

Conclusions from the analysis of causes of significant accidents involving pleasure craft in the SOS database 2004 to 2013 of the Netherlands and the Near Misses reporting of the United Kingdom

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Preface

This study was done on the initiative of the partners in 'Numericanal' which is a project co-financed by the INTERREG IVB Programme of the European Regional Development Fund . Numericanal' strives to improve safety on the water by providing information. Unfortunately, accidents on the water involving pleasure craft occur each year, a number of them involving fatalities. Improved insight into the causes of accidents is essential in order to increase safety on the water.

By writing the outline of Safe Boating in the beginning of the project a questionnaire was send to the partners containing questions about the definition of a danger zone and definitions of danger on the waterways in general. Between the UK, France and the Netherlands are big differences.

France – VNF (Voies Navigables de France) in this matter – stated that collisions between professional barges and recreational never have occurred like in the Netherlands. This could be explained by the fact that the inland waterways in France are much more extensive and less busy than the waterways in the Netherlands. However collisions with floating waste (mostly plastic or wood) causes damage to the boats and ships. Also the UK (CRT – Canal and River Trust) indicated they never had any collisions between professional barges and recreational boats, however they reported the near misses. This had never been done in the Netherlands and France. The figures are included as an attachment.

A near miss is an unplanned event that did not result in injury , illness or damage – but had the potential to do so. Only a fortunate break in the chain of events prevented and injury, fatality or damage; in other words, a miss that was nonetheless very near. The phrase “Near Miss” should not be confused with the phrases “nearly a miss” or “they nearly missed” which would imply a collision. Synonymous phrases to “near miss” are “close call” or “nearly a collision”.

The type and cause of the near misses in the UK shows that dangers have to be put in a wider perspective and that keeping a record of these events can prevent future accidents.

In the Netherlands no study had ever been made to compare the collisions on the water. These collisions have been reported for 10 years in the SOS database of Rijkswaterstaat (ministry of Transport). Not all collisions were reported but the ones reported by the Police, waterway managers of the state (Rijkswaterstaat) were. WRN (Waterways Netherlands) compared the number of accidents, type of accident and possible cause. The study is included as attachment.

The study learned WRN that not only collisions between waterway users occur but also a lot of them happen, like the situation in France and the UK, by colliding with infrastructure and floating waste. Also a lot of accidents due to poor maintenance on yachts (e.g. gas explosions or engine failiure).

By discussion the definition of the 'danger' on the water with our partners of Numericanal we (WRN) came up with the idea to survey this existing database that had never been used for this purpose. We have learned the danger is more than safe routes and behaviour on the water and we have extended our own safety programme with the input of VNF and CRT.

We have all learned that near miss reporting can prevent future accidents as they are often preceded by warnings of near accidents. Because approximately a 100 near misses occur before an accident happens. The outputs of this are especially the apps (pogo VNF, pogo CRT and Safeguarder WRN) in which all dangers and near misses on the waterways can be reported. But also the Numericanal website has this opportunity (helpdesk). The outcomes will be exchanged yearly.

There is still much to be learned about the causes of accidents involving pleasure craft. We hope that this study is a valuable contribution to the larger picture.

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1 Reason for study

Since 2008 the information campaign 'Safe Boating' in the Netherlands has striven to further improve safety on the water by means of diverse information channels. The Numerical project has the same goal but to bring it to a wider perspective for the partner regions and the Netherlands and bring it to a higher level this study was conducted to make a comparison to the partner regions possible. See Annex 3 for a list of the partners involved in 'Numerical'.

In the Netherlands in 2013 there were 9 fatal accidents involving pleasure craft. These accidents, questions from the media, the attention given by the Ministry of Infrastructure and the Environment to safety as well as the goals of 'SAFE BOATING' prompted 'SAFE BOATING' to study the possible causes of accidents. No accidents happened in the UK and France (or were not officially registered).

The partners in 'Numerical' have expressed the wish to 'set a point on the horizon' with regard to increasing safety on the water. It appeared that the overview of and insight into the possible causes of accidents was not sufficient to enable well-supported suggestions about the measures that could contribute to increasing safety. This was a reason to further study the causes of accidents among pleasure craft.

2 The goal of the study

The goal of the study was:

- To get insight into the causes and consequences of serious and fatal accidents among pleasure craft and between pleasure craft and commercial vessels;
- To improve the basis of the (collective) communication about safety on the water provided to commercial vessels and pleasure craft;
- To improve the basis for answering questions about safety on the water asked by media and other parties;
- To advise on possibly refining the registrations in the SOS database.
- To identify what knowledge is lacking and to advise on improving the information and collecting information at and after accidents.

Using the results of the study, we examined whether and how the contents and use of the safe boating programme of Numerical information could be implemented to further increase safety on the water.

3 Analysis of SOS database

The national RWS database for shipping accidents (SOS database) was further analysed. The SOS database contains information about shipping accidents that have occurred in the area supervised by the Netherlands. More information on the SOS database can be found via:

<http://www.rws.nl/water/veiligheid/scheepsongevallenregistratie/>.

For the analysis, we used incidents registered in the SOS database that met the following criteria:

- Registered incidents involving only pleasure craft.
- Registered incidents involving pleasure craft and commercial vessels.
- Registered incidents on Dutch inland waterways.

- Registered incidents from 2004 to 2013.

- Significant shipping accidents. These are serious accidents (victims, obstructions lasting longer than an hour, serious damage to a waterway and/or boat).

A total of 445 significant incidents registered in the SOS database met these criteria. In 107 significant incidents pleasure craft and commercial vessels were involved. In 338 significant incidents only pleasure craft were involved. The design of the study is explained in Annex 1.

4 Most important results of the study

Learning from registered accidents in the SOS database NL and the near miss registration of the UK

- It was educational to validate and analyse the registered significant incidents in the SOS database together and compare these with the database of the near misses of Canal and River Trust. As a result, 'Numericanal' partners now have a shared view of the information that is and is not available with regard to the accidents. The study improved a number of aspects of the information on registered significant incidents in the SOS database; for example, incidents that did not meet the requested criteria were deleted and, on the basis of the qualitative descriptions, inconsistencies in the registrations were adjusted.

In the database of the UK the focus was on the Near misses as accidents do not occur.

- The SOS analysis showed that the suspected cause and effect of the accident was very often registered as 'unknown' in the 445 significant incidents analysed in the SOS database. Moreover, subjectivity possibly played a role in completing the registration form. The quality and thoroughness of the registration of significant incidents should be improved. In addition, no information was given about, for example, the captain (age, sailing diplomas/licenses, familiarity with the area, owner or renter of boat). This information is needed to gain more insight into the causes of accidents involving pleasure craft.

The registration system of the UK is more structured and less options are possible to use in the database. This makes it easier to compare. Also less incidents occur, fewer boats are on the waterways and fewer types of vessels (mostly narrow boats).

- SOS is a collective database that is intended to give a total overview of all shipping accidents that have been registered in the Netherlands. The sources of information for the SOS database are the registrations of shipping accidents by diverse parties such as nautical supervisors (RWS, harbour supervisors, the Coast Guard, some provinces) and the police and inspection services (including the KLPD [Corps of National Police Services] and IL&T [the Human Environment and Transport Inspectorate]). In addition, some information about accidents is taken from news releases in the national media. All of these services supply information to the SOS database but, in practice, not all of the relevant information from these parties is entered into the SOS database. This should be improved. Another point of attention is using registered information from lower government bodies and non-government bodies such as the KNRM [Royal Dutch Rescue Team] (this enters SOS partly via nautical supervisors) and insurance companies. For a study of the causes of accidents, the information from these various sources should be uniformly accessible.

In the Near miss database of the UK the incidents are – next to the reporting as mentioned above in the Netherlands – also reported by boaters.

Diagram 1 gives an overview of registered significant incidents, suspected cause and consequences of the SOS database in the Netherlands.

Schema 1: SOS database 2004-2014 Number of registered significant casualties in which recreational crafts were involved

				plausible cause	effects								
					total	injured	badly injured	deceased	boat damage	infrastructure damage	stagnation	environmental damage	
recreational boats/ commercial barges	107			operating error	59	3	4	3	56	2	3	2	
				local error	3	1							1
				device / material	9	1	1	1	8		1	1	
				unknown	36	6	6	6	30	3	2	2	
				total	107	11	11	10	94	5	6	6	
moored	44			operating error	2				2	1		1	
				local error	2	1			2				
				device / material	18	3	6	1	18		1	4	
				unknown	22				22	2		12	
				total	44	4	6	1	44	3	1	17	
recreational boats	338	singel	111	operating error	15	4	4	3	15				
				local error	4	2	6	1	4				
				device / material	41		1	1	40	3		2	
				unknown	51	7	6	3	49	1	2	6	
				total	111	13	17	8	108	4	2	8	
navigating	294		boat-boat	45	operating error	30	3	5	1	30	2		
				local error	1		3		1				
				device / material	6				6	1	1	1	
				unknown	8	2			8				
				total	45	5	8	1	45	3	1	1	
accident	183		boat-infrastructure	117	operating error	35	1	3	1	34	2	1	2
				local error	4				4	2			
				device / material	18				8	1	1	1	
				unknown	68	4	2		59	2	1	1	
				total	125	5	5	1	105	7	3	4	
boat-object	21			operating error	4	1	1	1	4				
				local error	13				13				
				device / material	1				1				
				unknown	3		1		3				
				total	21	1	2	1	21	0	0	0	

In the registration of incidents in the SOS database there are five separate categories of suspected causes:

- Operating error: Error by (the condition of) the crew or a crewmember of the boat.
- Error of surroundings: Error not caused by the crew or (the condition of) the boat, but by an external factor.
- Facilities/material: Error caused by the lack of (suitable) equipment/material/procedures, poorly operating or non-operating equipment/material or an incorrect construction.
- Communication error: Error cause by the communication between the crewmembers of one or more boats and/or between the crewmembers of boats and traffic supervisors on shore.
- Unknown: Suspected cause was not known at the time of registration.

Learning from incidents with pleasure craft NL

- In the ten-year period 2004 to 2013, 338 accidents were registered as significant incidents with pleasure craft in the SOS database (see diagram 1).
- Of the 338 significant incidents with pleasure craft registered in the SOS database in 2004 to 2013, many of them seem to be sailing, one-craft significant incidents (111), and many are traffic accidents between a boat and the infrastructure (117) (see diagram 1). In the cases of boat-infrastructure, many accidents involved the shore (stranding), bridges and groynes.
- Of the 338 significant incidents with pleasure craft registered in the SOS database in 2004 to 2013, 31 of them resulted in 61 slightly injured, 37 incidents resulted in 56 seriously injured and 12 incidents resulted in 14 fatalities (see Annex 2).
- Almost all of the registered incidents resulted in boat damage (334). Damage to the environment was especially registered for stationary significant incidents (8) (see diagram 1).
- The suspected causes of the 338 registered significant accidents with pleasure craft only are often operating errors (86), facilities/material errors (84) and unknown (144) (see diagram 1). The most common operating errors were errors of judgment (18), navigational errors (20) and irresponsible behaviour (17). Fire (23), engine trouble (18) and explosions (14) were the most frequently registered sorts of facilities/material errors (see Annex 2).

Learning from incidents between pleasure craft - commercial vessels

- In the ten-year period 2004 to 2013, 107 accidents were registered as significant incidents between pleasure craft---commercial vessels in the SOS database (see diagram 1).

- Of the 107 significant incidents between pleasure craft---commercial vessels registered in the SOS database in 2004 to 2013, 11 incidents resulted in 26 slightly injured, 11 incidents resulted in 18 seriously injured and 10 incidents resulted in 17 fatalities (see Annex 2).
- Operating errors (59) and unknown (36) are the most frequently given suspected causes of the registered significant incidents between pleasure craft---commercial vessels in the SOS database 2004 to 2013 (see diagram 1). Lack of attention (29) and errors of judgment (17) were the most frequently registered reasons for operating errors for the registered significant incidents between pleasure craft---commercial vessels.
- In 65 cases of the 107 registered incidents between pleasure craft---commercial vessels, the person suspected of having caused the accident was identified on the basis of the qualitative description of the accident. It appeared that both pleasure craft and commercial vessels were equally often the suspected cause of these registered significant incidents.

Diagram 2 gives an overview of registered significant incidents, suspected cause and consequences in the UK

Wasn't completely sure what information you needed so here is some basic information and attached is a spreadsheet containing the Near misses recorded since 01/04/2014.

We record Near misses in our SAP system using a notification call a ZQ. These notifications are used to collect several different types of occurrence, not just Near Miss. The near misses have been recorded since 01-04-2014.

By way of an outline these types breakdown by type:

Row Labels	Count of Notifictn type
Discouraged Behaviour	320
Environment	1584
Heritage	37
Loss or Injury	269
Near Miss	563
Port Marine Safety Code	49
Water	62
Grand Total	2884

Each type is also split into categories/causes, which breakdown like this:

Row Labels	Count of Notifictn type
Abandoned vehicles	9
Accidental damage property/asset/equip	27
Accidental damage to heritage asset	24
Air Pollution	1
Animal Carcass	27
Animal/Insect Incident	28
Begging/Vagrancy	19
BGA-Blue Green Algae	13
Boat sink/capsize/hangup	84
Body found	14
Collision	11
Disabled/driftng vessel	4
Drug related litter and sex waste	15
Electrical contact/discharge	16
Excessive Wash	2
Exposure to harmful substance	11
Failure of nav aid	4
Fall from height	70

Health

Row Labels	Count of Notifictn type
Fire/explosion incident	14
Fish kill	13
Fly Tipping	248
Grounding	7
Handling, lifting or carrying	26
Hazardous Boat	21
Hit by moving, falling object or vehicle	78
Hit something fixed or stationary	43
Impact with fixed structure	1
Injured by vegetation/plants	20
Injury from machinery/equipment	55
Invasive Plants - Aquatic	118
Invasive Plants - Terrestrial	827
Invasive/Pest - Animals	57
Land Pollution	30
Light Pollution	4
Lock Hang-up	1
Malicious Damage	55
Malicious damage to heritage asset	9
Misuse of infrastructure	75
Monitoring Non-Conformance	37
Noise nuisance	5
Occupational illness	4
Oil spill	13
Overtopping	62
Road traffic incident	42
Robbery/Mugging	2
Shipboard fire/explosion	1
Shopping Trolley	6
Sighted	1
Sinking	4
Slipped, tripped or fell on same level	235
Stranding	1
Structural or equipment failure	41
Substance/Alcohol Abuse	6
Theft/Burglary	18
Threatening/Aggressive Behaviour	41
Unauthorised access	43
Unauthorised swimming	3
Unauthorised vehicle on towpath	22
Unauthorised work to listed building	4
Verbal Abuse	10
Water Pollution	168
Weapons seen/used	2
Wildlife Incident	21
Youth nuisance	12
Grand Total	2885

Specifically the Near misses, of which there are 563 recorded, breakdown by category / cause like this:

Row Labels	Count of Notifictn type
Accidental damage property/asset/equip	17
Animal/Insect Incident	16
Boat sink/capsize/hangup	66
Electrical contact/discharge	15
Exposure to harmful substance	8
Fall from height	50
Fire/explosion incident	5
Handling, lifting or carrying	18
Hazardous Boat	21
Hit by moving, falling object or vehicle	53
Hit something fixed or stationary	21
Injured by vegetation/plants	13
Injury from machinery/equipment	29
Road traffic incident	31
Slipped, tripped or fell on same level	158
Structural or equipment failure	34
Threatening/Aggressive Behaviour	8
Grand Total	563

In the registration of near misses in the database is more detailed than the five separate categories of suspected causes. These causes are also included in the Dutch SOS database but less defined. A total of 563 Near misses have been registered.

Learning from incidents UK

Nothing is said about possible causes.

- However 41 (accidental damage, animal/insect incident and threatening/aggressive behaviour) are caused by external influences.
- 149 incidents related to (poor) maintenance (boat sink, electrical contact, fire/explosion incident, injury from machinery and structural equipment failure) happened.
- 51 incidents have happened due to poor handling of the boat (handling, hit by something fixed and injured by vegetation).
- The other accidents 313 are human errors.

5 Conclusions and consequences

Improving the registration of accidents

The registration of accidents involving pleasure craft should be improved:

- a) Improving the quality and thoroughness of the information in the SOS database. More structured like the UK database but due to the large number of incidents more extensive
- b) When accidents are registered, additional information about the captain should be included, such as age, sailing diplomas/licences, sailing experience, the knowledge of area and owner or renter of boat.
- c) Join databases/information about accidents to form one single database in order to analyse the causes of accidents involving pleasure craft.
- d) Start with registering the near misses and annually validate and analyse the significant incidents with Numerical partners and national stakeholders.

These improvements require the efforts of all of the parties in Numerical and from insurance companies and possibly other parties. Concretely speaking, this means that 'SAFE BOATING' partners will take the initiative to improve the quality, availability and accessibility of data about accidents. As owner and manager of the SOS database, RWS has formulated goals to improve the quality and clarity of the registration of incidents in the SOS database. Based in part on this study, they plan to see how missing information can be amended annually. It is desirable that information about incidents with fatal results is expanded when the police has finished its investigation.

Registered incidents with pleasure craft

The nature and suspected causes of the registered significant incidents with pleasure craft in 2004 to 2013 in both databases confirm the importance of good preparations for the trip, having technical equipment and material in order and being aware of safety on the water.

Waterways Netherlands has started with registering the near misses and other incidents on the waterways like Canal and River Trust.

Further study of the incidents with pleasure craft is desirable in the Netherlands as the incidents are much more severe than in the UK It needs to focus on:

- A) Causes and characteristics of fatal accidents;
- B) Involvement type of boat and characteristics of captain;
- C) Considering the number of significant incidents concerning boat – infrastructure, the further characteristics of these accidents.

To the extent that it is possible (given the number of unknowns), both categories A and C above could be further studied with the current SOS database, possibly supplemented with information from other sources. Further study of category B requires a more extensive registration.

Registered incidents between pleasure craft - commercial vessels

It is the goal of Numericanal to enhance safety where commercial vessels and pleasure craft meet on the water. The behaviour of the captain, of both the commercial vessels and the pleasure craft, is crucial to preventing accidents.

Numericanal encourages information that expands the importance of being aware, changes behaviour and provides mutual insight into the sailing behaviour of pleasure craft and inland navigation vessels. During the boating season, extra attention will focus on being aware of each other's presence on the waterways. Means that have proven effective (sailing on ships in places where pleasure craft and commercial vessels encounter each other) will be used more often to provide the opportunity to sail on commercial vessels. The Numericanal website gives bodies instruction on commercial inland navigation and on navigation by pleasure craft.

Further study is desirable in the cases of incidents between pleasure craft---commercial vessels that result in fatalities. The cause of most of the registered incidents between pleasure craft--- commercial vessels involving fatalities is registered as unknown. It is desirable to have more information about these accidents and their causes. The Numericanal project made it possible to set up a registration programme in the Netherlands and France too. In the future we need tot investigate these incidents further.