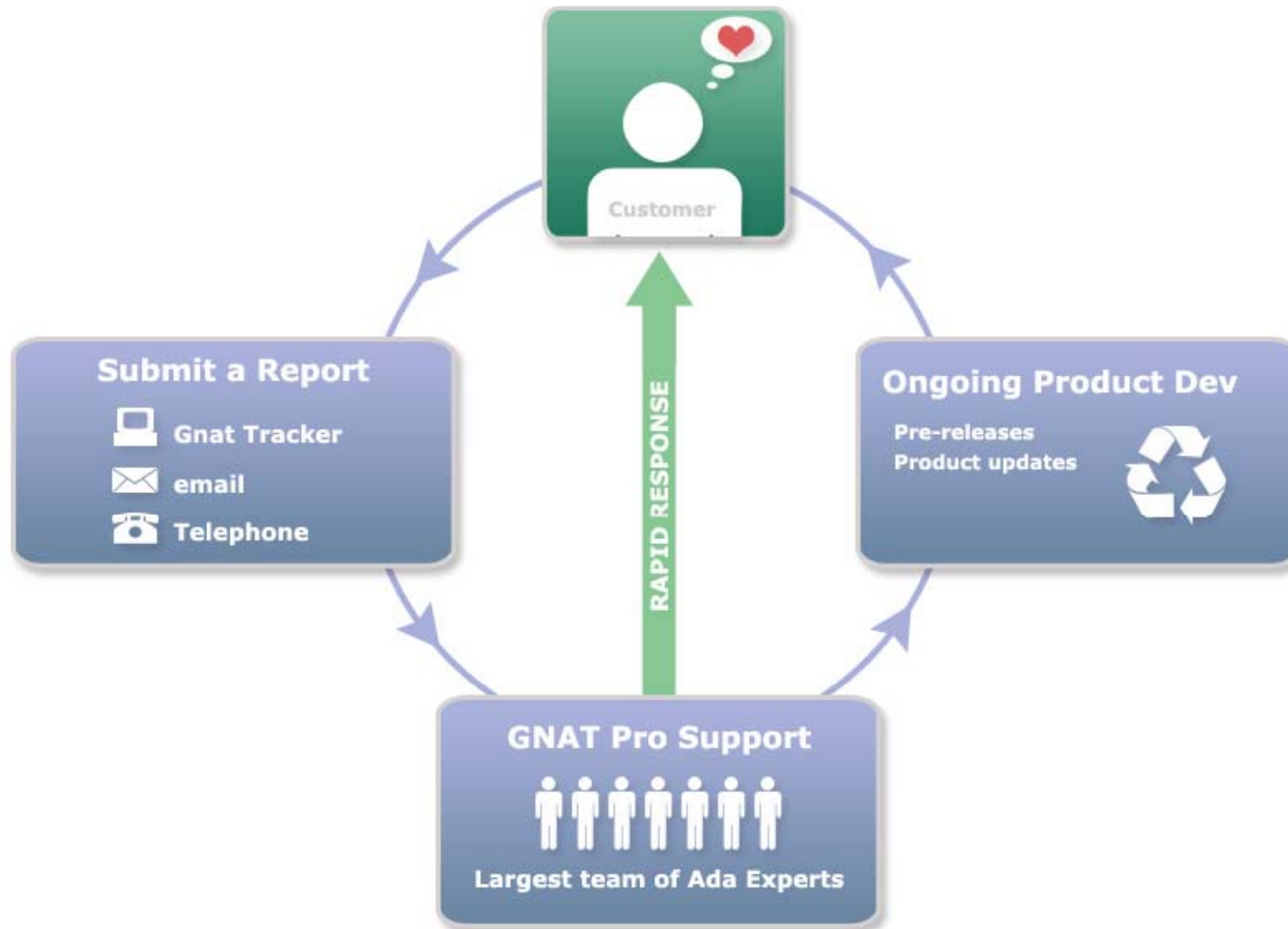
Online Ada Consulting

- **Expert answers to questions about Ada 83, Ada 95, Ada 2005**
- **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

- **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**

GNAT Tracker - Customer Web Server

The screenshot shows the GNAT Tracker customer web server interface. The header includes the AdaCore logo and navigation tabs for Dashboard, Tickets, Download, Wavefronts, Documentation, Developer, and Intern. The main content area is titled 'Dashboard' and shows account information for 'RAPITA SYSTEMS Ltd' with ID '1226'. A 'Subscription Summary' box indicates the subscription expires on Jan 20, 2008, for 5 Developers, with details for PowerPC ELF format and GNAT Pro High-Integrity Edition. Below this are two tables: 'Open Tickets (Last 12 months)' and 'Recently Closed Tickets'. The 'Open Tickets' table lists four tickets with descriptions, last messages, priorities, and waves. The 'Recently Closed Tickets' table lists three tickets with descriptions, last messages, and waves. A right-hand sidebar contains a search bar, links to 'Create a New Ticket' and 'Download GNAT Pro', 'Useful Information' links, and an 'AdaCore Developer Log' section with recent updates.

GNAT Tracker
The GNAT PRO customer site

AdaCore
The GNAT Pro Company

Log out ▾

Dashboard Tickets Download Wavefronts Documentation Developer Intern

Dashboard

Account Information

RAPITA SYSTEMS Ltd | 1226

Subscription Summary
Expires Jan 20, 2008: 5 Developers PowerPC ELF format (hosted on Windows), GNAT Pro High-Integrity Edition [Details ▾](#)

Open Tickets (Last 12 months)

Tickets	Description	Last Message	Priority	Wave
G301-006	build scripts for g++	Mar 05, 2007	High	
G203-018	multitasking in multiprocessor systems	Feb 28, 2007	Medium	
G118-023	GPS: input of unicode characters in editor	Feb 24, 2007	Medium	
G110-009	access to source code	Mar 03, 2007	Medium	

[All Tickets ▾](#)

Recently Closed Tickets

Tickets	Description	Last Message	Wave
G201-006	running GNAT under Windows 2003	Feb 10, 2007	
G108-018	support for non-Ada exceptions	Jan 21, 2007	Wave
R322-023	beginning with gtkada	Dec 28, 2006	

Search

[Create a New Ticket](#)

[Download GNAT Pro](#)

Useful Information

- [Getting Started Guide](#)
- [GNAT Pro License](#)
- [GNAT Pro Support Policy](#)
- [AdaCore Company Site](#)

AdaCore Developer Log

- Mar 02, 2007 [GNAT Pro 6.0.1 Released](#)
- Mar 02, 2007 [No warnings for obsolescent Handling functions](#)
- Mar 01, 2007 [GNATmake checks for up-to-date .axe file](#)

AdaCore Value Proposition

Reduce Risk
Improve Productivity
Build Quality Software

AdaCore Reliable Tools, Ada Expertise and Rapid Support

AdaCore and Software Coops

- **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**



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Free Market & Monopoly

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:

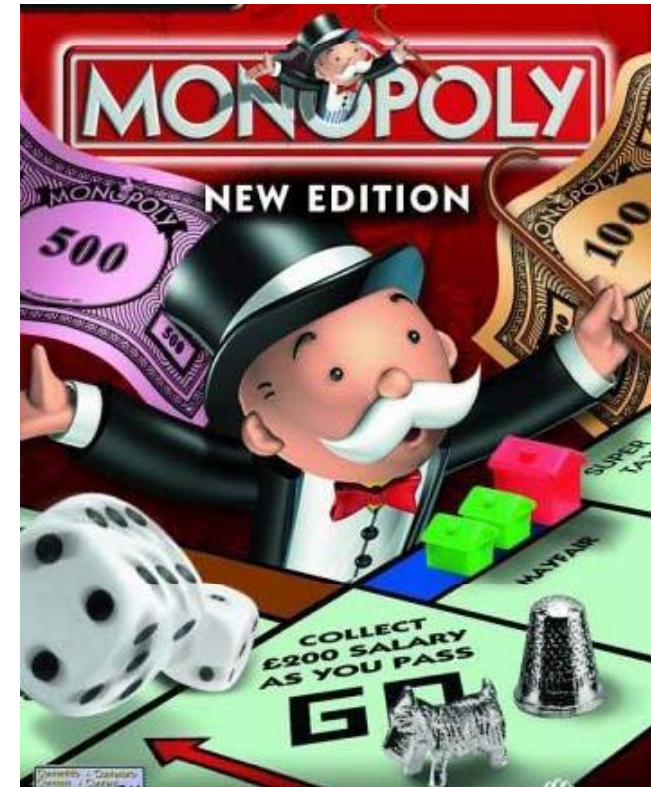
Telephony not so long ago

Tobacco in the EU

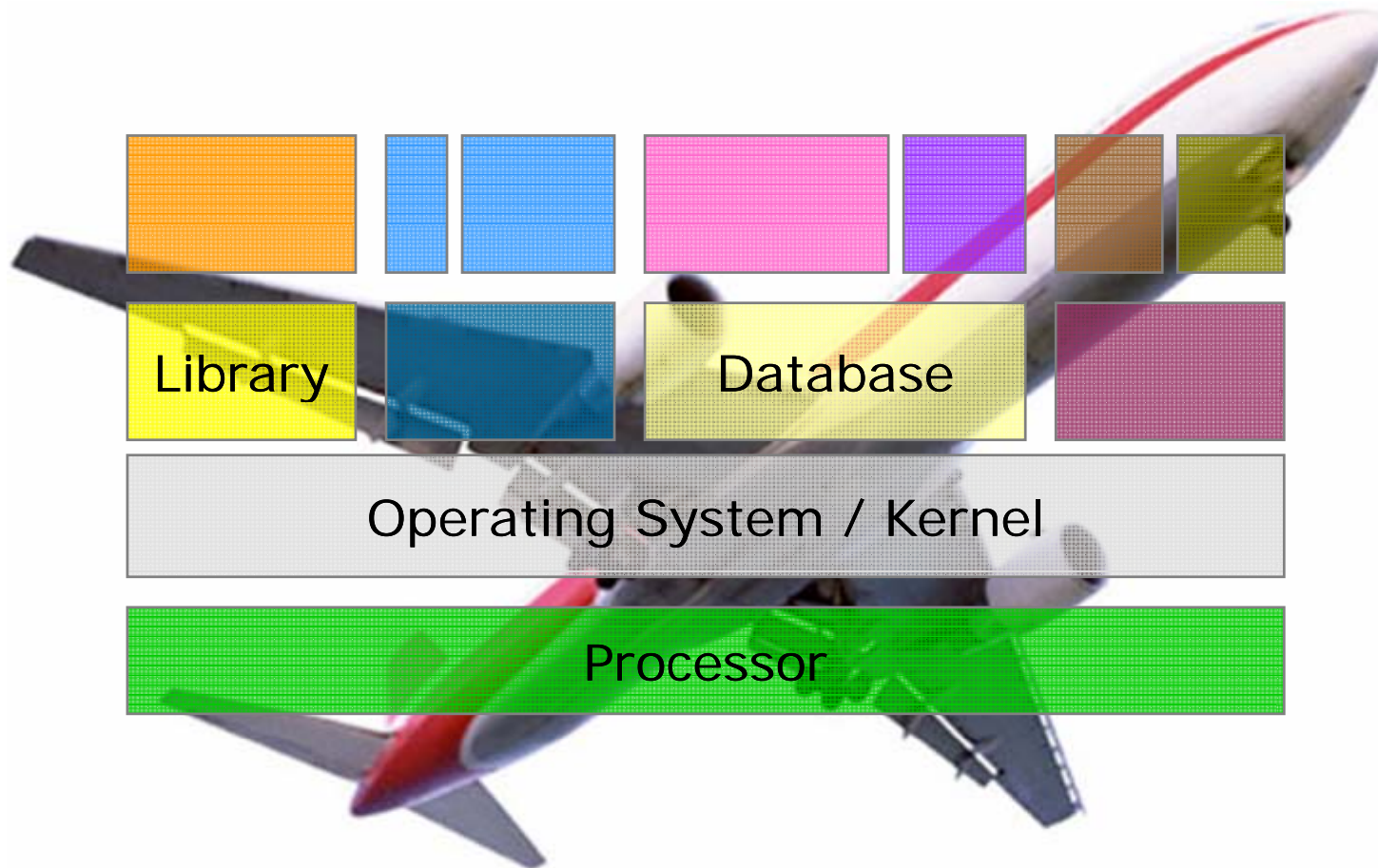
Free Market

Does NOT require systematic competition

But freedom to compete



Software and the Market

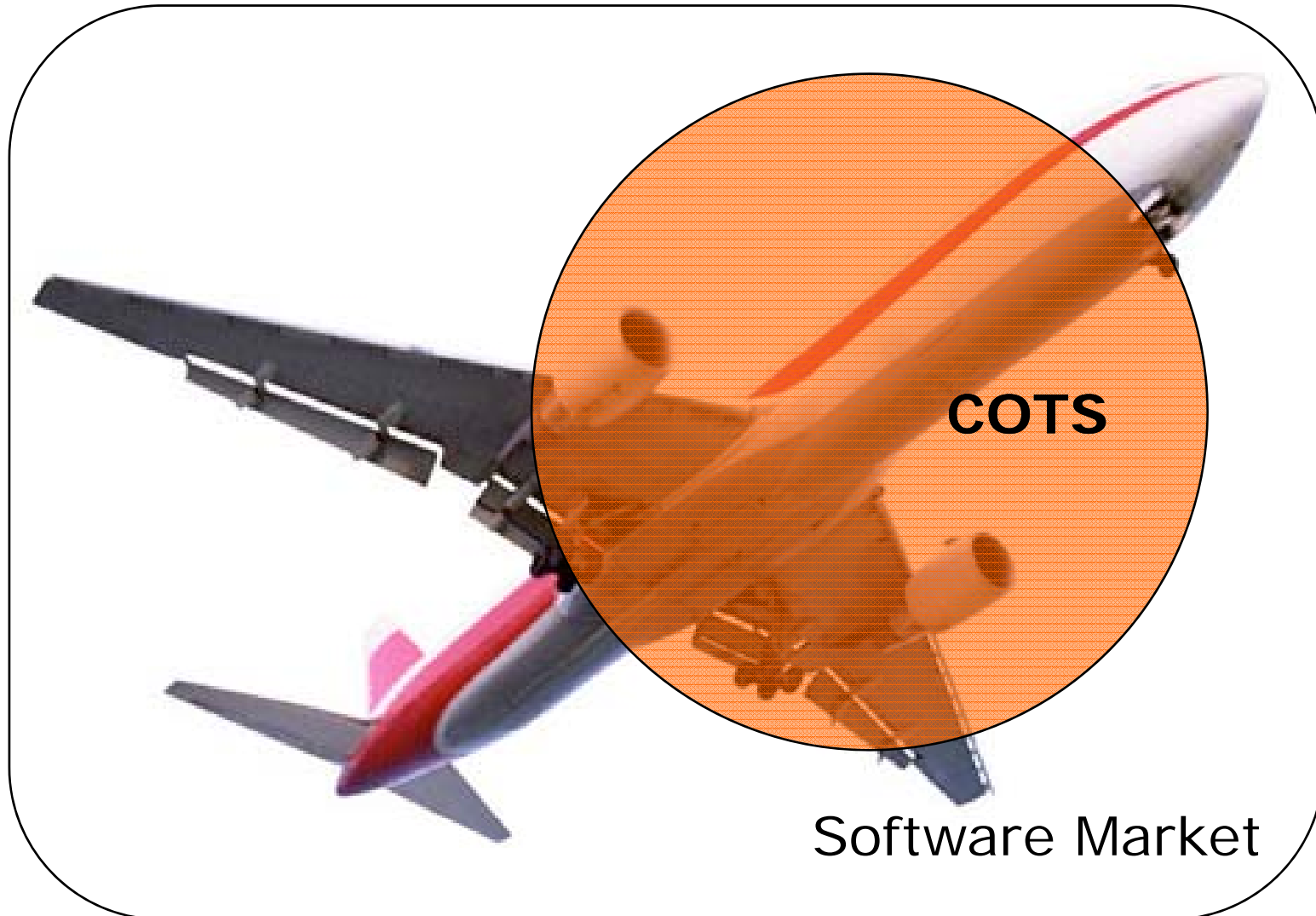


Reuse?

Build?

Subcontract?

Buy COTS?



What is COTS?

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

Creation

Industrialization

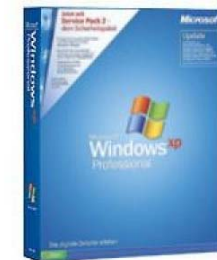
Support

Maintenance

Repair

Evolution

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



The COTS Vendor

What does a COTS vendor provide/sell?

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

COTS Support

(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

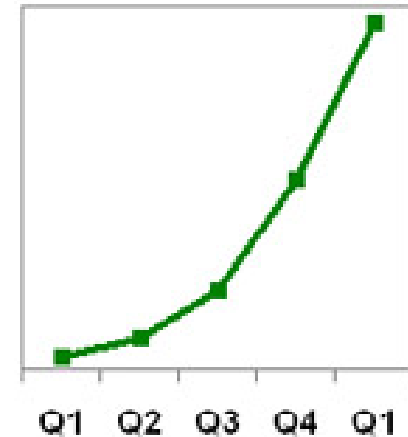
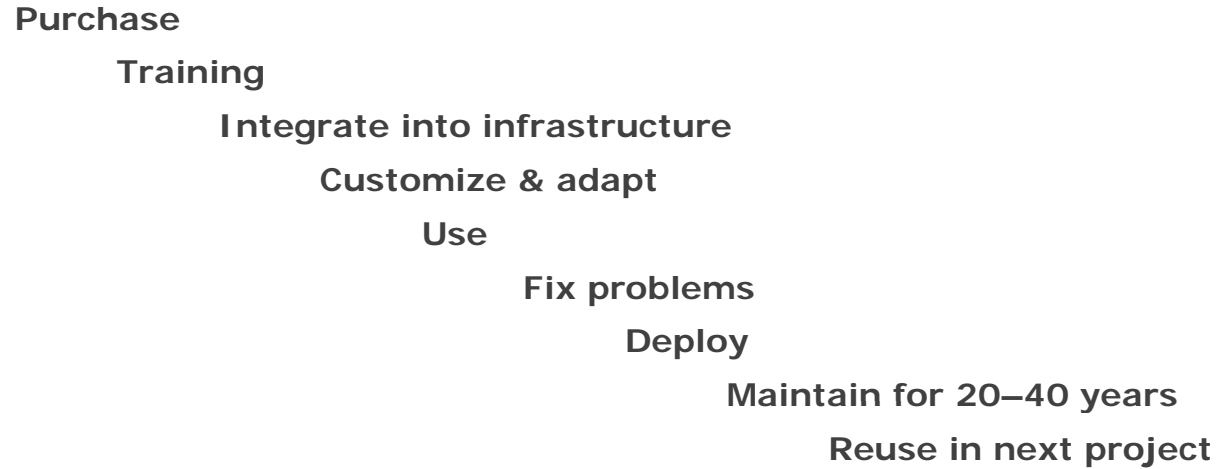
1. Get help from additional organization

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



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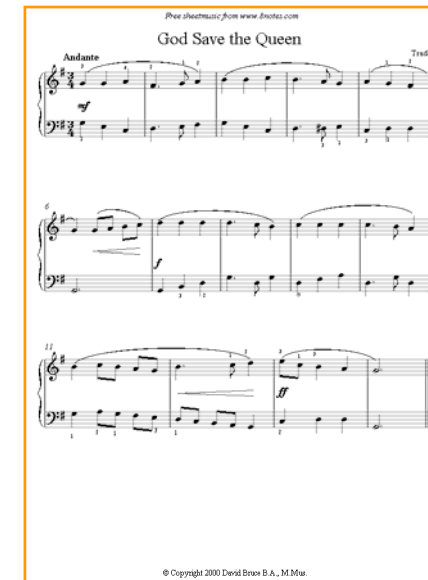


COTS and Monopoly

Legal Background: Copyright

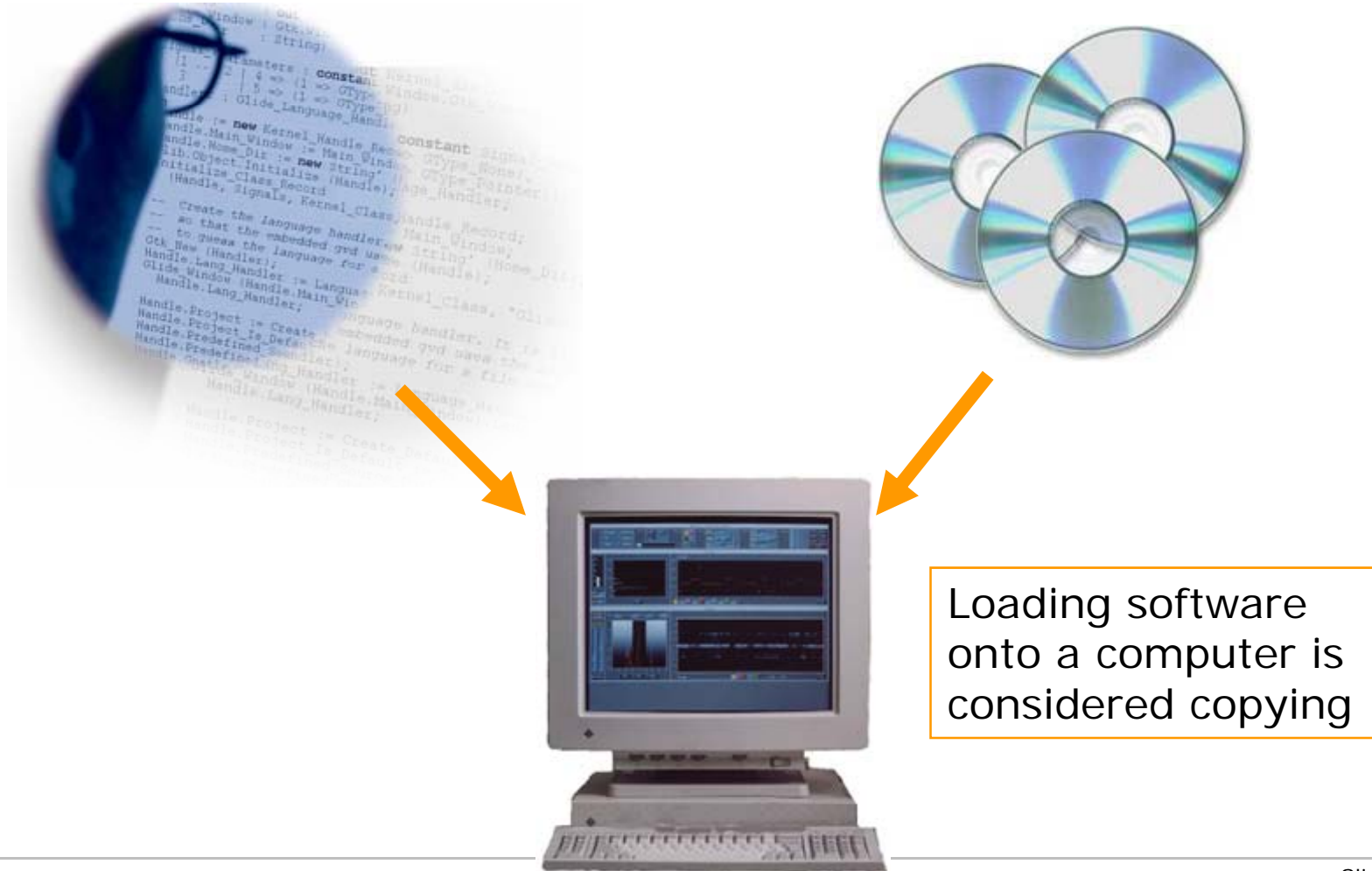
Exclusive legal right of copyright holder to

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



Software and Copyright

Both source and object code can be copyrighted



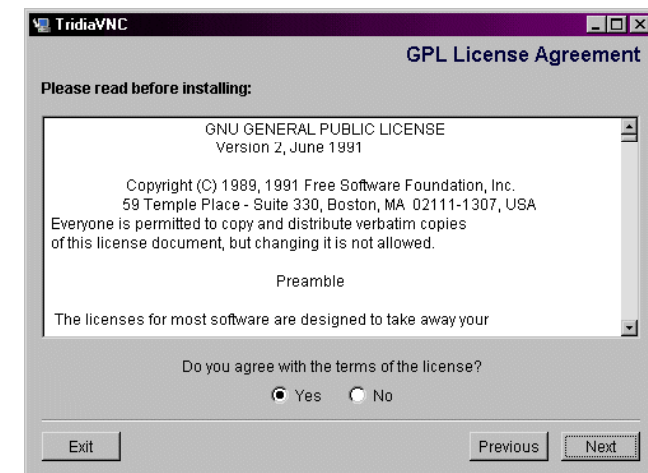
Copyright & Licensing

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

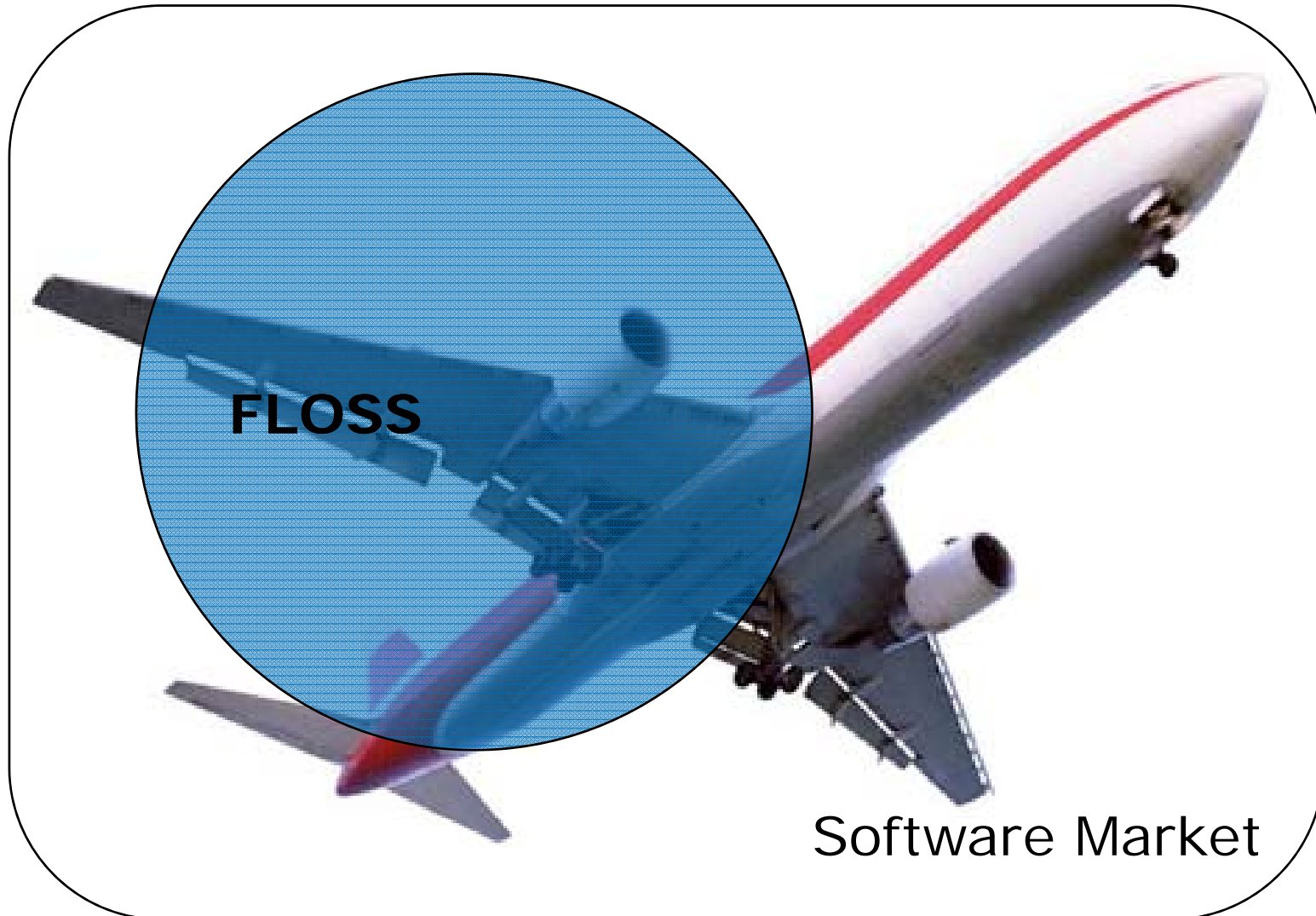




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FLOSS
Freely Licensed Open Source Software



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

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

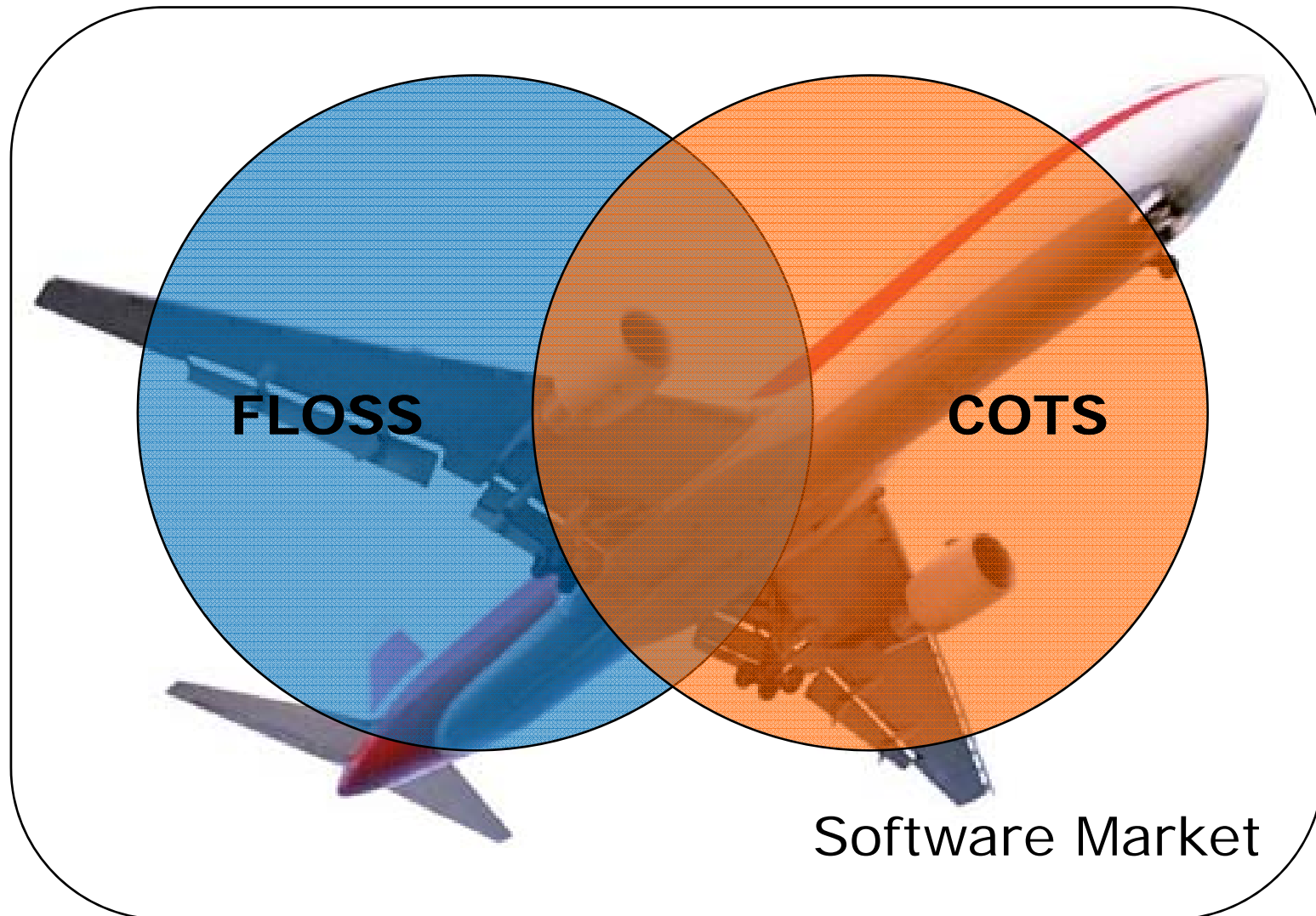
- **Today most OSS licenses are also FS licenses**
- **Conversely all FS licenses are OSS**
- **Common set of licenses is referred to as FLOSS**

The logo for AdaCore, featuring the word "AdaCore" in a blue, sans-serif font. The "A" and "C" are larger and more prominent. Below it, the tagline "The GNAT Pro Company" is written in a smaller, blue, sans-serif font.

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The title "COTS, FLOSS, and Licensing" is centered on the right side of the slide. It is written in a white, sans-serif font and is underlined with a thin white horizontal line. The background of the slide is a blue-tinted image of a printed circuit board (PCB) with various electronic components.

COTS, FLOSS, and Licensing



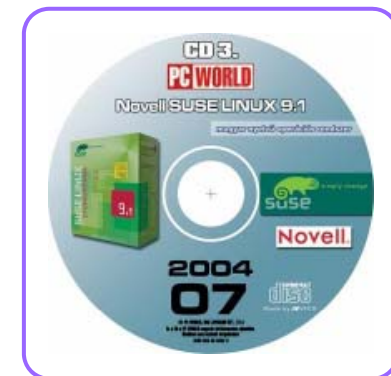
Two Types of COTS

- **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

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)

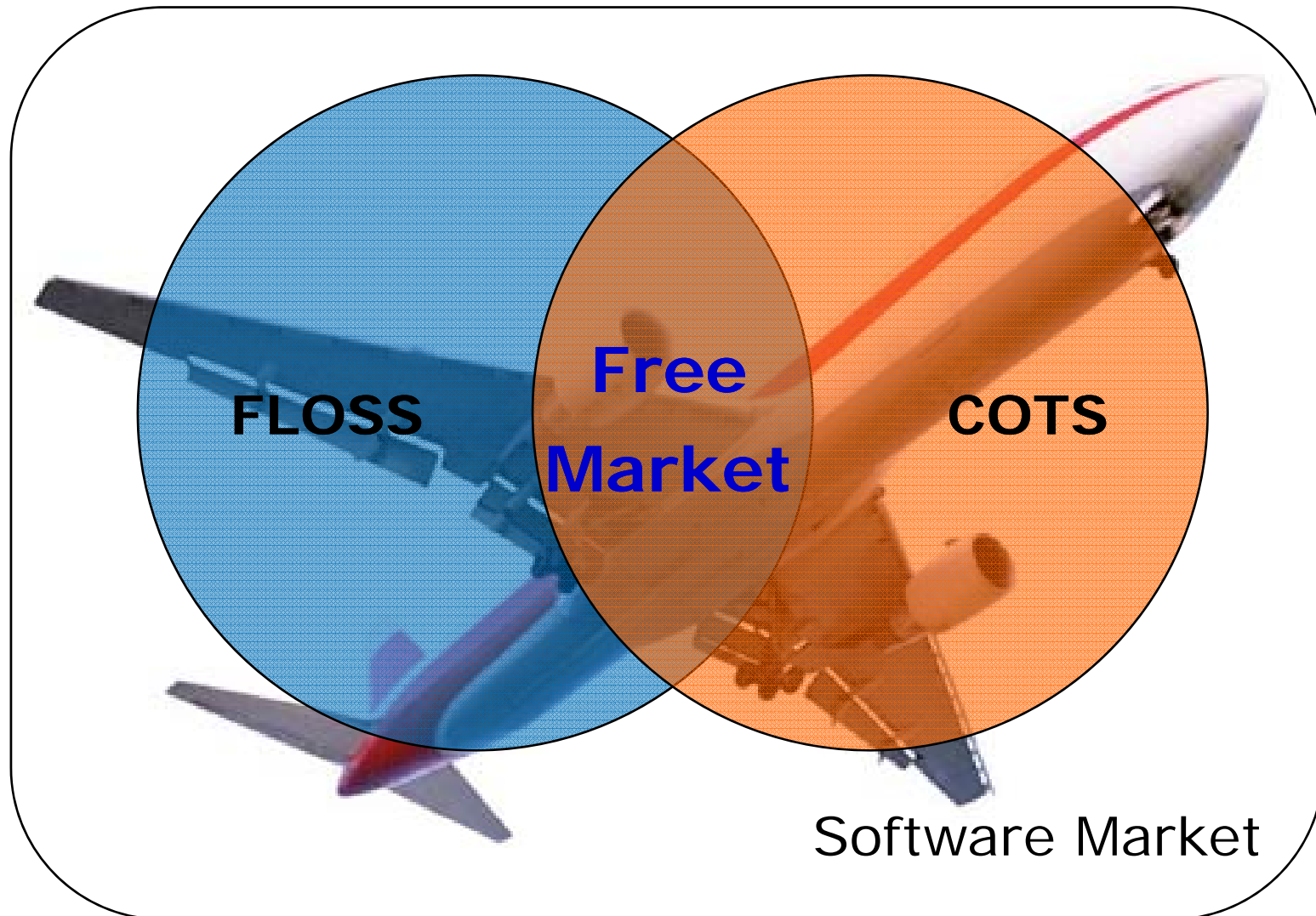
- **Copyright CAN be used to establish:**
- **Monopoly for**
 - COTS Software customization
 - COTS Changes
 - COTS Evolution
- **Monopoly for support**
- **Monopoly for certification material**

Duration of the Monopoly

- **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 😊

The image features a background of a blue-tinted circuit board with various components and traces. On the left side, there is a white vertical bar containing the AdaCore logo and tagline. The word "AdaCore" is in a large, bold, blue font, and "The GNAT Pro Company" is in a smaller, blue font below it. The word "Conclusion" is written in white on the blue background, underlined.

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Conclusion

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

- **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

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

Lobby with your RL-COTS Vendors

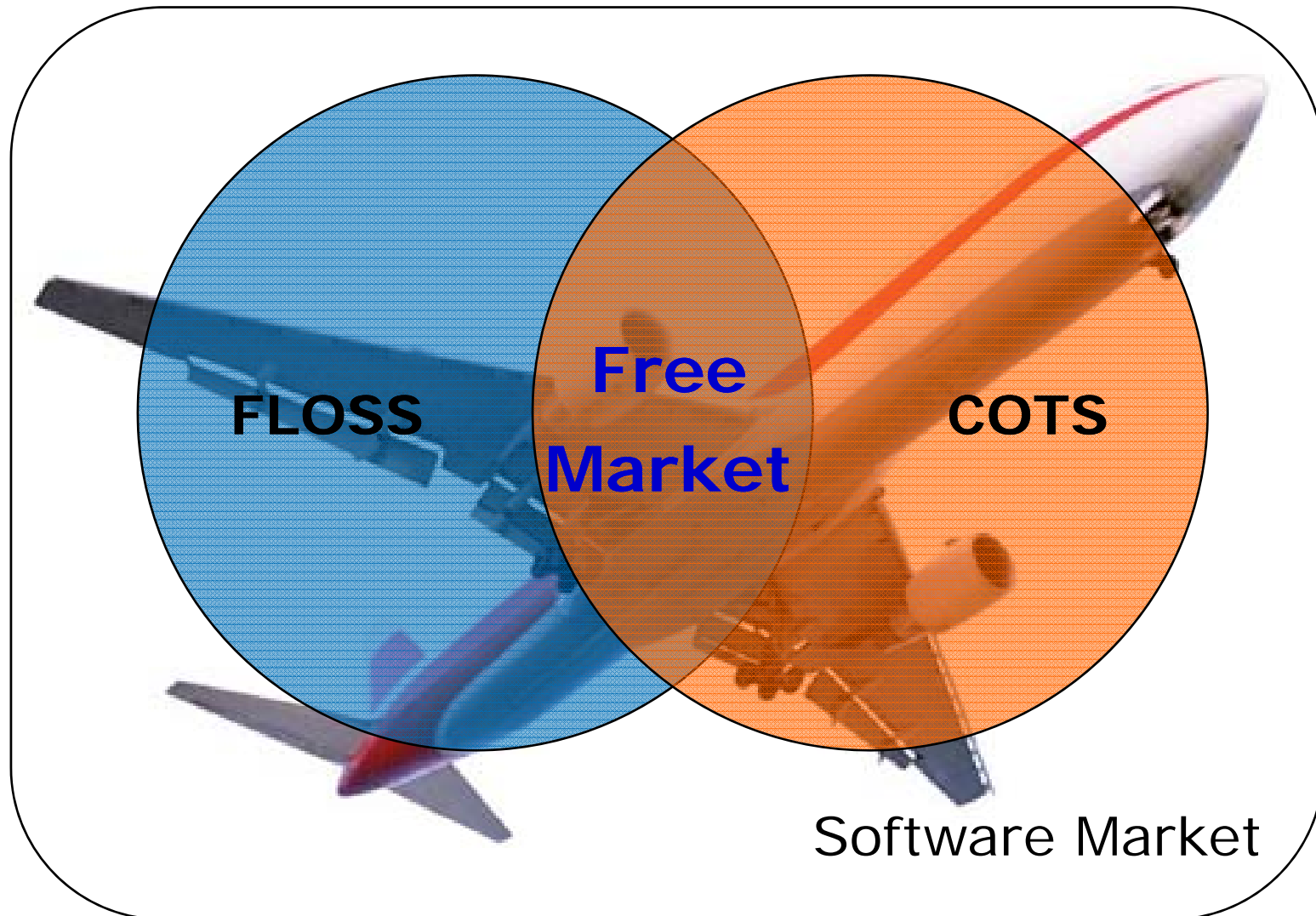
YOU can lobby with your COTS vendors so that

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 Software Patents
	FL-COTS	RL-COTS	
Switch COTS	YES	YES	NO
Keep the COTS Switch vendor	YES	NO	NO

FL-COTS and Market Freedom

	FL-COTS	RL-COTS
Switch COTS	YES	YES
Use other party for support	YES	NO
Use other party for changes	YES	NO
Use other party for certification material	YES	NO

Quality Guarantees of RL-COTS & FL-COTS

- **NONE**
 - Unless evidence, such as certification material, is produced to the contrary
- **RL-COTS: May not even have access to sources**
- **FL-COTS: Even with access to sources/build procedures**
 - No license requires:
 - Distribution of design documents
 - Development plans
 - QA procedures
 - Test suites
 - Other software development artifacts
- **Nothing prevents FL-COTS from achieving high-quality**
 - and being used in safety-critical systems

An Example from the GNAT Pro Compiler

- **Several test suites are run every day:**
- **The ACATS**
 - Conformance test suite formerly used to prove compliance to Ada ISO standard
 - Formerly know as ACVC
 - ~ 4000 tests
- **The Internal test suite**
 - Test cases coming from public, OEM, and customer interaction
 - More than 10.000 tests and 12 millions line of code !

GNAT Pro Compiler Nightly Test Reports

TN Manager Wavefront Manager (TODO) **GAIA** Download Stats CRM

GAIA

Query a daily overview

Date (YY-MM-DD):

Query a TN overview

System:

Runtime:

TN:

Query a platform overview

Platform overview

Overview of builds of runtime **3.17w** on machine **rome**.

Date	Crashes	Diffs	0003-G01	0003-G02	5723-F02	D315-
04-03-31	0	4 (+0,-1)	diff	diff	diff	dif:
04-03-30	0	5 (+1,-2)	diff	diff	diff	dif:
04-03-29	0	6 (+7,-1199)	diff (*)	diff (*)	diff (*)	diff (:
04-03-11	1	13 (+14,-2)	diff	diff		
04-03-10	0	2 (+1,-1)				

- All reports archived for traceability
- Used to qualify pre-releases

More on GNAT Pro & Quality

GNAT Pro High-Integrity Edition

- Comes with an Ada runtime being certified to DO-178B Level A
- Used on 767 Tanker
- Used on C-130 AMP
- Used on A380
- Used on A400M
- Used on the Boeing 787
- Used on BOOM
- Used on METEOR
- ...