

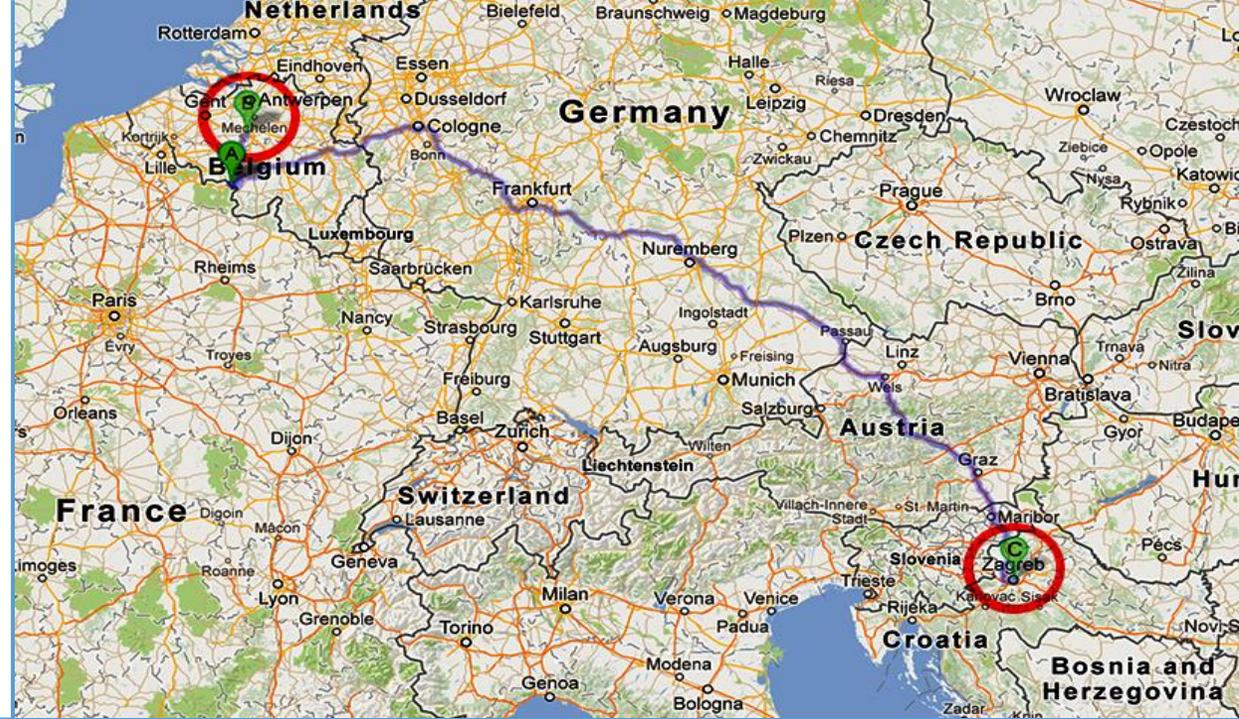


# Identification and Distinction of GNSS Civil Liability

China National Administration of GNSS and Applications  
Institute of Space Law and Strategy, Beihang University  
ICG-13, Xi'an

# 1. Woman Drives for 900 Miles Instead of 90 Thanks to GPS Error

@ GIZMODO



# 2. Woman Follows GPS, Drives Car Into Canada's Georgian Bay

@ abc News



# 1 Japanese Tourists Follow GPS Directions, Wind Up in Bay



Photo: via Imgur

It can be nerve-racking to drive a car in unfamiliar territory, but in March of 2012, a group of Tokyo students in Australia deserved every bit of that traditional tourist anxiety and embarrassment - and then some. When they ignored common sense to [follow the counter-intuitive instructions on their GPS](#), they wound up smack in the middle of Moreton Bay. The tourists were trying to navigate between two islands along a channel route when they got stuck in the water. Fortunately, it was low tide.

What happened? Student Yuzu Noda said the GPS "...told us we could drive down there. It kept saying it would navigate us to a road. We got stuck... There's lots of mud."

Blasted machines, always making innocent geniuses do things they don't want to do! Taking this shortcut definitely a costly mistake: The tourists wound up forking over about \$1,500 in extra charges to the car rental company, as outlined in their contract as part of an Idiot Tax.

# 3 Woman Sues Google Maps After Getting Hit By a Car



Video: YouTube

What do you remember from Kindergarten, other than the delicious salty-sweet flavor of paste? Here's one lesson that's stuck with me: Look both ways before you cross the street.

Unfortunately, Lauren Rosenberg must have missed class that day. In January of 2009, the California resident consulted Google Maps to find the best walking route to her destination in Park City, UT. When it directed her onto a busy four-lane highway, she confidently strode off the curb and [straight into oncoming traffic](#). D'oh!

Not surprisingly, Rosenberg suffered injuries and was hospitalized. More than a year later, she filed a more than \$100,000 lawsuit against Google Maps (and the driver who hit her), claiming Google's "reckless and negligent providing of unsafe directions" caused her to suffer "severe permanent physical, emotional, and mental injuries." Come again? She tried to blame a computer for her mental disorder, implying that without it, she would have been too smart to wander onto a busy highway.

FYI: A court ultimately ruled against Rosenberg, ruling that the disclaimer / warning was clear enough.

# 2 Woman Follows GPS, Drives Straight Into Swamp

We all know that moment of panic that comes when we miss a turn in a place we don't know too well. In those instances, you only have two options: Figure it out yourself, or rely on the GPS.

In June 2011, three women driving a rented Mercedes SUV near Seattle made the absolute wrong decision. When their trusty little robot rerouted them down a large boat launch, these Mensa candidates simply shrugged and hit the gas. They cruised all the way [into the Mercer Slough](#), where the car became submerged in murky water.

The women were okay -- they all managed to get out -- and Mercer Island divers were called in to recover the Mercedes. Quoth one of the rescuers on scene: "I don't know why they wouldn't question driving into a puddle that doesn't seem to end..."

That makes two of us.



WNNfans.com / twitter: @abcWNN

# 4 New Jersey Driver Follows GPS, Causes Four-Car Pileup

Ever driven in the state of New Jersey? If so, you're probably familiar with this rule: Don't make a left turn. Just do not do it. For some reason, New Jersey has a lot of "jughandles" -- ramps that force drivers to first turn right before, ultimately, turning left. Consider yourself warned.

Unfortunately, a 17-year-old Marlboro Township driver [screwed up](#) big time in May of 2010, when, while following his GPS, he made an illegal left turn on Route 33. That decision led to a four-car pileup (and several tickets for the teen driver, who had a provisional license). The driver's excuse? His GPS "told him to turn left." When asked what he would do if his GPS told him to jump off a bridge, the teen asked, "How high?"



Photo: via Reddit

5

## UK Woman Follows GPS, Drives Mercedes Into River



Photo: via Twitter

What's the deal with people driving expensive cars into enormous bodies of water? This is why we can't have nice things.

In March 2007, a 28-year-old woman following her in-car satellite navigation system ignored a number of warning signs telling her not to drive down a certain road toward a rain-swollen river, drove directly toward said rain-swollen river anyway, and [drove her Mercedes SL500 right in](#) to that rain-swollen river. Swollen with heavy rain, the raging River Sence in Leicestershire, UK, carried her car several hundred feet downstream.

Luckily, the driver was rescued by someone who witnessed the accident -- but it took crews a week to get the submerged Mercedes (estimated at £96k) out of the water.

7

## Trucker Follows GPS Directions, Winds Up in Tree



Photo: via Wikimedia

It can be hard to multitask. Usually, when you're listening to the voice on your GPS, you're also driving a motor vehicle. And what, you're expected to read signs, too? Nice try, words. You'd have to wake up pretty early in the morning to fool me.

In July of 2007, a German driver listened to his GPS and drove a cargo truck at the same time, but he drew the line on responsibility right there. While barreling through the Lucerne area of Switzerland, the driver daydreamed right past [several "No Entry" signs](#). In broad daylight, he drove down a busy pedestrian walkway and plowed straight into a cherry tree.

The truck, naturally, was wedged into the tree. When the truck driver tried to back out, he wound up taking out several lamp posts and causing even more tree destruction.

6

## Bus Driver Follows GPS, Gets Wedged Under Bridge



Photo: via Reddit

This one is kind of scary. Did you ever see / read *The Sweet Hereafter*? If not, and you have kids who take the bus, or if you regularly take the bus yourself, or if you live somewhere where the roads are slick and snowy, maybe skip it (and be careful, for chrissake). Otherwise, check it out when you are in the mood for a major bumper.

In April of 2008, a bus driver responsible for a high school girls softball team ignored the basic laws of math, his bus driver training, and all common sense when he [plowed the bus](#) into - and under - a bridge in the Washington Park Arboretum.

The bus was 12 feet high. The very old pedestrian foot bridge was 9 feet high, and flashing lights and yellow signs posted on its path said as much. But the GPS on the bus said go! go this way, it's safe; ignore that little demon on your shoulder; I would never steer you wrong; everything will be fine, just fine. So the driver went

The roof of the bus was sheared off, and several students were treated for minor injuries. In a statement, the president of the charter bus defended the driver and blamed the GPS: "We just thought it would be a safe route, because why else would they have a selection for a bus?"

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## UK Motorists Follow GPS, Get Stuck on Narrow Roads



In the tiny villages and towns around Winchester, UK, motorists have long had problems with GPS navigation. They follow the route their devices suggest and repeatedly wind up stuck -- the roads are simply too narrow for some wider vehicles.

The problem got so bad in the town of Exton that a bright yellow [sign was erected](#) to warn drivers NOT to follow their GPS and to, instead, rely on common sense. These are the times we live in, folks.

Who shall be liable and responsible for those damage?

GNSS Service Providers?

or

Any others?

**1.** Definition of GNSS Civil Liability

**2.** Elements of GNSS Civil Liability

**3.** Distinction of GNSS Civil Liability

**4.** Roadmaps for GNSS Civil Liability

## **GNSS Criminal Liability**

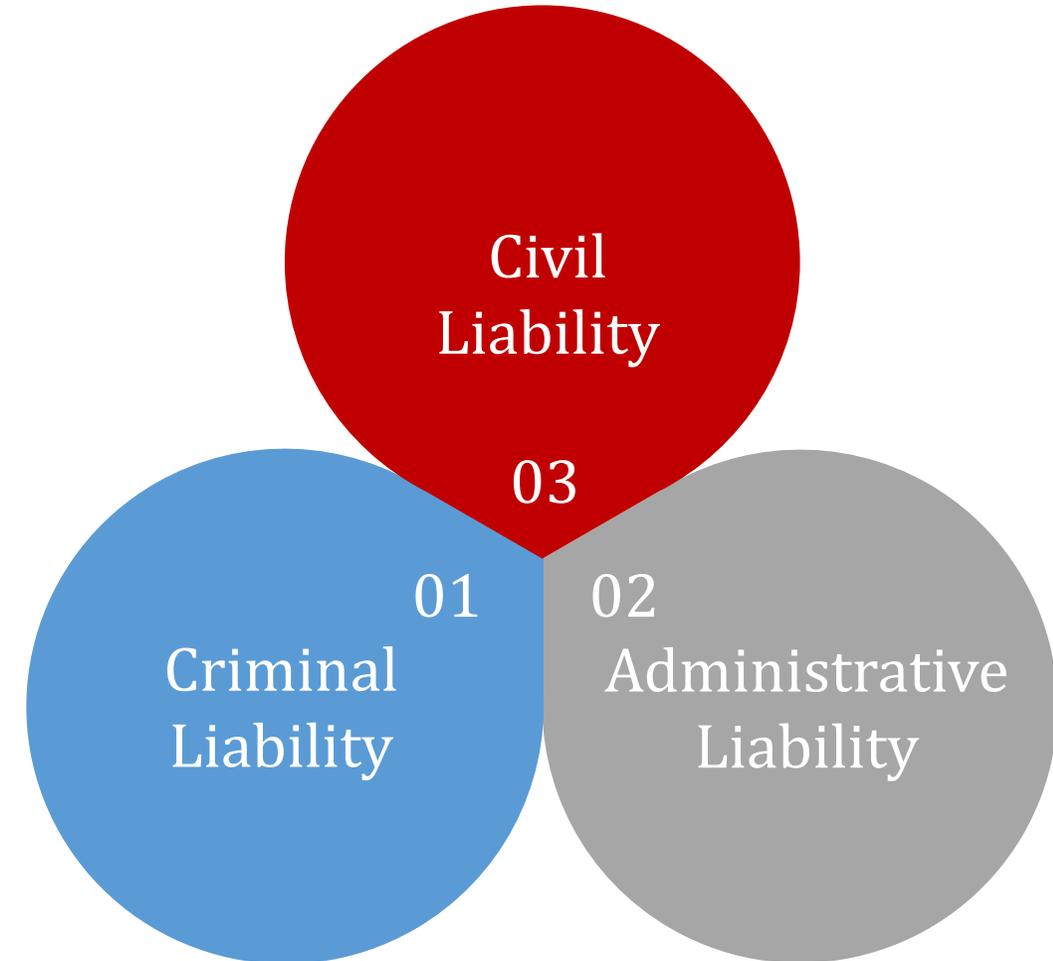
- criminal penalty due to huge loss of lives and properties
- regulators, providers, third parties

## **GNSS Administrative Liability**

- administrative sanctions due to maladministration
- regulators

## **GNSS Civil Liability**

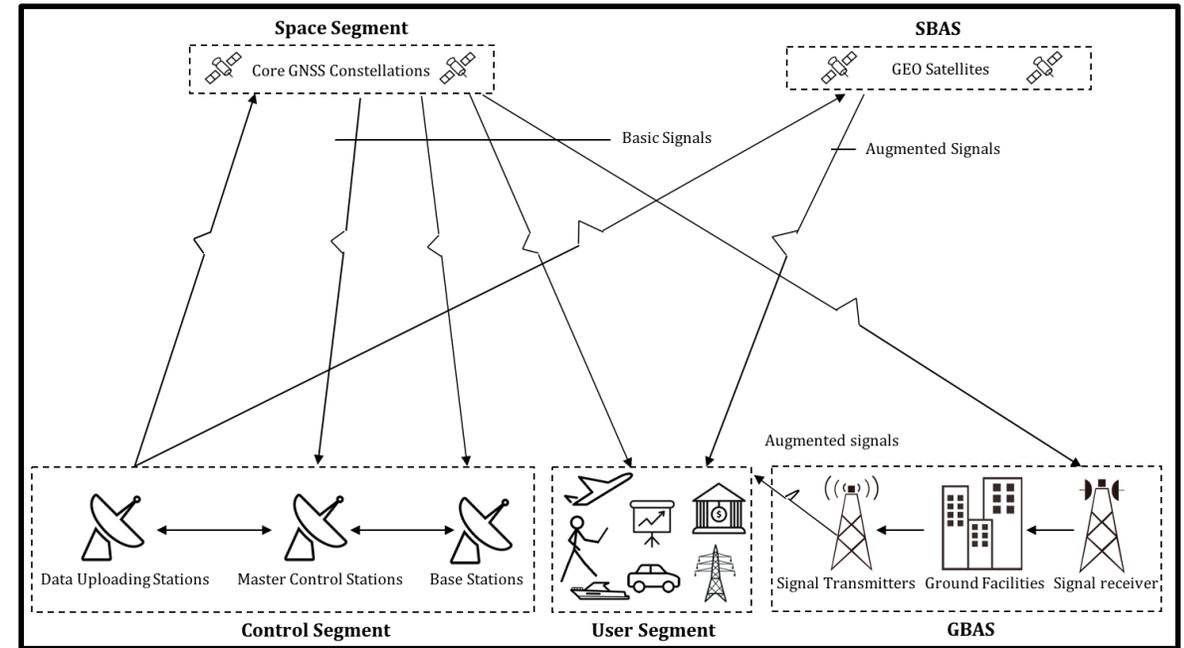
- monetary compensation for damage
- service providers



## GNSS Civil Liability

### Civil Liability for Damage caused by GNSS

- the obligation to
- make monetary reparation
- for any damage caused by
- the deflection or loss of PNT signals
- provided by
  - (1) core GNSSs;
  - (2) augmentation systems;
  - (3) regional systems
- But excluding:
  - (1) GNSS value-added services;
  - (2) malfunctioning of the user equipment
  - (3) Map service provider



<b>Contractual Liability</b>	<b>Non-Contractual Liability</b>
	≈ Tort Liability
	Third Party Liability and/or Product Liability and/or other kinds of Tort Liability

1. Definition of GNSS Civil Liability

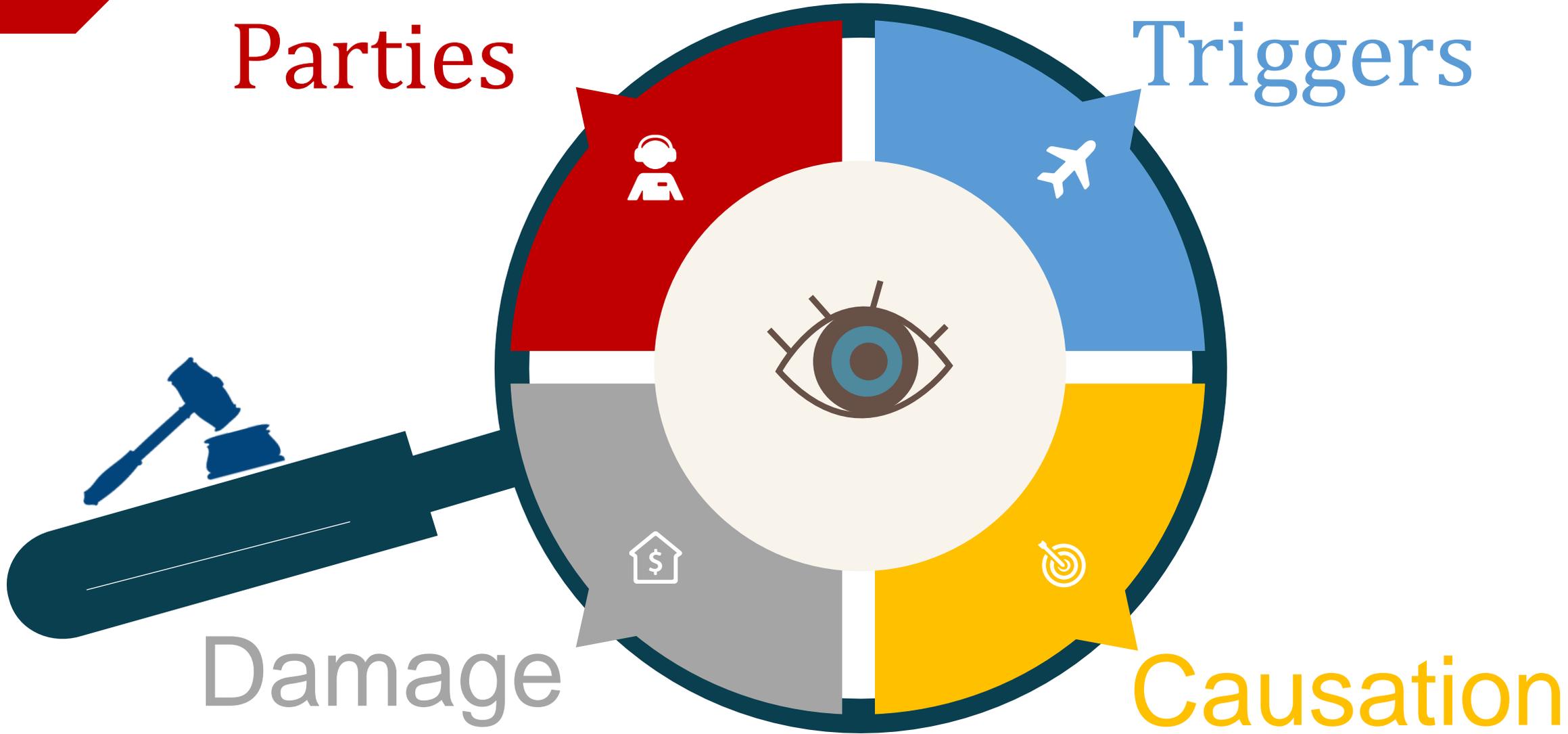
2. Elements of GNSS Civil Liability

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Parties

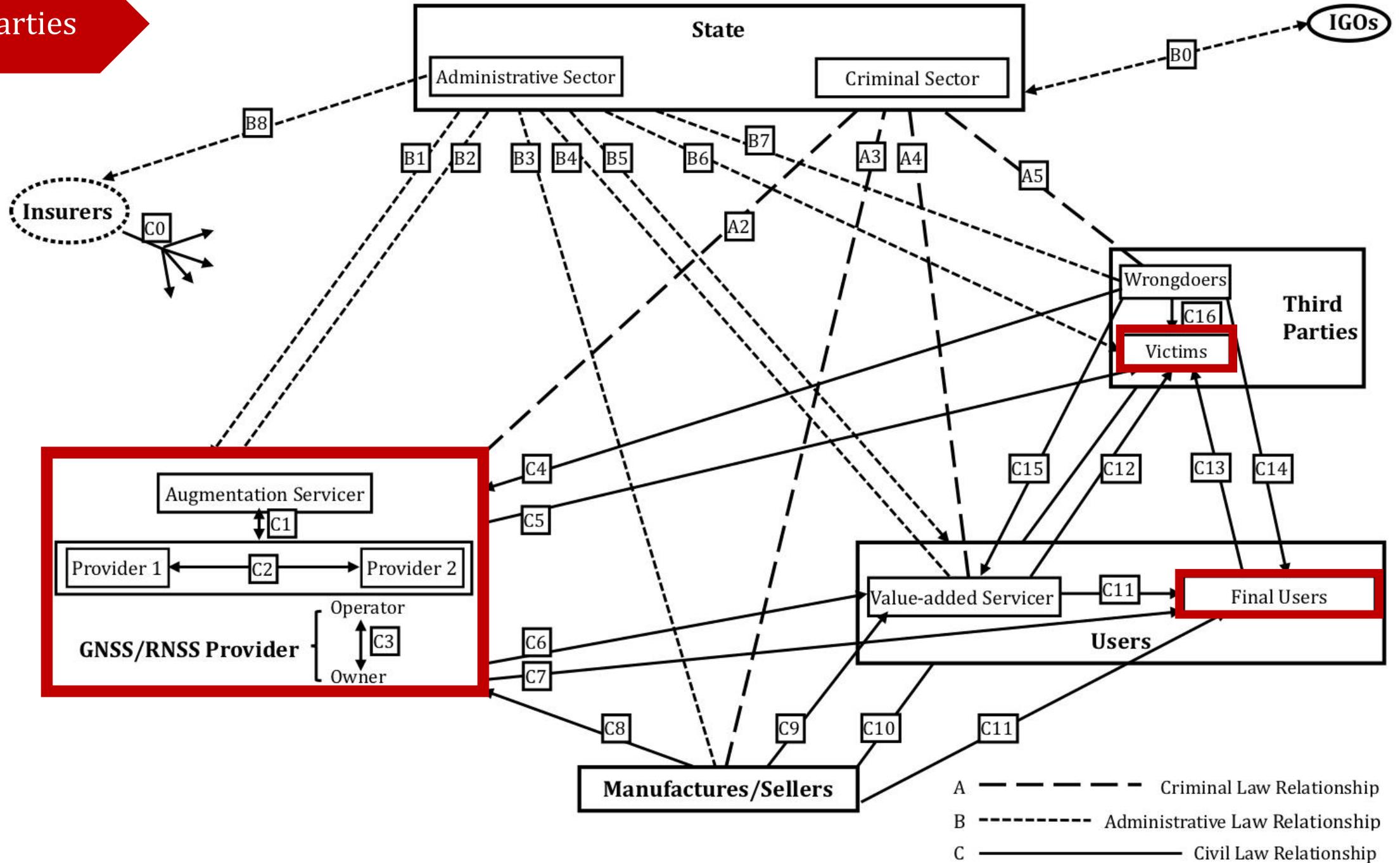
Triggers



Damage

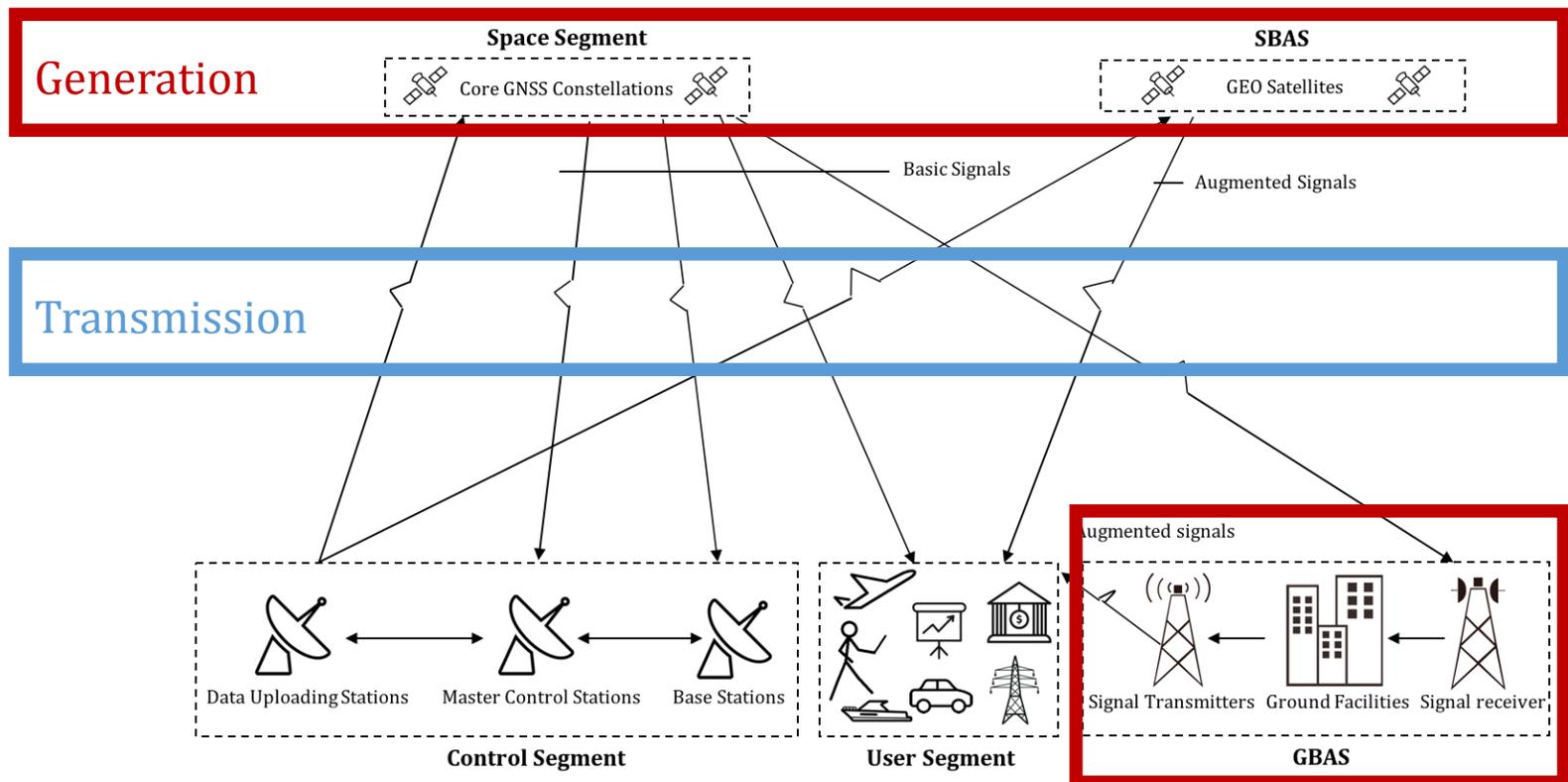
Causation

# Parties

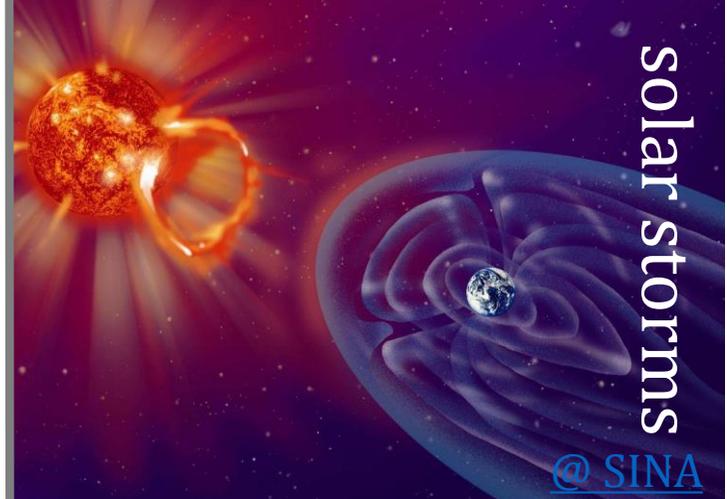


# The **defection** or **loss** of GNSS signals

Where any harm to another person is caused by a force majeure, the tortfeasor shall not be liable, except as otherwise provided for by law.



Act of God



# Damage



@ Pangtree

mental damage?



@ Paixin

loss of property



@ Photo photo

body damages



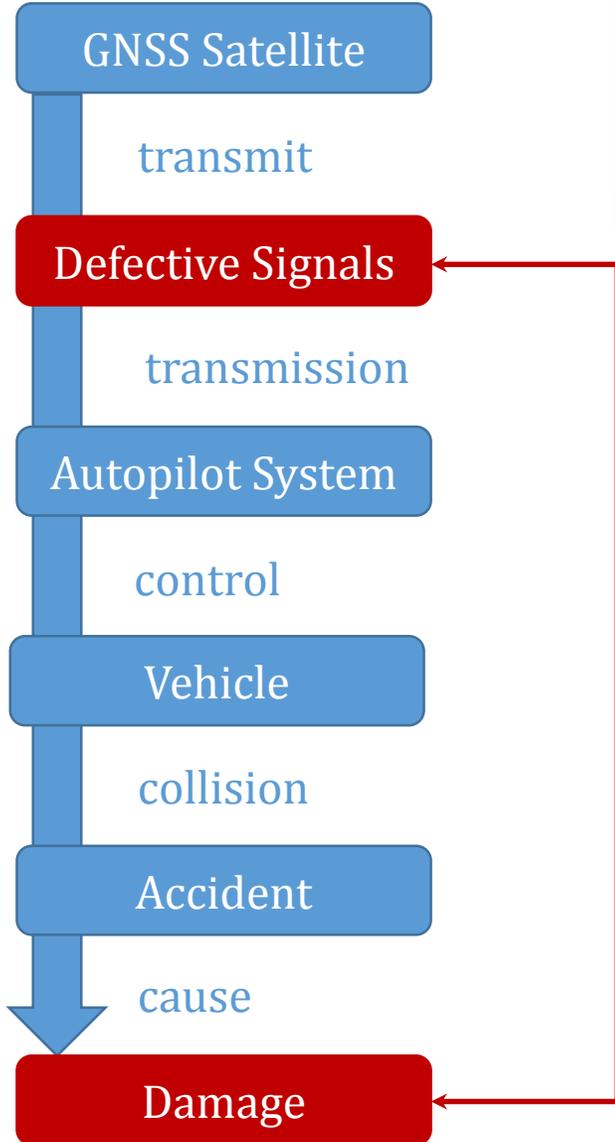
@ Mala

loss of lives



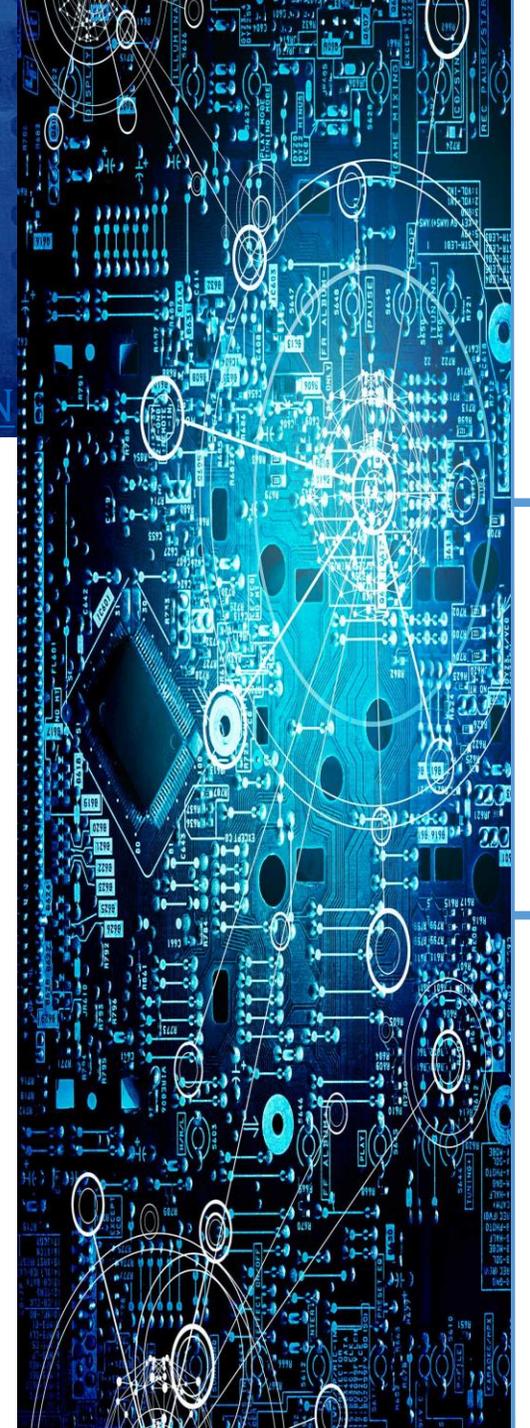
机场跑道

# Causation



## Difficult but **not Impossible**

- Technical Log
- Legal Measures
  - **Reverse** the Burden of Proof
  - **Expert** Witness



Damage

Caused by

GNSS

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# Terminals

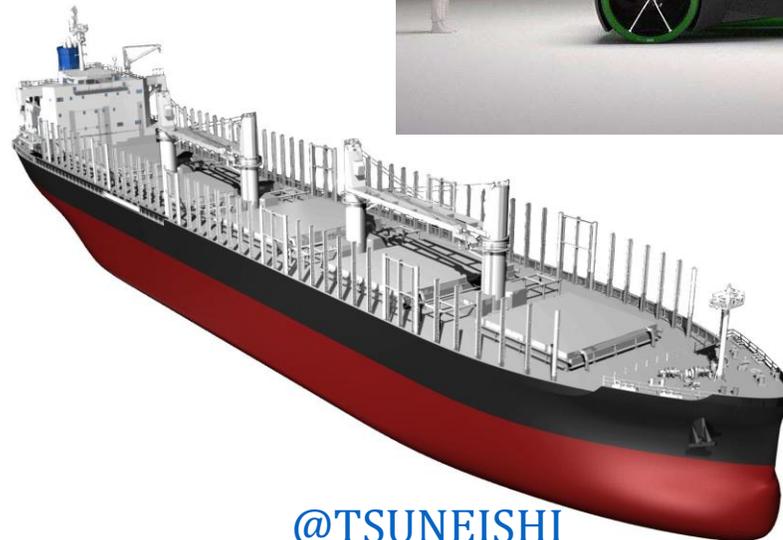
## GNSS Civil Liability

- service provider
- signal loss or defection
- service liability

VS

## Civil Liability of Receivers

- manufacturer & seller
- product defection
- product liability



ATC

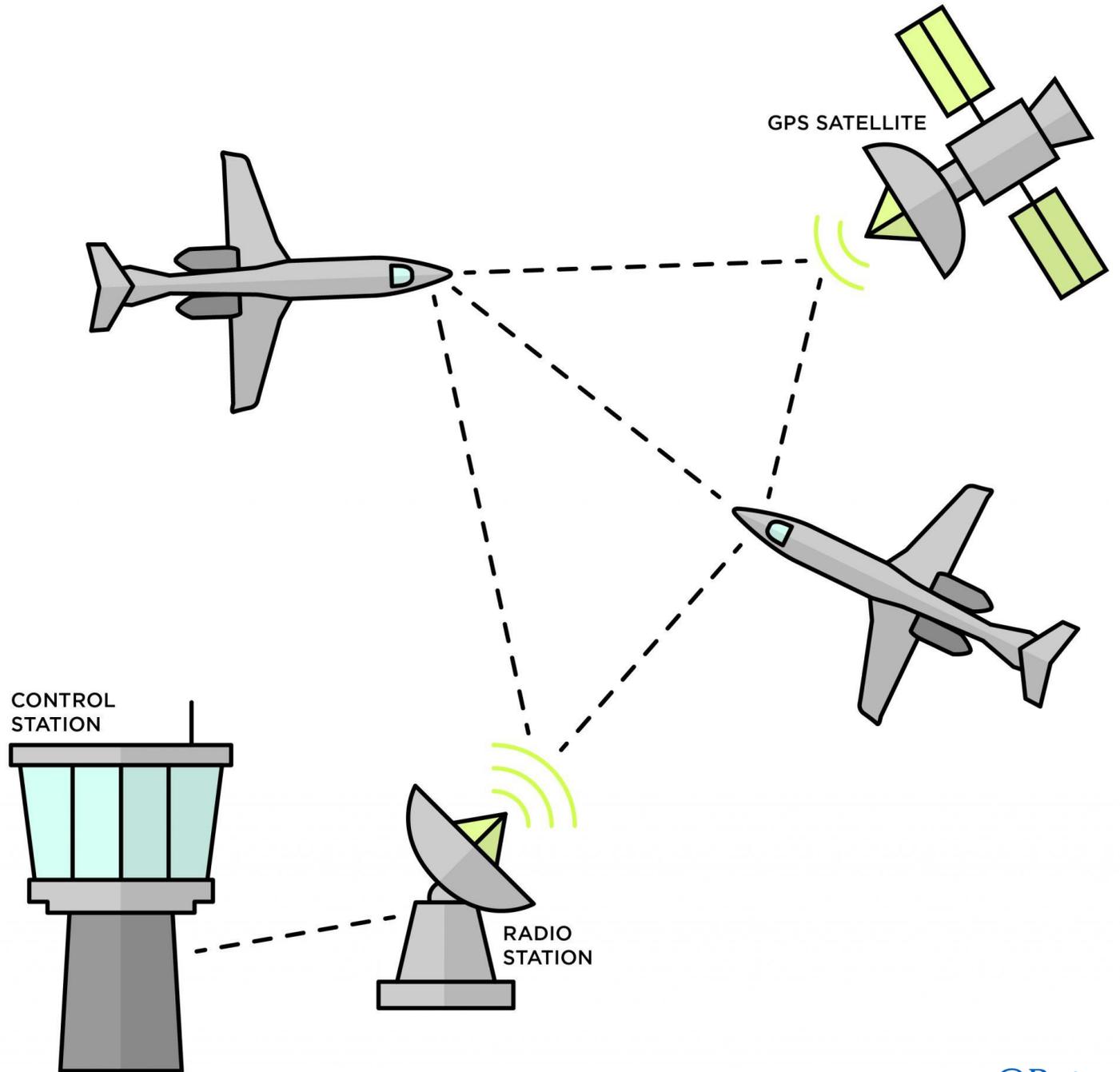
**GNSS Civil Liability**

- service provider
- signal loss or defection

VS

**ATC Civil Liability**

- ATC agency
- ATC command



# Map

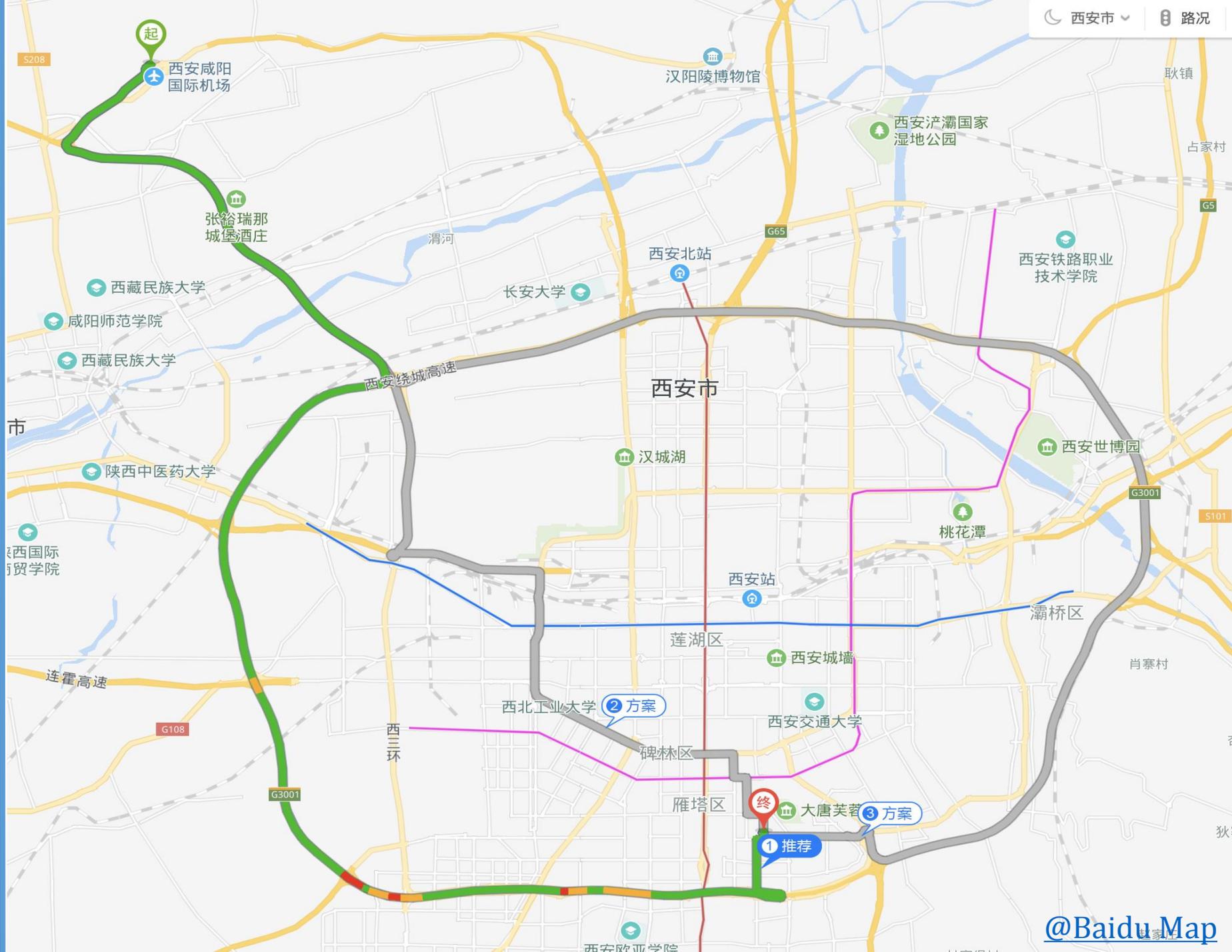
## GNSS Civil Liability

- service provider
- signal loss or defection

VS

## Civil Liability of Map Provider

- map service provider
- map data



### **GNSS Civil Liability**

- service provider
- signal loss or defection

### **Civil Liability of Third Parties**

#### **Civil Liability of Jammer Users**

- device user
- illegal behavior

#### **Civil Liability of Spoofing Device Users**

- device user
- illegal behavior

#### **Civil Liability of Hacker**

- hacker
- illegal behavior

### **Strict Liability**

A GNSS provider has to take the burden of civil liability, no matter the loss or defection of GNSS was caused by the fault of this provider or any others.

### **Fault-based Liability**

A GNSS provider is only liable for the case where the loss or defection of GNSS was caused by the fault of this provider.

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4. Roadmaps for GNSS Civil Liability



### The technical, institutional and legal evolution of CNS/ATM systems under the ICAO Regime

Year	Events
1983	The ICAO Council established the FANS Committee.
1988	<ol style="list-style-type: none"> <li>1. The FANS Committee developed the concept of CNS/ATM systems.</li> <li>2. The ICAO Legal Committee started to work on the legal aspects of CNS/ATM systems, with a focus on GNSS.</li> <li>3. The priority of legal aspects of CNS/ATM systems became Item 4.</li> </ol>
1989	The FANS Phase II was established.
1991	<ol style="list-style-type: none"> <li>1. The concept of CNS/ATM systems gained universal approval at the 10<sup>th</sup> Air Navigation Conference.</li> <li>2. The 10<sup>th</sup> Air Navigation Conference requested the initiation of an agreement between the ICAO and GNSS-provider States concerning quality and duration of GNSS.</li> </ol>
1992	<ol style="list-style-type: none"> <li>1. The concept of CNS/ATM systems was endorsed at the 29<sup>th</sup> Session of the ICAO Assembly.</li> <li>2. The priority of legal aspects of CNS/ATM systems moved to Item 5 and further to Item 1.</li> <li>3. The 28<sup>th</sup> Session of the ICAO Legal Committee made preliminary conclusions on no inconsistency between the Chicago Convention and the implementation of the concept of CNS/ATM systems.</li> </ol>
1993	The ICAO Air Navigation Commission established the Global Navigation Satellite System Panel (GNSSP, subsequently renamed NSP) to amend certain ICAO SARPs.

1994	<ol style="list-style-type: none"> <li>1. The ICAO Council released the 'Statement of Policy on CNS/ATM Systems implementation and operation' for the implementation of CNS/ATM systems including GNSS.</li> <li>2. The 29<sup>th</sup> Session of the ICAO Legal Committee:               <ol style="list-style-type: none"> <li>(1) prepared the Draft Agreement Between the International Civil Aviation Organization (ICAO) and GNSS Signal Provider Regarding the Provision of Signals for GNSS Services;</li> <li>(2) recommended establishing the LTEP, using a two-stage approach, namely, identifying a suitable solution for the immediate future, and a legal framework for the long-term future.</li> </ol> </li> <li>3. The US government and ICAO exchanged letters on the use of GPS in civil aviation.</li> </ol>
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1995	<ol style="list-style-type: none"> <li>1. The 31<sup>st</sup> ICAO Assembly adopted Resolution A31-7 which requests the Council to establish the LTEP.</li> <li>2. The LTEP was established by the ICAO Council.</li> </ol>
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1996	The Russian Federation and ICAO exchanged letters on the use of GLONASS in civil aviation.
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1998	<ol style="list-style-type: none"> <li>1. The first edition of the Global Air Navigation Plan for CNS/ATM Systems was released;</li> <li>2. The World-wide CNS/ATM Systems Implementation Conference ((Rio de Janeiro) gave recommendations to legal action for CNS/ATM systems.</li> <li>3. The 32<sup>nd</sup> ICAO Assembly:               <ol style="list-style-type: none"> <li>(1) adopted Resolution A32-19 'Charter on the Rights and Obligations of States Relating to GNSS Service', which was followed by a number of Recommendations offered by the LTEP on those subjects which need to be further studied before a consensus was reached;</li> <li>(2) adopted Resolution A32-20 'Development and elaboration of an appropriate long-term legal framework to govern the implementation of GNSS', which instructed the ICAO Council to establish a Secretariat Study Group on Legal Aspects of CNS/ATM Systems.</li> </ol> </li> <li>4. The ICAO Council established the Secretariat Study Group 'Development and Elaboration of an appropriate</li> </ol>
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	long- term legal framework to govern the implementation of GNSS'.
2001	The first package of SARPs was introduced in Volume I (Radio Navigation Aids) of Annex 10 (Aeronautical Telecommunications) to the Chicago Convention.
2002	The second edition of the Global Air Navigation Plan for CNS/ATM Systems was released.
2003	The 11 <sup>th</sup> Air Navigation Conference recommended a worldwide transition to CNS/ATM systems.
2004	The Secretariat Study Group submitted its report, and the Group received approval on its accomplishing its mission at the 35 <sup>th</sup> ICAO Assembly.
2005	<ol style="list-style-type: none"> <li>1. The priority of legal aspects of CNS/ATM systems moved to Item3.</li> <li>2. The first edition of the GNSS Manual was released.</li> </ol>
2007	<ol style="list-style-type: none"> <li>1. The third edition of the Global Air Navigation Plan was released.</li> <li>2. The US government and ICAO updated their exchanges of letters on the use of GPS in civil aviation.</li> </ol>
2012	The 12 <sup>th</sup> Air Navigation Conference addressed issues of use of multiple constellations and GNSS vulnerabilities.
2013	<ol style="list-style-type: none"> <li>1. The fourth edition of the Global Air Navigation Plan was released.</li> <li>2. The second edition of the GNSS Manual was released.</li> <li>3. The priority of legal aspects of CNS/ATM systems moved to Item 3.</li> </ol>
2014	The priority of legal aspects of CNS/ATM systems moved to Item 5.
2015	The priority of legal aspects of CNS/ATM systems moved to Item 4.

2016	The fifth edition of the Global Air Navigation Plan was released.
2017	The third edition of the GNSS Manual was released.
2018	The 13 <sup>th</sup> Air Navigation Conference will pave the way forward to a more cost-efficient manner on the use of GNSS in civil aviation.



INTERNATIONAL INSTITUTE FOR THE UNIFICATION OF PRIVATE LAW  
INSTITUT INTERNATIONAL POUR L'UNIFICATION DU DROIT PRIVE

**STUDY LXXIX - THIRD PARTY LIABILITY FOR GLOBAL NAVIGATION SATELLITE SYSTEM (GNSS) SERVICES (2010 - )**

Print | Email

UNIDROIT 2010 - Study LXXIX - Preliminary Study

Informal Consultation Meeting on "Third party liability for Global Navigation Satellite System (GNSS) services". Rome, 22 October 2010. An instrument on third party liability for Global Navigation Satellite System (GNSS) services: a preliminary study (prepared by the UNIDROIT Secretariat) - March 2010

- The Proposal
- Objections raised against the project
- The Initial Research conducted by the UNIDROIT Secretariat
- Possible Approaches
- Meetings

**The Proposal**

In 2005, the Governing Council of UNIDROIT was seized of a proposal to examine the possibility of preparing an international instrument for liability resulting from GNSS malfunctioning. In the years that followed, the proposal was explained in more detail. The positions for and against were illustrated respectively by Professor Sergio Carbone<sup>1</sup> and Dr Hans-Georg Bollweg,<sup>2</sup> both members of the UNIDROIT Governing Council. The UNIDROIT Secretariat subsequently prepared a background document which illustrated the situation as regards the different services available and the work that had already been done by other organisations such as the ICAO.<sup>3</sup> In essence, according to the proposal

- a legal regime is needed to balance the economic sustainability required by operators and the adequate compensation that victims of accidents might be entitled to;
- the proposed instrument should cover all issues of liability, irrespective of the type of application. It should not be limited to aviation;
- the present regime is inadequate because:
  - the 1972 Convention on International Liability for Damage Caused by Space Objects treats only physical damage;
  - the 1944 Chicago Convention on International Civil Aviation: Article 28 relates only to navigation and not to all other areas in which satellites are utilised;
  - the relevant rules are inadequate as regards the question of sovereign immunity in the context of the provision of GNSS services by States or State-owned entities; and
  - the studies conducted by ICAO have shown that the problem of liability exists and that the solutions given by domestic law are both conflicting and insufficient.

A specific legal regime might include the following:  
 (a) certification of providers of GNSS Services as "qualified providers";  
 (b) channelling of liability to qualified providers;  
 (c) strict liability for damage resulting from failure or malfunction of GNSS services, subject to a



**POLICY ASPECTS OF THIRD PARTY LIABILITY IN SATELLITE NAVIGATION**

PREPARING A ROADMAP FOR EUROPE

Report 19, July 2009

edited by  
**Alfredo ROMA,**  
**Kai-Uwe SCHROGL** and  
**Matxalen SÁNCHEZ ARANZAMENDI, ESPI**

**Civil Liability for Damage caused by Global Navigation Satellite System**

GNSS Civil Liability

A Doctoral Thesis submitted to the International Institute of Air and Space Law

Dejian Kong  
 Leiden University

The Liability of Global Navigation Satellite System (GNSS) used for Air Navigation in Brazil

Juliana Macedo Scavuzzi dos Santos

Institute of Air and Space Law  
 Faculty of Law, McGill University, Montreal

2013

A thesis submitted to McGill University in partial fulfillment of the requirement of the degree of Master of Laws (LL.M.)

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GNSS & THE LAW

STATE OF PLAY IN THE EUROPEAN UNION  
**Liability for GNSS Signals and Services**

INGO BAUMANN  
 IFO LEGAL, GERMANY

Safety critical systems are rarely wholly reliant on GNSS, but related services that are otherwise independent may have GNSS as a common point of failure. Should users of GNSS or third parties be able to claim compensation for damage suffered from reliance on malfunctioning GNSS systems? This question is a subject of international discussion, particularly for the European Union's Galileo, the only GNSS under civil control with a commercial service subject to usage fees and based on contractual relations through the service chain.

ing a crucial role in 14 of the 16 industries that are classified as part of the critical and high infrastructure. Both the US and the European Union (EU) may consider designating the systems themselves as critical infrastructure.

GNSS has become a convenient and ubiquitous that users tend to treat as services as a given. However, these highly complex systems are vulnerable to malfunctions in space weather, jamming, spoofing, and the deployment, maintenance, and protection of GNSS requires significant public resources.

Delays in deployment or modernisation, launch failures, or individual satellite failures may decrease the availability and performance of GNSS signals and services. In the great majority of cases, the degradation or loss of GNSS signals and services will cause only individual or local inconvenience, but the possibility exists for wider failures with more serious consequences.

Although it is currently rare for safety critical systems to rely wholly on GNSS, related services that are otherwise independent may have GNSS as a common point of failure. The question thus arises whether users of GNSS or

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His recent research was published in the German Aerospace Journal (DLR) including as Head of the IFO Legal Policy Office and CEO of the IFO Legal Policy Office for the German Civil Aviation Authority.

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Luxemburger Juristische Studien – Luxembourg Legal Studies 12

Andreas Loukakis

**Non-Contractual Liabilities from Civilian Versions of GNSS**

Current Trends, Legal Challenges and Potential

Nomos

*for all GNSS providers!*

**Increase**

- legal certainty on the burden of compensation + insurance
- reputation of GNSS providers
- confidence and acceptance of GNSS users

**Decrease**

- misunderstanding of the public
- resistance to accept the implementation of GNSS
- unexpected cost of civil liability

Forward

# Lets Work Together!



GNSS provider is **merely** responsible and liable for :

- (1) ...
- (2) ...





THANKS!

谢谢