



REPORT SUMMARY

This section provides an overview of the predictive analytics used for the estimation of claim severity, exposure, and fraud risk for the most recent crash or event sequence.



Repair / Loss Exposure

The market value range for the vehicle is USD \$24,777.01 - 30,001.01. The vehicle is predicted to be a **TOTAL LOSS**.



Occupant Injury Risk

1st Party: Risk of Short-term Whiplash (100%). Risk of Long-term Whiplash (100%)
3rd Party (if any; for average car size): Risk of Short-term Whiplash (36%)



Pre-Crash Vehicle Speed

Within the 5.0 seconds of recorded pre-impact data for the most recent crash, the recorded speed range on this vehicle was **76 mph** to **85 mph**. The vehicle speed was **76 mph** at the moment of impact.



Flags / Loss Indicators

High Risk (7 Alerts): Drive Down, No Avoidance Maneuver, Possible Distracted Driver, Steered-To Sideswipe, Past Posting, Pre-Damaged Vehicle, Emissions Test Failure



Recommended Action / Notes

Compare pre-crash data to reported circumstances. If posted speed is 55.0 mph or less, evidence of Dangerous Operation.



CRASH DATA RECORDS

This section lists crash data records stored on the vehicle's event data recorder. The date of crash data collection was 2018-08-17.

Recency / Sequence	Crash Severity	Type / Damage Area	Sudden Speed Change	Force of Impact (g-Force)	Direction of Force	Engine Starts Since Event
Most Recent	Moderately Severe	Left Side Impact	16.88 mph (Increasing)	11.33 g	288 degrees (10 o'Clock)	22
1st Prior	Moderate Severity	Frontal (Right)	-9.38 mph (Decreasing)	5.66 g	4 degrees (12 o'Clock)	316

How To Interpret This Information

The crash severity (acceleration / g-force) measured by the airbag module accelerometer reached a maximum value of 16.88 mph within 150 milliseconds, which is considered "severe" in terms of severity. Damage occurred on the left side of the vehicle. The vehicle's ignition was turned on 22 times between the incident and crash data download; this number can be used as an indication of event recency. For example, if the vehicle were used an average of 2 times per day, the recorded collision event would have occurred approximately 11 days prior to the the date of retrieval on 2018-08-17.

Crash events are sorted and displayed in order of recency. It is possible for an airbag module to contain multiple records for a single event. In that case, event recency will be further marked by "1st Impact", "2nd Impact"...etc., with "1st Impact" being the initial record in sequence.



PRE-CRASH DATA / Most Recent

This section lists pre-crash data records stored on the vehicle's event data recorder.

Time Before Impact (sec)	Vehicle Speed (mph)	Engine Speed (RPM)	Accelerator Pedal (%)	Brake Switch Status	Deceleration (g)	Steering Angle (deg)
-5.0	81	2700	47.0	Off	N/A	5 (Straight)
-4.5	82	2700	32.0	Off	N/A	5 (Straight)
-4.0	82	2800	19.0	Off	N/A	5 (Straight)
-3.5	83	2800	20.0	Off	N/A	5 (Straight)
-3.0	84	2800	20.0	Off	N/A	5 (Straight)
-2.5	84	2800	20.0	Off	0.0 (Light)	5 (Straight)
-2.0	84	2800	18.0	Off	N/A	5 (Straight)
-1.5	84	2800	18.0	Off	0.0 (Light)	10 (Straight)
-1.0	85	2800	24.0	Off	N/A	5 (Straight)
-0.5	83	2800	0.0	On	-0.2 (Light)	0 (Straight)
0.0	76	2600	0.0	On	-0.6 (Hard)	-20 (Left)



PRE-CRASH DATA / 1st Prior

This section lists pre-crash data records stored on the vehicle's event data recorder.

Time Before Impact (sec)	Vehicle Speed (mph)	Engine Speed (RPM)	Accelerator Pedal (%)	Brake Switch Status	Deceleration (g)	Steering Angle (deg)
-5.0	2	700	0.0	On	N/A	0 (Straight)
-4.5	2	700	35.0	Off	0.0 (Light)	0 (Straight)
-4.0	3	1500	36.0	Off	N/A	0 (Straight)
-3.5	6	1600	27.0	Off	N/A	0 (Straight)
-3.0	8	1500	15.0	Off	N/A	0 (Straight)
-2.5	8	1600	30.0	Off	N/A	0 (Straight)
-2.0	9	1200	35.0	Off	N/A	0 (Straight)
-1.5	11	1400	21.0	Off	N/A	0 (Straight)
-1.0	11	1500	12.0	Off	N/A	0 (Straight)
-0.5	12	1500	4.0	Off	N/A	0 (Straight)
0.0	12	1500	0.0	Off	0.0 (Light)	0 (Straight)

How To Interpret This Information

Each pre-crash data set contains recorded vehicle operating status 5.0 seconds prior to impact. Accelerator Pedal, Brake Switch Status, and Steering Angle can be used to reconstruct the driver's maneuver leading up to the impact.

Deceleration (in g) is calculated using speed differences between data points. Note that deceleration depends heavily on road conditions. For example, in winter driving conditions, it may only be possible to reach a peak deceleration of 0.2g.



SEAT BELT & AIRBAG STATUS (Most Recent Crash)

This section lists the restraint system status at the time of the event recording, including airbag deployment status and the seatbelt buckle insertion status for supported seating positions.

Seating Position	Driver	Front Passenger
Occupant Classification	Unavailable	Unavailable
Safety Belt Status	Buckled	Unbuckled
Frontal Airbag	Not Deployed	Not Deployed
Side Seat Airbag	Deployed	Not Deployed
Side Curtain Airbag	Deployed	Not Deployed
Knee Airbag	Unavailable	Unavailable



FLAGS / LOSS INDICATORS

This section lists flags for further investigation based on known anti-fraud indicators and/or inconsistencies with reported circumstances.

Indicator	Description	Risk Alert
Drive Down	Frontal collision where the driver accelerates up to impact, with no pre-impact brake application.	Yes
No Avoidance Maneuver	No driver input for either brake or steering maneuver within the 2 seconds prior to impact.	Yes
Possible Distracted Driver	In a frontal collision, driver did not either brake or steer 2 seconds prior to impact.	Yes
No Pre-Impact Speed Reduction	Brake is only applied lightly with no meaningful reduction in speed.	No
Steered-To Sideswipe	Driver steers either left or right, causing an impact on the steered-to side.	Yes
Swoop & Squat	Driver steers to make a lane change and quickly applies brakes.	No
Panic Stop	Rear-end collision where driver brakes just prior to impact.	No
Past Posting	Accident recording may not be recent. Event data recorded 10 or more engine starts prior to data retrieval.	Yes
	Event data recorded on successive engine starts (sequential ignition)	

Possible Intentional Damage	cycles), or multiple events recorded on the same ignition cycle, where pre-crash data does not overlap.	N/A
Pre-Damaged Vehicle	Evidence of prior accident damage, where event data was recorded 25 or more engine starts prior to the count at crash data retrieval. Possible issues include: Unrelated Damage to Incident, staged Hit & Run, Phantom Accident, or Paper Accident.	Yes
Unbuckled Occupant	Driver or front passenger not wearing seat belt at the time of crash data recording.	N/A
Emissions Test Failure	Vehicle failed emissions inspection due to insufficient sensor data or diagnostic trouble codes (DTCs).	Yes

Reported Circumstances

The flags in this section are generated through cross-referencing provided information (if any).

Indicator	Description	Diagnostic and Predictive Data	Reported Info
Reported Number of Occupants	Compares the reported number of occupants to the available seat sensor data.	1	N/A
Reported Maximum Pre-Impact Speed	Compares the reported travel speed with the pre-crash data and flags a variance of 10 km/h.	85	N/A
Reported Impact Speed	Compares the reported impact speed with the pre-crash data and flags a variance of 10 km/h.	76	N/A
Reported Pre-Impact Maneuver Variance	Compares the reported pre-impact motion with pre-crash data and impact angle for consistency.	Going Ahead	N/A
Reported Appraisal Variance	Compares a provided appraisal estimate with the AI estimate and flags an appraisal variance of +15%.	22509	N/A
Reported Airbag Deployment Variance	Determines whether airbags were manually removed to exaggerate damage by comparing recorded airbag deployment status.	Deployed	N/A
VIN Mismatch	Compares the VIN diagnostically retrieved from the vehicle to the the VIN sticker or provided VIN. Requires claim reference number.	WBA8E3G50GN*****	N/A
Image Integrity	Utilizes algorithms to identify digitally edited or altered parts in provided photographs.	N/A	N/A
Pre-Accident Vehicle Sale Attempt	VIN identified in online classifieds within the last 6 months.	N/A	N/A

1ST PARTY / INJURY SEVERITY & DURATION



This section predicts occupant injury risk for WAD (Whiplash Associated Disorder) and MAIS2+ (Maximum Abbreviated Injury Scale - moderate/serious) injury for frontal/side/rear collisions using a regression model of crash severity versus reported injuries from real-world crash studies using event data recorders.

Occupant Detail	Risk of Initial WAD Symptoms	Risk of Long-term WAD Symptoms	Risk of Serious Injury
Occupants in Side Impact	100% (Almost Certain)	100% (Almost Certain)	4% (Improbable)

How To Interpret This Information

With a high risk of whiplash or other injury, the claim can be expedited. Early treatment is often effective in providing the best probable outcome for patient recovery.

The injury prediction is based on the actual incidence rate or proportion of injury in tracked studies using data from real-world outcomes. The most important factor in predicting the risk of injury or death in a vehicle crash is the crash severity, which is expressed as the velocity change, or Delta-V, experienced by the vehicle during the crash. The Crash Investigation Sampling System (CISS) is the largest database in the world with over 100,000 cases linking injury outcomes with Delta-Vs, which are obtained from field reconstructions. The effects of occupant age, gender, and belt use on injury and fatality risk have been found substantial.

RELATIVE INJURY RISK / 3RD PARTY EXPOSURE



This section provides a lead indicator for relative 3rd party injury risk based on accident reconstruction principles including conservation of momentum and relative vehicle mass (Delta V2 (Change in velocity) = Delta V1 * M1 / M2). The calculation does not require the vehicles reach a common post-impact velocity.

Assumed 3rd Party Vehicle	3rd Party Vehicle Delta-V / Severity	Risk of Initial WAD Symptoms	Risk of Long-term WAD Symptoms	Risk of Serious Injury	3rd Party Vehicle Speed
Compact Car (3993 lb)	27.52 mph	36% (Possible)	18% (Unlikely)	4% (Improbable)	N/A
Midsize Car (4972 lb)	22.10 mph	34% (Possible)	17% (Unlikely)	2% (Improbable)	N/A
Van/SUV/Light Truck (5984 lb)	18.36 mph	28% (Possible)	13% (Unlikely)	1% (Improbable)	N/A
Full Size Truck/SUV (7986 lb)	13.76 mph	23% (Possible)	8% (Unlikely)	1% (Improbable)	N/A



POTENTIAL RECALLS / SAFETY / DIAGNOSTIC SCAN DATA

This section lists any potential outstanding recalls, known safety ratings & issues, retrieved DTCs (Diagnostic Trouble Codes), and respective Freeze Frame impact data, if any.

Potential Safety Recalls

Vehicle safety recall information is received from Transport Canada and includes all known recalls associated with this particular vehicle model. Any listed recalls are potential recalls which can be verified as outstanding or not by providing the VIN to a local dealer's service department.

Recal Date: 2015-11-19

Recall Number: 2015552

Affected System: Powertrain

Description: On certain M3 and M4 vehicles, the slip-joint located on the driveshaft going from the transmission to the rear axle may not have been greased properly during the manufacturing process. Over time, this could cause the slip-joint to fail, which would result in a loss of motive power increasing the risk of a crash causing injury and/or damage to property.

Correction: Dealers will inspect and replace the drive shaft as necessary.

Recal Date: 2016-09-08

Recall Number: 2016438

Affected System: Suspension

Description: On certain M-series vehicles that had the rear differential replaced during servicing, one-time use bolts holding rear sub-frame may have been inadvertently reused due to missing information in the repair instructions. This could cause the bolts to become loose as they would not achieve sufficient clamping force. A loose sub-frame could affect vehicle handling and stability which could increase the risk of a crash causing injury and/or damage to property. Correction : Dealers will replace the rear sub-frame bolts.

Recal Date: 2018-10-26

Recall Number: 2018587

Affected System: Engine

Description: On certain vehicles, the cooler for Exhaust Gas Recirculation (EGR) module may develop an internal leak and coolant could mix with diesel engine soot/sediment. In rare circumstances, this condition could result in smouldering particles and lead to the melting of the intake manifold, increasing the risk of a fire causing injury and/or damage to property.

Correction: Dealers will inspect the EGR cooler, and if necessary, replace it. If it is determined that the EGR cooler has leaked internally, the intake manifold will also be replaced. The EGR pipe connecting the cooler to the manifold will be cleaned.

Note: An operator may be alerted to this condition by one or more of the following symptoms: A warning symbol in the instrument cluster displaying a loss of engine coolant, a reduction in engine power, an unpleasant odour (exhaust gas), an unusual noise from the engine compartment, and/or smoke from the engine compartment.

IIHS Crashworthiness / Safety Ratings

Insurance Institute for Highway Safety (IIHS) in the US publishes vehicle safety ratings based on actual crash tests. In each category, the possible ratings are: Good, Acceptable, Marginal, and Poor. Further vehicle research on safety ratings and features, reviews, tips and more can be found here: www.iihs.org/iihs/ratings.

The overall IIHS Crashworthiness / Safety Rating for this vehicle is "Good".

Diagnostic Trouble Codes (DTCs)

Diagnostic Trouble Codes (DTCs) are set by a control module when it detects faults in its system through self-diagnostics. The following section lists DTCs retrieved from various control modules of the vehicle.



Engine Control Module (ECM)



1 Code Found: P0881



Transmission Control Module (TCM)



No Issues Found

Freeze Frame Data

Freeze Frame Data refers to a snapshot taken by a control module when it detects a fault in its system. The snapshot consists of measured values from various sensors and can be useful in determining the root cause of the fault. Note that not all vehicles support the items listed below and thus some values may be inaccurate.

DTC

Engine RPM

Vehicle Speed

Throttle Position

Engine Run Time



MARKET VALUE

This section provides an estimated market value for 2016 BMW 3 Series (328i xDrive SULEV). Estimate based on 57 similar vehicles sold between 2018-08-02 and 2018-12-15 within the range of USD \$24,777.01 - USD \$30,001.01.

Assumed Milage	Market Value	Time Period	Estimate Certainty
29,438 miles	USD \$27,389.01	6 Months	99%



EXPOSURE / AUTO PHYSICAL DAMAGES

This section provides predictive loss and repair estimate/cost information. AI inputs: Trusted Repair Estimates, Max Delta-V, Impact Angle, Vehicle Model/Specs (weight, stiffness), Airbag Deployment status, DTCs, Damage Area/Level/Photographs (if any).

Repair Estimate (AI Prediction)	Salvage Value (80% of Market Value)	Prediction: Total Loss / Repairable	Estimate Certainty
USD \$22,509.78	USD \$21,911.21	Likely Total Loss	94%

How To Interpret This Information

The vehicle is predicted to be a Total Loss. The algorithmic repair estimate exceeds the estimated salvage (as damaged) value of the vehicle. The algorithmic repair estimate for this prediction considered "total repair estimates" from similar vehicles, with similar recorded impact configuration and severity, also requiring airbag replacement. Photographs of the damaged vehicle were not used to generate the prediction.

The repair estimate does not replace a physical damage appraisal. Collision Sciences is working with strategic partners to develop an advanced repair cost prediction algorithm using a combination of photo-based estimating, diagnostically detected impact configuration and severity, and diagnostic issues requiring repair. The repair estimate may currently be used to predict a total loss or repairable condition, identify potentially exaggerated repair estimates and provides a contextual frame of reference for claim severity.



VEHICLE SPECIFICATIONS

This section lists basic vehicle details encoded by the VIN.

VIN	WBA8E3G50GN*****	Year	2016
Make	BMW	Model	3-Series
Trim	328i XDrive	Engine	2.0-L L-4 DOHC 16V
Made In	Germany	Style	Sedan
Steering Type	Rack & Pinion	Anti-Brake System	4-Wheel ABS
Fuel Type	Premium Unleaded (Required)	Fuel Capacity	15.8 gallons
Overall Length	190 inches	Overall Width	72 inches
Overall Height	59.4 inches	Standard Seating	5
Curb Weight	4010 lb	Gross Weight	N/A
Highway Mileage	34 miles/gallon	City Mileage	22 miles/gallon
Invoice Price	\$37,620	MSRP	\$40,350

Event Data Disclaimer

It is important to note is that if a vehicle was spinning or rolling surrounding the collision, then the report's speed measurements would not accurately reflect the actual speed of the vehicle during/after it lost control; the speed measurement is typically based on the wheel speed sensor. Signs of this type of anomaly would be rapid changes in speed between the brief timing intervals. The reported speed may be an average of the four wheels; thus could also be skewed by spinning wheels. In combination with scene evidence, an expert could assess vehicle speed by analyzing the data via accident reconstruction and engineering analysis.

Users of the Collision Sciences service and reviewers of the reports and exported data shall ensure that data and information supplied is applicable to the vehicle, vehicle's system(s) and the vehicle ECU. Collision Sciences Inc. and all its directors, officers, employees and members shall not be liable for damages arising out of or related to incorrect, incomplete or misinterpreted software and/or data. Collision Sciences Inc. expressly excludes all liability for incidental, consequential, special or punitive damages arising from or related to the online services, evidence logistics, EDR data, EDR software or use thereof.

Injury Risk / Biomechanical Assessment Disclaimer

The estimated injury risks are calculated based on the recorded crash pulse, relative energy changes, known vehicle characteristics in standardized and real-world crashes, published databases, and recognized studies. The provided information can be used as a guide in settlement decisions but cannot be used to definitively prove the existence or non-presence of an injury. In cases with a very low risk of whiplash or other injury, claims can be identified for further investigation. Conversely, for cases with a high risk of whiplash or other injury, the claim can be expedited, since early treatment is often effective in reducing the long term prognosis.

Delta-V (Change in Velocity) has traditionally been used to correlate crash severity with risk of occupant injury (Augenstein et al., 2003; Bahouth et al., 2004; Sunnevång et al., 2009; Kononen et al., 2011). Injury tolerance and risk for various injury types based on real-world crashes with recorded crash data have been established (Gabauer and Gabler, 2006; Gabauer and Gabler, 2008; Kullgren and Krafft, 2008; Ydenius, 2010). Large-scale retrospective studies have also examined the relationship between minor severity crashes and the risk of occupant whiplash complaints, including studies in the U.S. (Tencer et al., 2001), Germany (Eis et al., 2005; Hell et al., 2002) and Sweden (Krafft et al., 2005). Injury risk studies consider the following risk factors: Crash configuration (front, side, rear, rollover), Delta-V = Change in velocity, Vehicle mass (size, weight), Vehicle stiffness, Vehicle geometry and engagement, Restraint system and its adjustment, Occupant seated position, Occupant profile (age, gender, previous injury), Number of WAD symptoms, and Psychological Distress. Structural damage and known whiplash thresholds overlap, indicating structural damage and repair cost are a poor predictor of minor injury threshold. Damage can also vary widely by vehicle model and impact configuration.