Creating New Accident Databases

・Developing SIP accident patterns
・In-depth accident case studies from D-Call Net®

Toru Kiuchi, Senior Researcher, Research Division

Preface

In 2017 the number of traffic accident fatalities came to 3,694. Even though this fell by 210 from the previous year, far too many precious lives are still being lost. ITARDA's traffic accident databases have been broadly divided up into macro database and micro database, both of which are put to their own respective effective uses. This paper will introduce SIP accident pattern analysis as a new form of macro database, as well as in-depth accident case studies from D-Call Net® as a new form of micro database.

1. Trends in the number of traffic accident fatalities

Trends in the number of traffic accident fatalities in Japan (1948 – 2017) and the government's targets (2020) are shown in Fig. 1. Two peaks can be confirmed within this figure. The peak of 16,765 fatalities that occurred in 1970, which was the year that saw the largest number of fatalities in the post-war period, came to be known as the "Traffic War I." The Traffic Safety Master Plan was formulated the following year in 1971, and by 1979 the number of fatalities had fallen to 8,466. Thereafter, the number surpassed the 10,000-person mark again in 1988, ultimately peaking at 11,452 fatalities in 1992 in what came to be known as the "Traffic War II." ITARDA was then established in March of that same year.

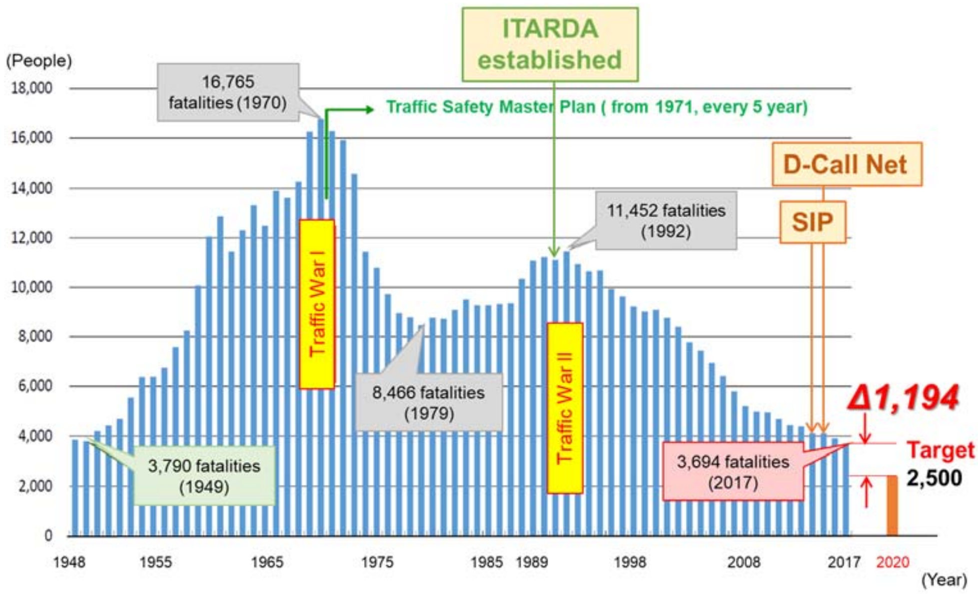

Fig. 1. Trends in the number of traffic accident fatalities and the government's targets

The Tenth Traffic Safety Master Plan that was formulated in 2016 set a target value for the number of fatalities five years later in 2020 at 2,500 fatalities. However, as of 2017 the number of fatalities was 3,694, indicating that there is still a gap of 1,194 fatalities. Given that the downward trend in the number of fatalities has been slowing down in recent years on account of factors like the increase in the number of elderly people, this indicates that further effort will be needed in order to achieve this target.

2. ITARDA's accident databases

As shown in Fig. 2, ITARDA's accident data exists in the form of micro studies and macro analysis, which form the two wheels of said data. The SIP accident pattern database that will be introduced in this paper as a new type of accident database is based on macro analysis. Conversely, the in-depth accident case studies from D-Call Net® are derived from micro in-depth case studies for specific purposes.

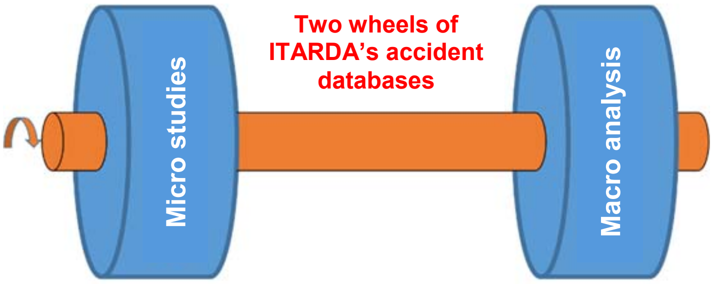

Fig. 2. The two wheels of ITARDA's accident databases

3. SIP accident patterns database

(1) Strategic Innovation Promotion Program (SIP)

At the 107th meeting of the Council for Science and Technology Policy held in March 2013, Prime Minister Abe kicked off the proceedings by stating, "We will once again aim to become 'the No. 1 in the world.' In order to aim to be the No. 1 in the world, innovation will be important above all. I would like to clearly state that the Abe administration will, as its new policy, focus on innovation." At the 114th meeting of the Council for Science and Technology Policy held six months later in September 2013, Prime Minister Abe offered the following statement, "the Cross-ministerial Strategic Innovation Promotion Program (SIP) as part of the National Emphasis Program, which will be the key to paving the way for the future of Japan. We will strongly push this program forward." Based on this, SIP Programs were initiated for 11 areas as indicated in Fig. 3.

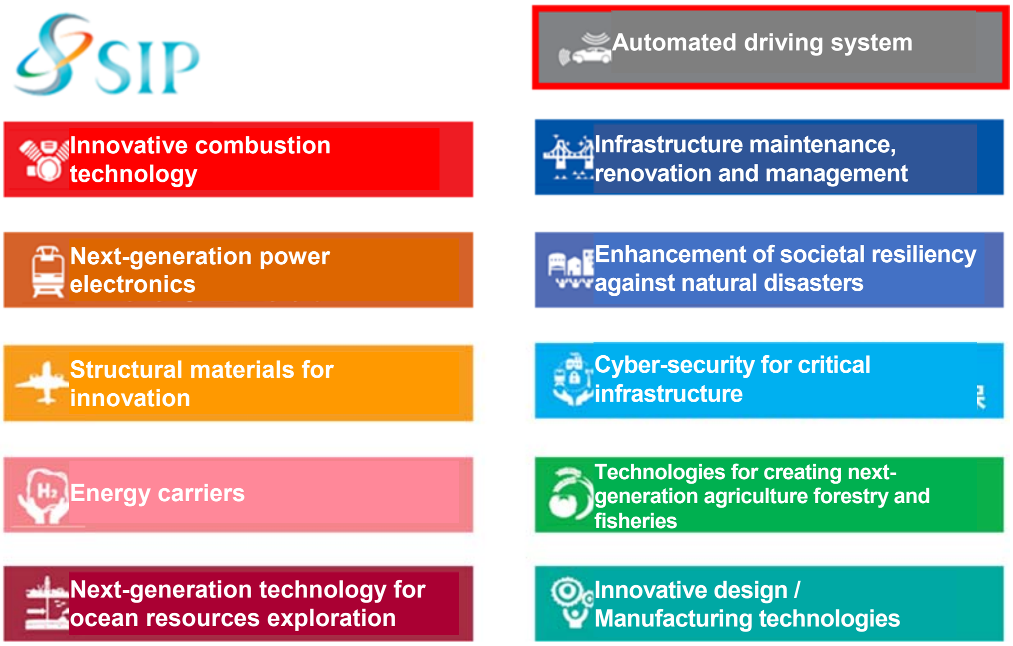

Fig. 3. List of SIP Programs

One of these programs, "Automated driving system," consists of the following six promoted initiatives.

(1) Develop/verify automated driving systems

(2) Advance basic technologies to reduce traffic fatalities and congestion

(3) Promote international cooperation

(4) Deploy next-generation urban transportation

(5) Conduct large-scale field operational tests

(6) Other

On the theme of "Develop technologies for estimating the impact on reducing traffic fatalities; create a common national database" found in "(2) Advance basic technologies to reduce traffic fatalities and congestion," which is one of these programs, ITARDA has continued with research and studies spanning a four-year period.

(2) SIP traffic accident patterns

SIP traffic accident patterns were established with the objective of estimating the impact of factors like automated driving systems, and were premised on the following four requirements.

- Should consist of a classification method that can be applied to a variety of different safety measures and devices.
- The database should be of a size that is easy to use for estimating impacts.
- Should be capable of being graphically represented to facilitate easy comprehension of the details of the classified accidents.
- Should be classifications that cover more than 80% of the number of traffic accident fatalities from 2013.

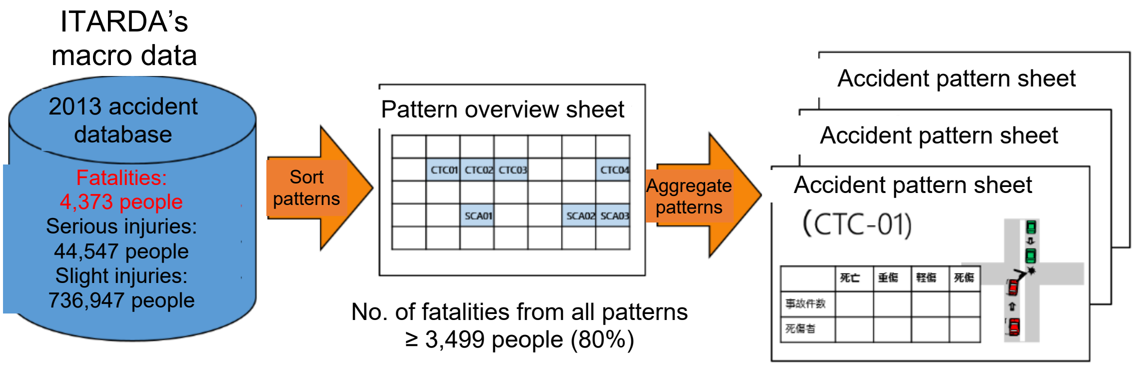

Fig. 4. Process for establishing traffic accident patterns

Fig. 4 shows the process for establishing SIP traffic accident patterns. ITARDA macro data from 2013 was used to classify the accidents into patterns. Since these needed to cover more than 80% of the number of traffic accident fatalities of 4,373, the patterns were set so that the total number of fatalities for the classified patterns came to more than 3,499. The set patterns were then organized into respective accident pattern sheets.

By primary party	By secondary party	By road type	Type of accident		Road configuration		Primary party's type of movement	Secondary party's direction of motion	
Car	Car	Public roads	Vehicle-Pedestrian	Walking facing / parallel to vehicle	Intersection	Signalized	Starting up / going straight	Vehicle	Oncoming vehicle
Motorcycle	Motorcycle			Crossing pedestrian crossing		Non-signalized	Changing lanes		Vehicle on left
Bicycle	Bicycle			Vicinity of pedestrian crossing	Near intersection		Turning left		Vehicle on right
Pedestrian	Pedestrian			Vicinity of pedestrian bridge	Non-intersection	Tunnel / bridge	Turning right		Same direction
				Other crossing		Curve	U-turn		Other (stopped)
				Road		Other	Reversing	Pedestrian	Facing / parallel to (right)
				Other	General traffic locations		Crossing		Facing / parallel to (left)
			Vehicle-vehicle	Head-on collision			Other		From left
				Rear-end					From right
				Crossing					Other (standing still)
				Roadside structure					
				Parked vehicle					
				Run off the road					
				Overturn					
				Other					
			Single vehicle	Utility pole					
				Signpost					
				Central reserve / median strip					
				Guard fence					
				House / wall					
				Bridge / pier					
				Other roadside structure					
				Parked vehicle					
				Run off road					
				Overturn					
				Other					
		Expressways	Vehicle-Pedestrian	All					
			Vehicle-vehicle	Rear-end					
				Collision / contact					
				Other					
			Single vehicle	Overturn / run off road					
				Median strip					
				Guard fence					
				Parked vehicle					
				Road under construction					
				Other					

Car: Passenger cars, Trucks, special cars
Motorcycle: Motorbikes, mopeds

Signalized: Lit, blinking
Non-signalized: Unlit, out of order, no such facilities

Fig. 5. Classification items for the traffic accident patterns

The classification items for the traffic accident patterns are shown in Fig. 5. Multiplying all of these classification items together would result in a net total of 31,500 patterns, so to achieve a database size that is easier to use it was necessary to narrow down the patterns. Table 1 shows the number of fatalities for each combination of primary and secondary party by road and accident type found in the macro data from 2013. As for the threshold values within the table, when the number of fatalities found within each individual SIP accident pattern consists of five or more, four or more, or three or more people, then this is deemed to be the total number of fatalities for that pattern. As such, the smaller the number of people the larger the total number of fatalities. Moreover, when the threshold value has been set at four or more or three or more people, this indicates the number of patterns and the coverage rate at that time.

Table 1. Number of fatalities, number of patterns, and coverage rate by threshold value (2013)

Road	Type of accident	Primary party	Secondary party	Code	No. of fatalities	Threshold values			No. of patterns		Coverage rate	
						5 or more people	4 or more people	3 or more people	4 or more people	3 or more people	4 or more people	3 or more people
Public road	Vehicle-vehicle	Car	Car	CTC	636	546	574	583	25	28	90.3%	91.7%
		Car	Motorcycle	CTM	283	172	196	211	17	22	69.3%	74.6%
		Car	Bicycle	CTB	359	272	276	300	20	28	76.9%	83.6%
		Motorcycle	Car	MTC	204	133	137	140	12	13	67.2%	68.6%
		Motorcycle	Motorcycle	MTM	13	0	0	3	0	1	0.0%	23.1%
		Motorcycle	Bicycle	MTB	8	0	0	3	0	1	0.0%	37.5S
		Bicycle	Car	BTC	132	80	80	89	4	7	60.6%	67.4%
		Bicycle	Motorcycle	BTM	5	0	0	0	0	0	0.0%	0.0%
	Single vehicle	Car		SCA	650	501	525	552	38	47	80.8%	84.9%
		Motorcycle		SMA	214	120	148	163	18	23	69.2%	76.2%
	Vehicle-Pedestrian	Car	Pedestrian	CTP	1297	1143	1143	1173	40	50	88.1%	90.4%
		Motorcycle	Pedestrian	MTP	37	23	23	26	3	4	62.2%	70.3%
		Pedestrian	Car	PTC	126	100	100	106	8	10	79.4%	84.1%
		Pedestrian	Motorcycle	PTM	6	0	0	0	0	0	0.0%	0.0%
Express way	Vehicle-vehicle	Car	Car	HCTC	95	66	66	72	6	8	69.5%	75.8%
		Car	Motorcycle	HCTM	7	0	0	3	0	1	0.0%	42.9%
		Motorcycle	Car	HMTC	7	0	0	0	0	0	0.0%	0.0%
		Motorcycle	Motorcycle	HMTM	0	0	0	0	0	0	0.0%	0.0%
	Single vehicle	Car		HSCA	82	51	63	69	8	10	76.8%	84.1%
		Motorcycle		HSMA	18	0	4	4	1	1	22.2%	22.2%
	Vehicle-Pedestrian	Car	Pedestrian	HCTP	14	0	0	3	0	1	0.0%	21.4%
		Motorcycle	Pedestrian	HMTP	0	0	0	0	0	0	0.0%	0.0%
Total					4193	3207	3335	3500	200	255	76.3%	80.0%

The total field at the very bottom row of the table shows that the 255 patterns with threshold values of three or more people have a coverage rate of 80%.

Accident overview

Pattern No.	CTC-01
Road	Public road Expressway
Road configuration	Within intersection (Signalized Non-signalized) Near intersection Curve Tunnel/Bridge Other non-intersection General traffic location
By party (primary)	Car Motorcycle (including mopeds) Bicycle Pedestrian
By party (secondary)	Car Motorcycle (including mopeds) Bicycle Pedestrian
Type of movement (primary party)	Starting up/going straight Passing/overtaking Changing lanes Turning left Turning right Reversing Crossing Other
Direction of motion (secondary party)	Same direction Oncoming From left From right Stopped
Type of accident	Vehicle-vehicle (Head-on collision Rear-end Crossing While passing/overtaking While passing While turning left While turning right Collision/contact Other)

Aggregated results

	Fatalities		Serious injuries		Slight injuries		Casualties	
No. of accidents / %	21	0.5%	287	0.8%	4,907	1.0%	5,215	1.0%
No. of casualties / %	22	0.5%	326	0.8%	7,249	1.2%	7,597	1.1%

	Fatalities	Serious injuries	Slight injuries	Casualties
Total No. of accidents	4,028	37,012	495,859	536,899
Total No. of casualties	4,117	38,959	627,064	670,140

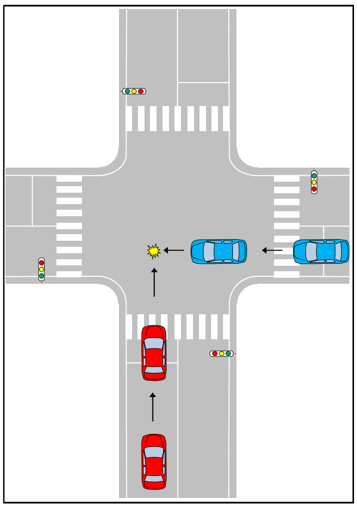

Fig. 5. Classification items for the traffic accident patterns

Fig. 5 shows one example of an accident pattern. This example shows a crossing collision accident at an intersection with a traffic signal between the primary party of a car starting up and going straight (the red car) and the secondary party of a car coming from the right (the blue car). It was given a Pattern No. of CTC-01. The "Aggregated results" section shows the number of people who suffered fatalities, serious injuries, and slight injuries due to this pattern, as well as the number of casualties which is the sum total of all of these. In addition, the numbers of fatalities, serious injuries, slight injuries, and casualties from 2013 for both the total number of accidents and the total number of casualties were added as well to serve as a reference.

By time of day	No. of accidents	Composition rate
Morning	303	6.4%
Afternoon	2,865	60.9%
Dusk	416	8.8%
Nighttime	1,120	23.8%

Weather	No. of accidents	Composition rate
Clear	2,879	61.2%
Cloudy	1,102	23.4%
Rainy	601	12.8%
Foggy	8	0.2%
Snowy	114	2.4%

Road conditions	No. of accidents	Composition rate
Dry	3,762	80.0%
Wet	794	16.9%
Frozen/snow-covered	148	3.1%
Unpaved	0	0.0%

Median strip and structures	No. of accidents	Composition rate
Central median strip	450	9.6%
Median line	2,262	48.1%
No median strip	1,992	42.3%
General traffic location	0	0.0%

Type of road	No. of accidents	Composition rate
National highway	898	19.1%
Principal local road	847	18.0%
Public local road	2,939	62.5%
Other	20	0.4%

Topography		No. of accidents	Composition rate
Urban area	Concentrated population	1,833	39.0%
	Other	1,578	33.5%
Non-urban area		1,293	27.5%

Legal violation (primary party)		No. of accidents	Composition rate
Ignoring traffic signal		3669	78.0%
Transit demarcations		2	0.0%
Speeding violation		1	0.0%
Violating a crossing or other bans		2	0.0%
Failing to maintain inter-vehicular distance		0	0.0%
Violating a ban on changing lanes		0	0.0%
Improper overtaking		0	0.0%
Violation when turning right		0	0.0%
Violation when turning left		2	0.0%
Obstructing the right of way, etc.		52	1.1%
Safely traveling through an intersection	Vehicle traveling down an intersecting road	182	3.9%
	Vehicle turning right from opposite direction	1	0.0%
	Pedestrian	1	0.0%
	Other	19	0.4%
Obstructing pedestrians, etc.		0	0.0%
Obstructing a crossing bicycle, etc.		0	0.0%
Violating low-speed areas		11	0.2%
Failing to come to a temporary stop in designated locations		167	3.6%
Violation of mandatory safe driving	Driving operation error	22	0.5%
	Failure to pay attention forward	117	2.5%
	Failure to observe surrounding traffic movement	16	0.3%
	Failure to confirm safety factors	418	8.9%
	Other	9	0.2%
Other violation		9	0.2%
Uninvestigable / no violation		4	0.1%

Danger perception speed	Primary party No. of accidents	Primary party Composition rate	Secondary party No. of accidents	Secondary party Composition rate
10km or less	433	9.2%	180	3.8%
20km or less	637	13.5%	1178	25.0%
30km or less	877	18.6%	1231	26.2%
40km or less	1745	37.1%	1434	30.5%
50km or less	735	15.6%	530	11.3%
60km or less	221	4.7%	128	2.7%
80km or less	44	0.9%	16	0.3%
100km or less	2	0.0%	1	0.0%
Over 100km	1	0.0%	0	0.0%
Uninvestigable	9	0.2%	6	0.1%

Human factors (primary party)			
Delay in noticing	Failure to pay attention forward	Internal	Nodding off
			Other type of distracted driving
		External	Dropped something, trying to retrieve something
			Watching TV/ navigation system, etc. (while driving)
			Distracted by searching for road, guide sign, etc.
			Distracted by scenery, object, etc.
			Distracted by other vehicle/pedestrian
			Other distraction
	Failure to confirm safety factors	Failed to confirm safety factors	
		Failed to adequately confirm safety factors	
Error in judgment, etc.	Failure to observe surrounding traffic movement	Neglected to pay attention on assumption that other party would yield	
		Other type of failure to observe surrounding traffic movement	
	Failure of prediction	Mistaken impression while driving (speed, road width, distance, etc.)	
		Assumed other party would follow rules/yield	
		Other type of failure of prediction	
	Traffic environment		
Errors and the like while operating vehicle	Operating error	Misapplication of brakes/ accelerator	
		Applied brakes with insufficient force, delay in braking	
		Braked suddenly	
		Improper steering	
		Steering while braking	
		Other type of operating error	
Uninvestigable / no human factors			

Age	Primary party No. of accidents	Primary party Composition rate	Secondary party No. of accidents	Secondary party Composition rate
6 and under	0	0.0%	0	0.0%
7 – 15	0	0.0%	0	0.0%
16-24	631	13.4%	416	8.8%
25-49	1760	37.4%	2438	51.8%
50-54	325	6.9%	382	8.1%
55-64	755	16.1%	758	16.1%
65-74	740	15.7%	532	11.3%
75 and older	493	10.5%	178	3.8%

Fig. 6. A sample of the detailed analysis sheets

Fig. 6 shows a sample of the detailed analysis sheets. For each corresponding accident pattern, the number of accidents and composition rate for ITARDA's major macro data items were aggregated into these sheets. Using these sheets makes it possible to perform detailed analyses on the patterns.

(3) Example of using SIP traffic accident patterns

This section will show an example of using the SIP traffic accident patterns.

For the accident pattern involving a secondary party car moving straight ahead (Pattern No. CTC-26) and the accident pattern involving a stopped secondary party car (Pattern No. CTC-25), which are both counted among rear-end collision accidents at non-intersections, the trends in the number of accidents and the number of fatalities over the nine-year period from 2008 to 2016 were investigated.

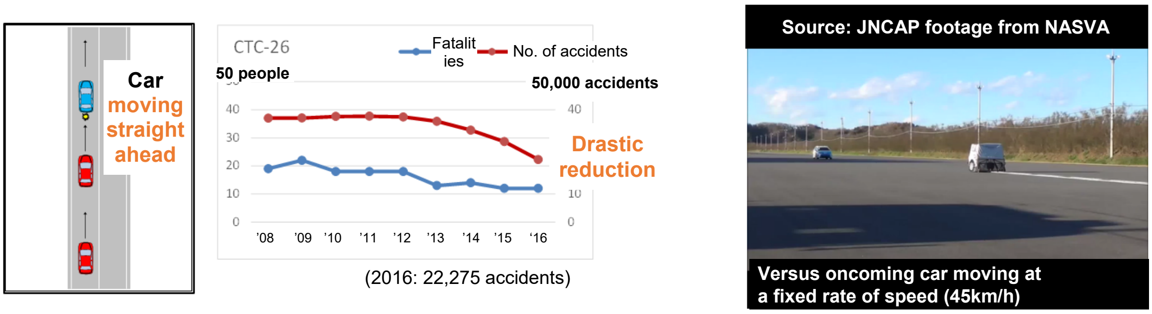

Fig. 7. Trends in the number of CTC-26 accidents and fatalities and NASVA footage

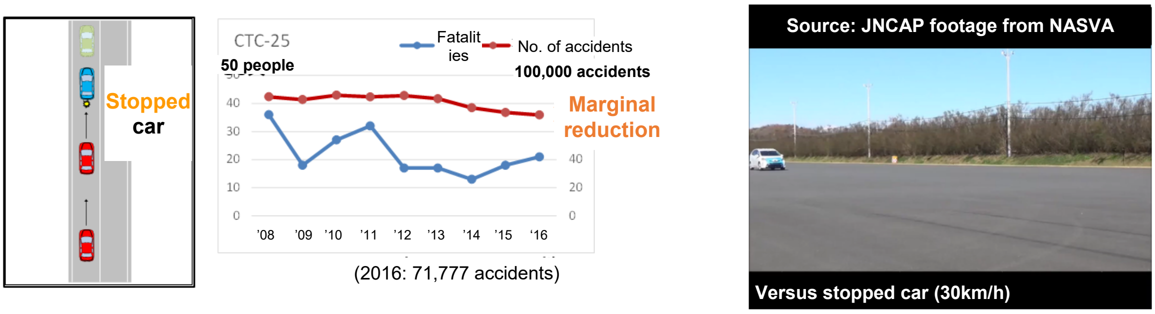

Fig. 8. Trends in the number of CTC-25 accidents and fatalities and NASVA footage

As for the number of accidents in 2008, there were twice as many accidents involving rear-end collisions with stopped vehicles, seeing as how there were approximately 40,000 CTC-26 accidents versus approximately 80,000 CTC-25 accidents. However, for the number of accidents in 2016, CTC-25 accidents saw a marginal reduction to approximately 70,000 such accidents, whereas CTC-26 accidents fell dramatically to approximately 20,000 accidents. Even in footage from tests assessing harm reduction brakes from the Japan New Car Assessment Program (JNCAP) by the National Agency for Automotive Safety & Victim's Aid (NASVA), the test vehicles stopped without colliding with the vehicle moving forward (balloon), but collided with the stopped vehicle (balloon).

According to a publication by the Ministry of Land, Infrastructure, Transport and Tourism, the dissemination rate for new vehicles equipped with harm reduction brakes had risen to 66.2% in 2016, up from 4.3% in 2013. This expanded dissemination of harm reduction brakes is thought to have contributed to the drop in the number of accidents when it comes to the dramatic fall in the number of CTC-26 accidents.

(4) Finalizing the SIP traffic accident patterns

Fig. 9 shows the changes in the coverage rate for SIP traffic accident patterns over the four-year period lasting from 2013 to 2016. For 2013 there were 255 accident patterns that were set so as to achieve a coverage rate of 80%. Yet due to the drop in the number of fatalities the coverage rate fell to 77% the following year in 2014, and then down to 75.5% in the fourth year after this in 2016.

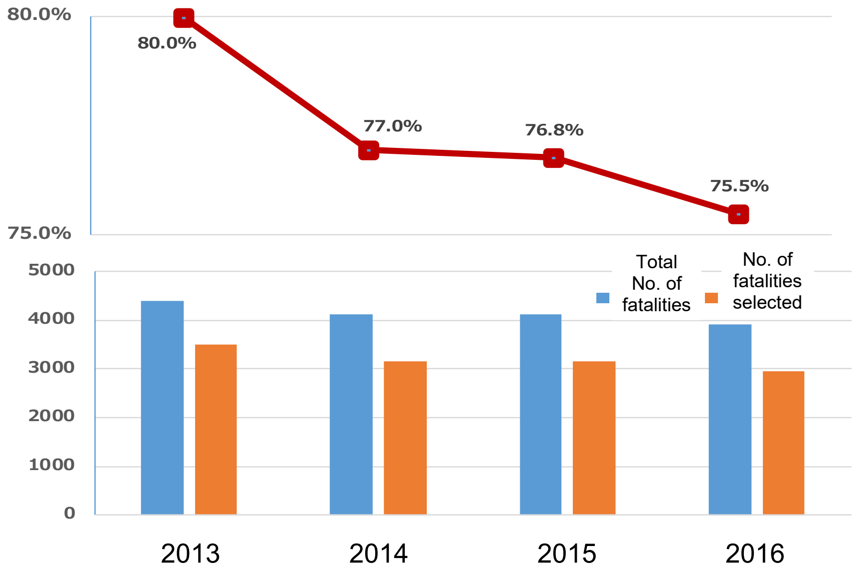

Fig. 9. Changes in the coverage rate for SIP traffic accident patterns

The study on traffic accident patterns came to an end in the fifth year. The plan for this final year was to raise this coverage rate by means of eliminating and consolidating some traffic accident patterns together and creating new ones, thereby making these patterns a shared national traffic accident database.

4. Database of D-Call Net® in-depth accident case studies

(1) Overview of D-Call Net®

Fig. 10 shows an overview of D-Call Net®. HELPNET is an emergency notification system that serves as an automatic traffic accident notification system which began operating in 2000. When an accident severe enough to cause the airbags to deploy occurs, the GPS location information is sent from the vehicle to a call center, where a third-party notification that an accident has occurred is sent by an operator to a fire department in which they request that an ambulance be dispatched to the scene.

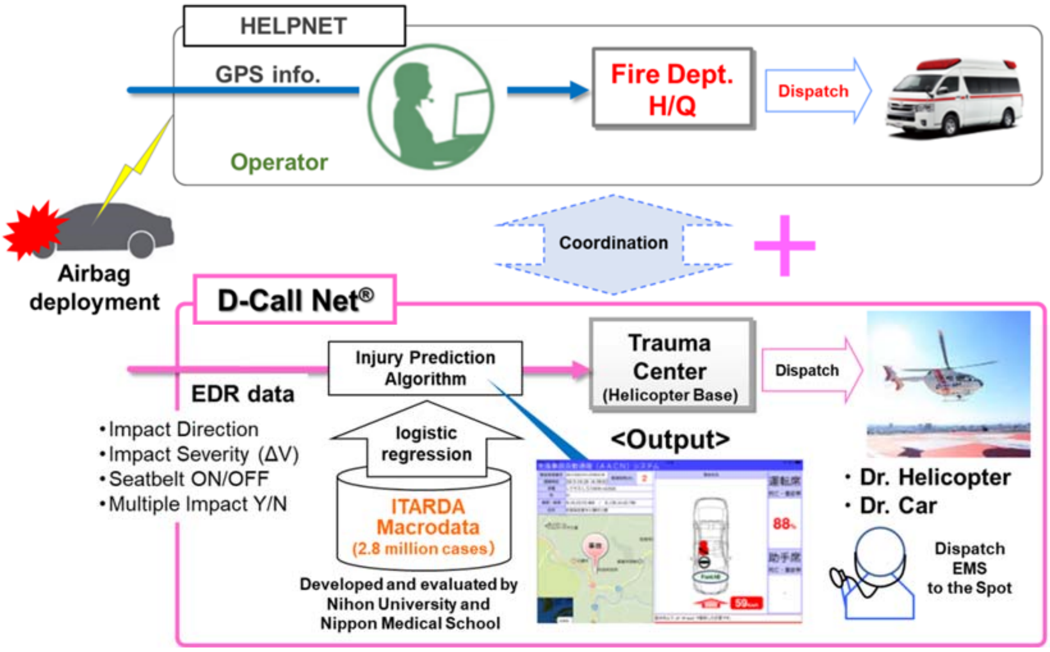

Fig. 10. Overview of D-Call Net®

D-Call Net®, which is automated emergency notification system, began operating in conjunction with HELPNET on a trial basis in 2015. In addition to the GPS location information provided thus far, it also obtains vehicle information such as the impact direction, the impact severity (ΔV), whether or not seat belts were being worn, and whether or not there were multiple collisions from the Event Data Recorder (EDR), and sends this to the call center. The call center uses an algorithm for estimating the fatality/serious injury rate in order to calculate the probability that the occupants in the driver's seat or passenger seats were killed or seriously injured. The results are then displayed on a tablet at a base hospital for medical helicopters together with information on the vehicle and the scene of the accident. Upon checking the tablet, doctors can then rush to the scene of the accident as needed.

An example of the tablet's display is shown in Fig. 11.

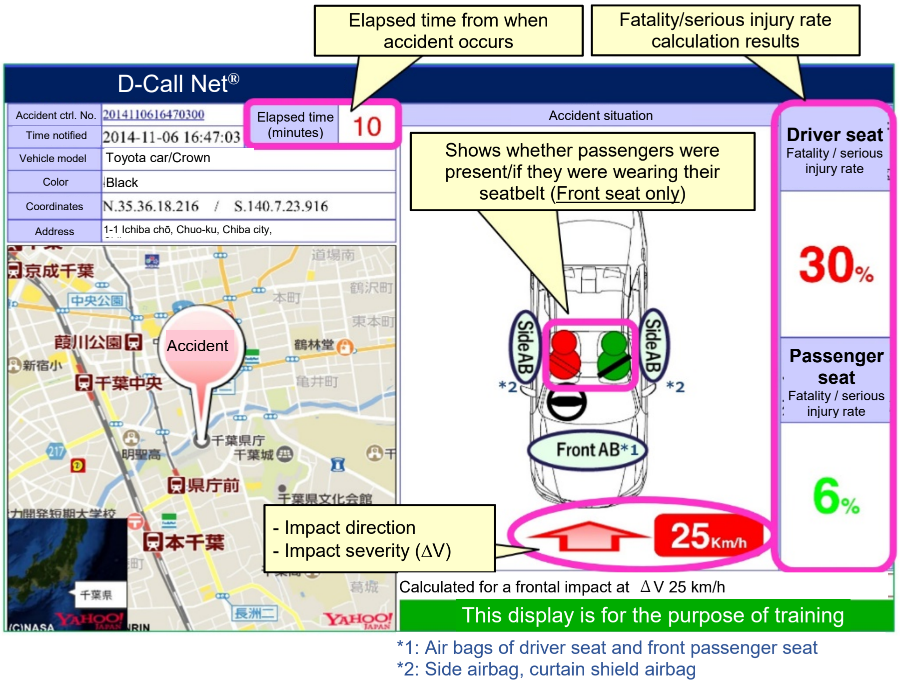

Fig. 11. Tablet display screen from D-Call Net®

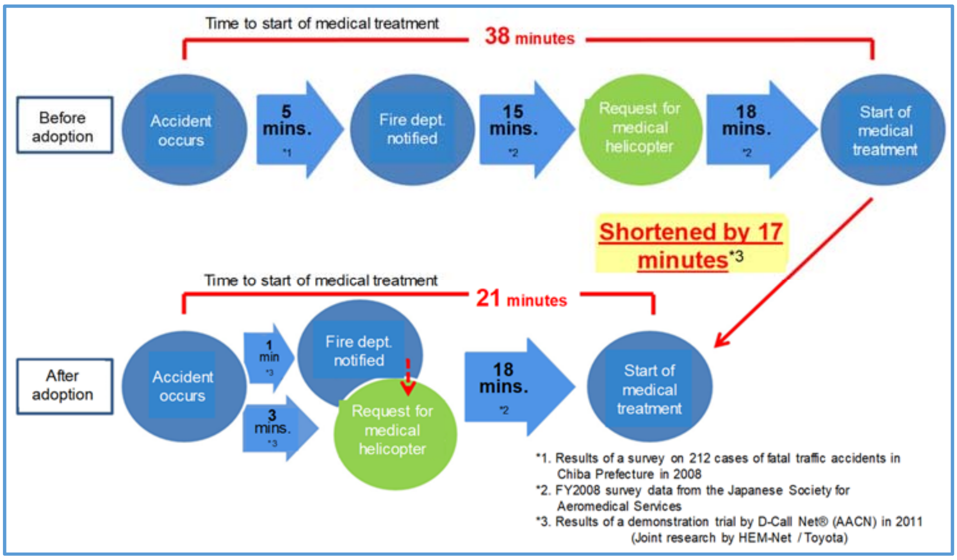

Fig. 12. Effect of D-Call Net® on shortening response times

Fig. 12 shows the effect D-Call Net® has on shortening response times. Before this system had been adopted, it used to take five minutes from when the accident occurred to notify the fire department and 15 minutes until a request for a medical helicopter could be placed. But the results of a demonstration experiment performed by the Japan Automobile Research Institute in 2012 showed that these times fell to one minute to notify the fire department and three minutes until a medical helicopter request was placed as a result of using D-Call Net®, thus confirming that it was possible to shorten response times by 17 minutes.

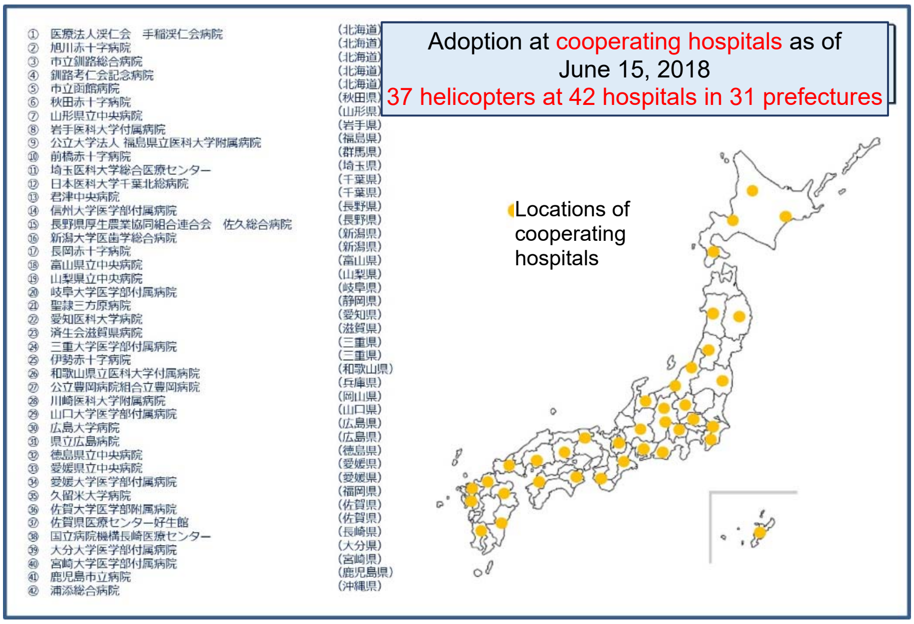

Fig. 13. D-Call Net® cooperating hospitals

Fig. 13 shows D-Call Net® cooperating hospitals as of June 15, 2018. The figure shows hospitals that are bases for medical helicopters that lend their cooperation by dispatching medical helicopters when they receive a D-Call Net® notification with the consent of prefectural government offices and fire department headquarters. This cooperative structure includes 37 helicopters from 42 hospitals in 31 prefectures.

(2) Structure for D-Call Net® in-depth accident case studies

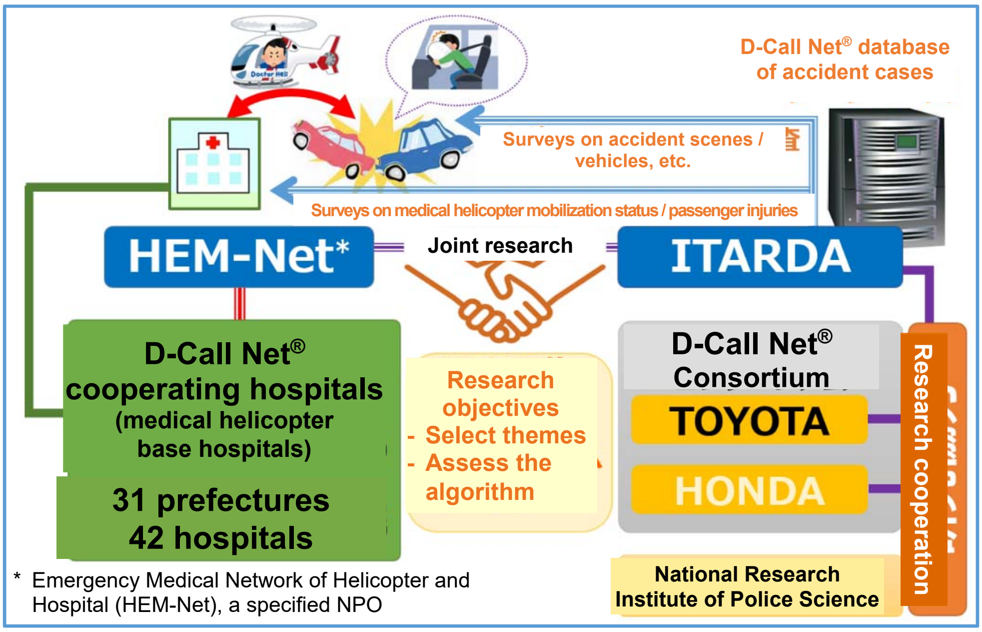

Fig. 14. Study structure for D-Call Net® in-depth accident case studies

Fig. 14 shows the structure for performing studies related to D-Call Net® in-depth accident case studies. Emergency Medical Network of Helicopter and Hospital (HEM-Net), a specified NPO, and ITARDA are promoting such studies through joint research with the goal of studying matters like selecting themes for D-Call Net® and assessing its algorithm for estimating injuries. Automobile manufacturers have also taken part in the form of the D-Call Net® Consortium.

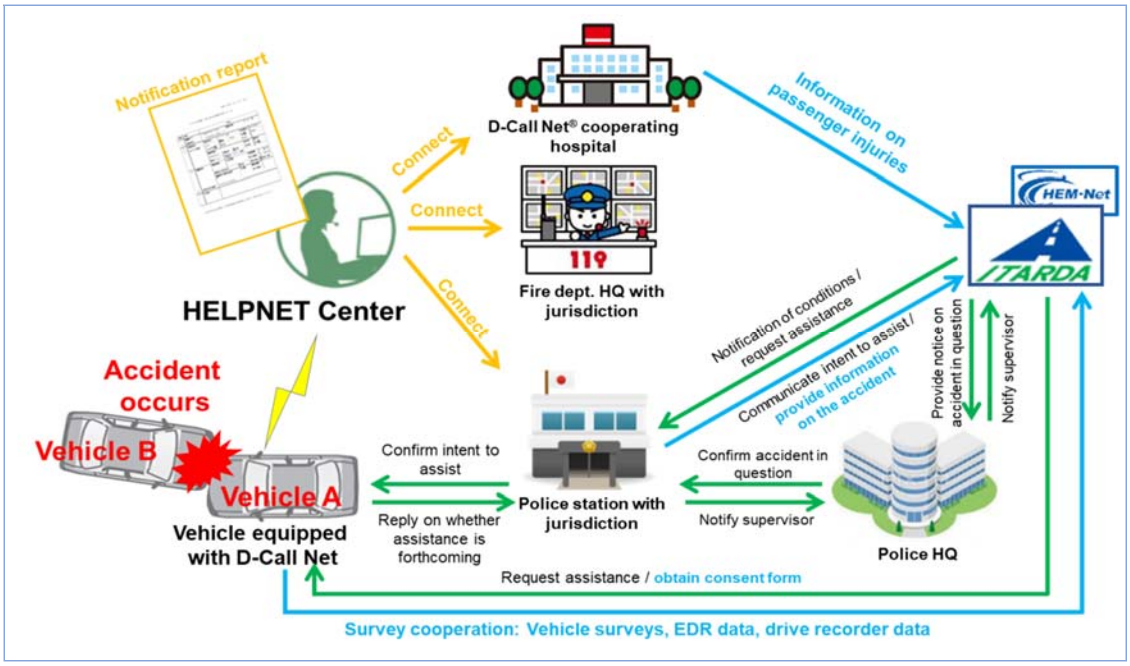

Fig. 15. Process for D-Call Net® in-depth accident case studies

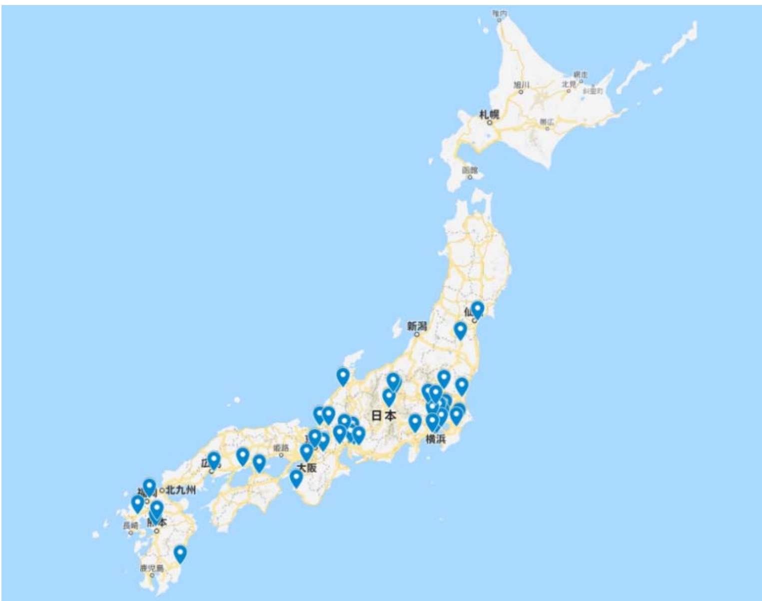

Fig. 16. Locations where the accidents from D-Call Net® in-depth case studies occurred

Fig. 15 shows the process for D-Call Net® in-depth accident case studies, while Fig. 16 shows the locations where accidents from D-Call Net® in-depth case studies occurred that had been surveyed in accordance with this process. To date, 30 in-depth case studies have been performed. The number of cases in which medical helicopters were actually mobilized is extremely small, and the majority of these were cases involving slight injuries. Since the in-depth case studies have only just begun, it was decided that these slight injury accidents are also to be surveyed as well.

(3) Example of a D-Call Net® accident (Chiba Prefecture)

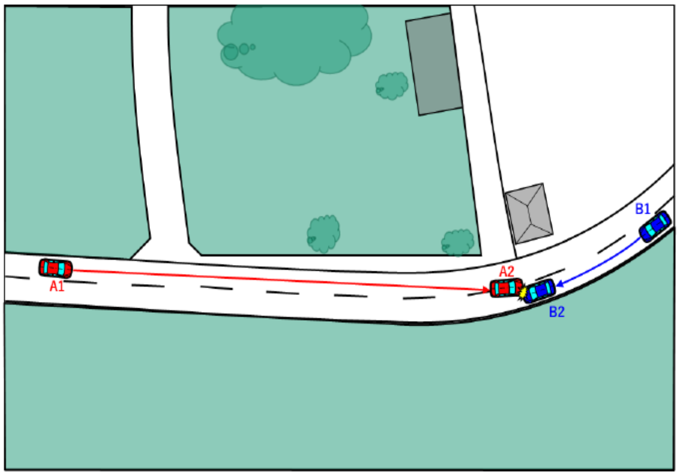

Fig. 17. Image of the scene of a D-Call Net® accident case

A case that occurred in Chiba Prefecture in January 2018 will be introduced, since it was the world's first successful case involving D-Call Net®. Fig. 17 shows an image of the scene of the accident case, while Table 2 shows an overview of said accident. Sometime after 15:00 on a cloudy day in January 2018 Party A (a woman in her 40s driving a small-sized passenger car) veered into the oncoming traffic lane despite of it being a left curve, where she caused a head-on collision with Party B (a man in his 50s driving a medium-sized passenger car equipped with D-Call Net®) who was coming in the opposite direction.

Table 2. Overview of a sample D-Call Net® accident

Date of accident	Jan. 2018 3-4 p.m.	Weather: Cloudy
Party A	Small-sized passenger car Female driver in her 40s (seatbelt ON) **Cerebral concussion, Collarbone fracture (RH), Sternum fracture ISS 12**	
Party B	Passenger car (**D-Call Net® equipped**) Male driver in his 50s (seatbelt ON) Contusion over entire body ISS 1	

Party A was wearing her seat belt, but still suffered injuries such as a cerebral concussion, a fractured collarbone, and a fracture of the sternum (ISS =12). Party B was also wearing his seatbelt, and suffered injuries in the form of contusions over his entire body (ISS=1).

Fig. 18. Extent of the deformities to the vehicles from the D-Call Net® accident case

Fig. 18 shows the extent of the deformations to the vehicles of Parties A and B. These deformations did not extend to the inside of the passenger compartment of either vehicle.

Table 3. Rescue events and elapsed time from sample D-Call Net® accidents

Elapsed time (min)	Rescue event
0	Collision
3	D-Call Net® alert
7	Coming back from another mission & landing
9	Taking off from the hospital
19	Arriving over the spot
36	Landing at the R/P Start of medical treatment by the onboard doctor
50	Taking off from the R/P
58	Arriving at the hospital Start of fundamental medical treatment at ER

The rescue events and elapsed time for this accident case are shown in Table 3. At the time when the incident was confirmed on the tablet at the base hospital, the medical helicopter was already in flight for another incident. So after returning to the hospital, it took off once again nine minutes after the accident occurred. While it arrived over top the scene 19 minutes later, it took 36 minutes before it was able to touch down at a rendezvous point close to the scene. Immediately after touching down the onboard medics began administering medical treatment. In this case, the helicopter faced the challenge of being flying on hold for 17 minutes.

Ideally, rendezvous points should be set in place and the helicopter should land at the scenes of accidents (with it being crucial to ensure safety in advance) in order to eliminate this time spent in flying on hold.

(4) Assessing the D-Call Net® algorithm

An assessment of the algorithm was conducted based on the 30 accident cases surveyed. There were neither serious injury cases (true positive cases) nor under triage cases among these 30 cases, so only the over triage rate was assessed. The results are shown in Fig. 19.

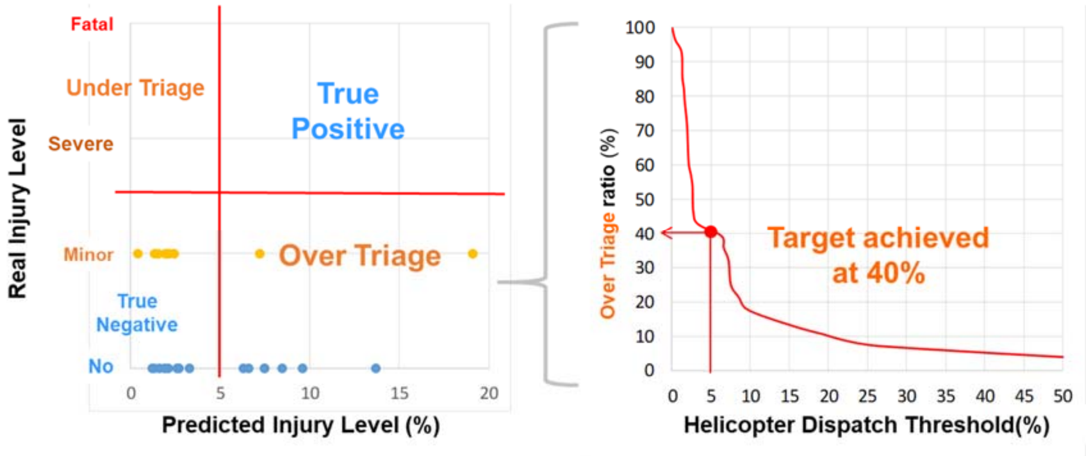

Fig. 19. Assessing the algorithm via D-Call Net® in-depth accident case studies

With D-Call Net®, the algorithm for estimating injuries cannot currently use the age of the driver of the vehicle because the vehicle cannot detect the age, and so age 65 was entered as the default value. When the driver age is set to a standard level of 65 years old, the current threshold value for deploying a medical helicopter of 5% had an overtriage rate of 40%. This falls below the 50% global threshold value, and is therefore at a level that is not deemed to be problematic.

For the future, it will be necessary to accumulate more D-Call Net® in-depth accident case studies and assess the algorithm for this, including the undertriage rate.

5. Conclusion

This paper introduced the SIP accident pattern database and the database of D-Call Net® in-depth accident case studies. These can be summarized as follows.

(1) SIP accident patterns had been developed from the macro data and they should be used extensively in the form of a nationwide database.

(2) Cases in which medical helicopters were dispatched via D-Call Net® were studied. Such cases will continue to be accumulated to reveal the issues of the system and to evaluate the algorithm.

(3) Activities to adopt the algorithm for estimating injuries from D-Call Net® as an international standard will be initiated, and considerations for performing new in-depth accident case studies on automated driving cars will begin.