**Air transport needs GNSS**

Many modern commercial aircraft are now equipped with GNSS units that feed location information into flight-management systems, a primary means of navigation, during all phases of flight except the approach phase. Since March 2003, the European EGNOS/GPS system is also enabling approach and landing operations in conditions of reduced visibility thereby increasing safety and helping to avoid delays and cancellations.

**A critical moment for road transport**

On any given day in any number of European cities, road-based delivery services shuttle documents, parcels and even life-saving equipment and supplies between offices, emergency facilities and homes.

F or the past three months, Danny Lebech has delivered medical supplies to local clinics in Brussels. Recently returned from Iraq, in France, Danny is a competent driver but still needs help navigating the winding streets of the European capital.

Today, Danny is on an important mission; an emergency clinic has received a man suffering from a pulmonary shock due to a lung injury. The on-duty physician has discovered to his great surprise that the supply of anaphylaxis is exhausted. If the patient does not receive treatment soon he could die. The doctor considers calling an ambulance but knows the supply service Danny works for is not far away.

Danny drives the medicine, types the clinic’s address into his GPS device and gets under way. About halfway there, the unexpected happens – the GPS readout says ‘no signal’.

"I can’t explain it," Bill tells the cop. "We’re going to have to land soon, but with the reduced visibility due to all this smoke and without suitable weather I won’t even risk it."

Bill will have to abort the mission just hope those people on the ground can get out in time.

**G N S S  a n d  a v i a t i o n**

Helicopters play a key role in today’s rapid-response services, undertaking emergency transport and delivery operations in life or death situations. They are also crucial tools in the field of aerial firefighting.

T hroughout the summer months in the Catalan Pyrenees, fires have been spreading. Firefighters have so far managed to keep them under control, but homes and businesses are now under threat.

Oscar Salazar is a decorated pilot when he missions in the first Gulf War. Today, he operates a private helicopter service, transporting important passengers and equipment, working on construction projects, search and rescue operations, and firefighting missions.

Helicopters are especially useful in fighting wildfires in areas like the Pyrenean mountains, where terrain can make it difficult for ground-based crews to respond quickly. Pilots must rely on satellite navigation technologies to locate fires and, crucially, to land at small airports and other sites for servicing, loading and unloading.

Today Bill is flying a large cargo-hauling helicopter in a bid to extinguish an area of burning scrub that is threatening a nearby village. An evacuation is evacuated, the untold disaster. The GPS signal disappears.

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Bill will have to abort the mission just hope those people on the ground can get out in time.

**W h y  w e  n e e d  G a l i l e o**

The stories presented in this brochure are fictitious.

Any resemblance to real events or persons is purely coincidental.

Front cover image: © René Mansi

**G N S S  f o r  p r e c i s i o n  a g r i c u l t u r e**

With the advent of satellite-based positioning systems, Europe has seen a revolution in the way farmers plant, map, sample, scout, measure and monitor crops.

Combined with satellite and aerial imagery, satellite positioning is now the basis for a new wave of agricultural technology.

M arcel Imbert runs a 150-hectare farm north of Paris. 75 hectares of which he sows with wheat alone, growing on a farm itself and rice well into his 6th decade in the agriculture business, Marcel has seen a realistic targets when the principles of precision agriculture are applied. But without satellite navigation aids, farmers can miss out on some 30%.

This year, Imbert has hit a major obstacle. The GPS signal he depends on has been suspended. When they work, GPS-based tractors can automatically steer farm equipment, so operators do not have to hold a straight line manually. They can work longer while paying closer attention to crop conditions, their machines, and ground obstacles.

With the suspension of GPS, Imbert’s combine harvester drivers have been forced to return to manual steering, an inefficient way to cover the vast area of farm.

Now, examining his books, Imbert finds profits are down.

**How secure is your security?**

From the beginning, the American GPS system has been aimed at providing a key strategic advantage to US and allied military troops on the battlefield. Today, the free GPS signal is also used around the world by security forces such as the police.

S trey Hansen is a retired military officer from Malini now representing a large producer of security systems. Today, he’s speaking to a group of people at an important trade show. Behind him, a slide is set up, a ‘GPS for Security’ slide. His audience includes a number of civilians, police officers and soldiers and one person who looks like a journalist.

"The STRIDE, as we like to call it in the field, is the handheld GPS receiver for domestic security. Based on a handheld-sized electronic device, he continues, ‘This little baby has all the hardware you will ever need to locate, mobilise and coordinate your security team, wherever they may be.’

Someone in the audience calls out ‘What if GPS gets cut off?’

Hansen hesitates, does not look at the person asking the question, then continues: ‘Most European governments have placed restrictions on the sale and use of the little baby, due to concerns about its use in certain applications. Very robust, very difficult to gang.’

What if the little baby can’t get GPS?”

"The little baby – “Harmon” stops short before finishing the word. “This device is absolutely, absolutely NOT capable of providing any applications, support, navigation, or tracking to any number of military or law enforcement agencies.”

"What if the little baby can’t get GPS?”

\[Image 600x379 to 634x434\]

**G N S S  f o r  r o a d  t r a n s p o r t**

Car navigation is currently the main GNSS application, with the average price per device falling from over €600 to under €150.

In 2009, more than 30% of all road vehicles had GNSS receivers, and 80% will have them within ten years. Of course, many drivers still rely on street maps or simply know where they are going, and many of them will assume they would not be affected if satellite navigation signals were cut off, but other drivers would be, and that would have an impact on everyone.

**S e l l i n g  G N S S - b a s e d  s e c u r i t y  a n d  d e f e n c e**

GPS-based technologies have become increasingly prevalent tools for law enforcement, and security professionals in solving crime and keeping citizens safe.

But there’s no more reliable than the GPS signal itself. Today, a more robust and security-encrypted version of the GPS signal exists but it can’t be used to keep the US military and its allies.

**Why do we need a European global satellite navigation programme?**

A lot of people would lie to know why we are investing public money in the European satellite navigation programme Galileo, when we already have the Global Positioning System (GPS).

The most recently available figures show that in 2009, 67% of the EU’s road vehicles were equipped with some sort of satellite navigation device. Most EU citizens have some experience with such applications, especially in the car, but no one knows for sure how many people rely on satellite navigation signals for much further applications, such as road transport or public safety, and touch areas of the economy we don’t even know exist.

The examples given in this brochure are part of the reason why believe that Europe must have an independent satellite navigation infrastructure: to guarantee the provision of services that have become so central to our economy and society, ensuring competitive advantage and ensuring our quality of life, health and safety depend.

**G N S S  n o w  p r o m i n e n t  i n  a g r i c u l t u r e**

Within the last five years, the GNSS market in agriculture has grown from 42 021 000 GNSS units shipped annually.

While high-technology devices, such as Real Time Kinematic (RTK) systems or commercial satellite augmentation services, will cost users about €12 000 to €18 000, European farmers set specific goals for wheat production, for example, as well as for the entire agricultural business sector.

**G N S S  r e p l a c e s  3 I M E S  b y  R E D I N T E G R A T I O N**

Many modern commercial aircraft are now equipped with GNSS units that feed location information into flight-management systems, a primary means of navigation, during all phases of flight except the approach phase.

Since March 2003, the European EGNOS/GPS system is also enabling approach and landing operations in conditions of reduced visibility, thereby increasing safety and helping to avoid delays and cancellations.

\[Image 1133x-1 to 1418x333\]

\[Image 1417x425 to 1702x624\]
GNSS for finance

Every day, banks and other institutions are called upon to resolve disagreements over the value of financial transactions. When is what order a transaction has taken place among thousands or millions of others can be critical factors in such disputes and, in the financial world, GPS is now the principle means of exact time determination.

Barbara is a single mother of two young children, living and working in Embank, in the London borough of Tower Hamlets. Today, she is not very happy with her bank, Barclays. She receives a call from the bank, to inform her that her credit card is about to expire. She connects her bank card to the bank’s automated teller machine (ATM) and requests to withdraw a few pounds. The machine indicates that the transaction has been carried out successfully but the card does not come out.

Somewhat annoyed, Barbara walks on a few blocks to find her bank, but the ATM is not working. She notes down the bank’s name and location and heads to the bank. She explains her case to the bank’s customer service representative. After a few minutes, she gets her card back but the ATM is still not working.

Confidence or vulnerability?

Acute synchronisation devices for power networks have long been available, but they are expensive. GPS timing signals make it possible to maintain accurate timing at low cost. While doubt that an attack is possible, one can say what would happen if the GPS signal were to be lost.

Power to the cities

Systems that monitor and control electrical power networks require precise timing, especially where network reliability is important. GPS is now widely used to provide this crucial time reference in many European cities, ensuring synchronisation even across great distances.

Eugene Boron manages a jewellery shop in downtown Budapest, on Károly Korút in Budapest. With his grandfather, he owns the Friendly Cab company, which serves the capital city of Hungary. Eugene has been running the business for over 20 years. When he first started working, he used to have to keep track of his drivers by radio, all of them at the same time. Today, Eugene says he can manage the work of dispatching about a hundred times easier.

Time is most definitely money

Millions of terminals at financial institutions around the world, from banks to mortgage lenders to insurance companies, are linked together in a network of transactions, including even the smallest withdrawals by people going about their daily business. How much of this depends on GPS? In 2006, the banking and financial industry accounted for about 5% of EU GDP. Of this, 8% was related to financial transactions that require precise time stamping, representing a total value of about €6 billion annually.

Keeping transport fleets up and running

GNSS-based technologies have revolutionised the way transport companies track, trace and direct numbers of vehicles, allowing for more efficient and streamlined services. But total reliance on GPS could be a double-edged sword.

The ship’s captain. “GPS failure,” Janez responds. Checking his read-out, he continues, “This is unusual; there is simply no signal!”

Maritime navigation – with satellites for stars

For thousands of years, man navigated the seas using only the stars and the sun or by staying within sight of land. Nowadays, satellite navigation technologies guide seagoing vessels, large and small, through even the darkest of passages.

Sea vessels out on a limb?

Specialised products are now available for both the maritime industry and recreational navigation, but GPS has a lesser-known and perhaps even more important function in the world of telecommunications.

GNSS and telecomms – no digital without timing

In digital telecommunications, precise and stable synchronisation of transmitted signals is sine qua non. Atomic clocks could do the job—they are extremely accurate—but they are also extremely expensive. Meanwhile, the equally accurate time signal generated by GNSS satellites is free of charge.

Not slowing down

In 2008, the number of vehicles equipped with fleet management and vehicle-tracking systems was 6 million in North America and roughly 5 million in the EU. A recent market report by industry analyst RNCOS forecasts total sales of GPS-based telematics and fleet-management devices to grow three-fold from €7 billion in 2010 to €21 billion in 2016. In addition to vehicles, freight carriers are increasingly being equipped with GNSS-enabled devices.