

TECHNOLOGY & SAFETY

An expensive combination?

By

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Overview

- Does technology make safety expensive?
 - The Airbag Example
- How to ensure technology solves your safety problems cost effectively?
 - Use Haddon Matrix to study accidents and injuries

The Airbag Example

- What is the cost of having airbags in a car?
- Let's try to purchase a car with airbags.



Fiat Punto

The screenshot displays a comparison interface for Fiat Punto variants. On the left, there are two checked options: 'Hide common features' and 'Highlight differences'. Three car cards are shown side-by-side, each with a yellow Fiat Punto image, a close button (x), and a dropdown arrow. The first card is for 'Fiat Punto Evo Active 1.2' with a price of ₹ 4.56 lakhs. The second is 'Fiat Punto Evo Dynamic 1.2' with a price of ₹ 5.12 lakhs. The third, highlighted with a red border, is 'Fiat Punto Evo Emotion 1.4' with a price of ₹ 6.66 lakhs. Below the cards are tabs for 'Overview', 'Features', 'Specifications', and 'Colours'. A 'SAFETY' section is expanded, showing 'Airbags' with a table of counts: Active 1.2 (1), Dynamic 1.2 (1), and Emotion 1.4 (2 (Driver & Co-Driver)).

Variant	Price (₹ lakhs)	Airbags
Fiat Punto Evo Active 1.2	4.56	1
Fiat Punto Evo Dynamic 1.2	5.12	1
Fiat Punto Evo Emotion 1.4	6.66	2 (Driver & Co-Driver)

Base variant costs INR 4.56 L and the lowest airbag variant costs INR 6.66 L

Tata Zest





Hide common features
Highlight differences

Variant	Price (₹)	Airbags
Tata Zest XE Petrol	₹ 4.64 lakhs	None
Tata Zest XM Petrol	₹ 5.25 lakhs	None
Tata Zest XMS Petrol	₹ 5.43 lakhs	2 (Driver & Co-Driver)
Tata Zest XT Petrol	₹ 5.99 lakhs	2 (Driver & Co-Driver)

Base variant costs INR 4.64 L and the lowest airbag variant costs INR 5.43 L

Hyundai i20 Elite

Hide common features
 Highlight differences

 Hyundai Elite i20 Era 1.2 Price: ₹ 4.90 lakhs Ex-showroom, New Delhi On-Road Price	 Hyundai Elite i20 Magna 1.2 Price: ₹ 5.42 lakhs Ex-showroom, New Delhi On-Road Price	 Hyundai Elite i20 Sportz 1.2 Price: ₹ 5.94 lakhs Ex-showroom, New Delhi On-Road Price	 Hyundai Elite i20 Sportz 1.2 (O) Price: ₹ 6.25 lakhs Ex-showroom, New Delhi On-Road Price
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Overview Features Specification Colours

SAFETY

Airbags	×	×	1 (Driver Only)	1 (Driver Only)
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Base variant costs INR 4.90 L and the lowest airbag variant costs INR 5.94 L

Volkswagen New Polo

Hide common features
 Highlight differences

 Volkswagen Polo Trendline 1.2L (P) ▾ Price: ₹ 5.01 lakhs Ex-showroom, New Delhi On-Road Price	 Volkswagen Polo Comfortline 1.2L (P) ▾ Price: ₹ 5.59 lakhs Ex-showroom, New Delhi On-Road Price	 Volkswagen Polo Highline 1.2L (P) ▾ Price: ₹ 6.09 lakhs Ex-showroom, New Delhi On-Road Price	
Overview	Features	Specifications	Colour
SAFETY			
Airbags	2 (Driver & Co-Driver)	2 (Driver & Co-Driver)	2 (Driver & Co-Driver)

Base variant costs INR 5.01 L and includes airbags

Cost comparison (in lakhs)

VARIANTS & COST	Punto	Elite i-20	Zest	New Polo (2014)
Base Variant	4.56	4.90	4.64	5.01
Lowest Variant with airbags	6.66	5.94	5.43	5.01
Difference (in lakhs)	2.1	1.04	0.79	0

- Variant with airbags is usually a high end variant.
- Packaged with a lot more features adding up to the cost.

Hence, airbag equipped cars in India seem expensive.


Comparison of base variants by Model Year - VW Polo

Home > Volkswagen > Polo [2012-2014]

Volkswagen Polo [2012-2014]

Discontinued

Base variant of VW Polo 2012-2014 Model Year did not have airbags as standard equipment.



Last recorded price: ₹4.96 - 8.11 lakhs

Volkswagen has discontinued the Polo [2012-2014] and the car is out of production.

★★★★☆ 3.3 / 5 based on 168 reviews | Write a review

Like 0 +1 0

Volkswagen Polo New 2014 model

Overview On Road Price Reviews Photos Colours Versions More



Price: ₹5.01 - 7.39 lakhs
Ex-showroom, New Delhi

EMI: ₹ 9,277/-
For a loan of ₹ 4,25,851 @ 11.5% over 60 months

★★★★☆ 3.7 / 5 based on 6 reviews | Write a review

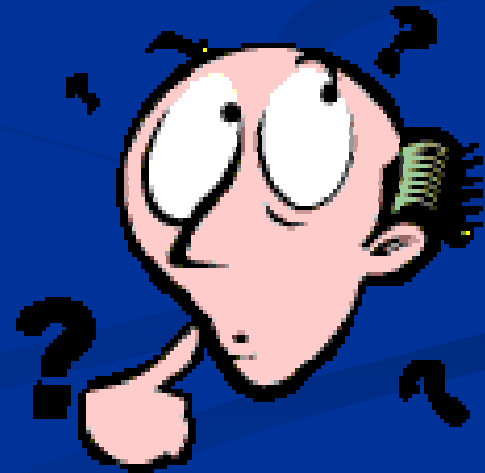
Check On-road Price

Airbags for just INR 5000?

Technology can be expensive if...

- Packaged with unessential items.
- You are unsure whether it solves the problem.
- The problem to be addressed is not correctly identified.

*But how do you identify
the safety problem accurately?*

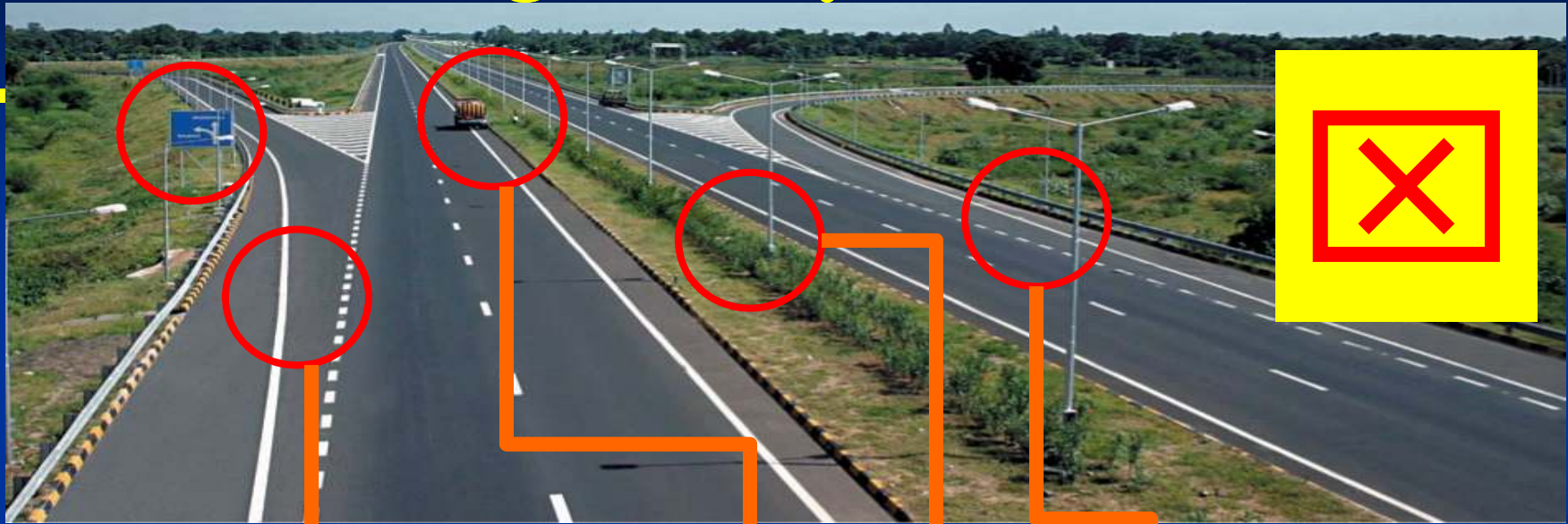


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What looks bad may not be unsafe



What looks good may not be safe



Back to the Airbag Example

- “Frontal air bags have saved 25,782 lives between 1987 and 2008. However, they are supplemental safety devices. Always wear your seat belt.”

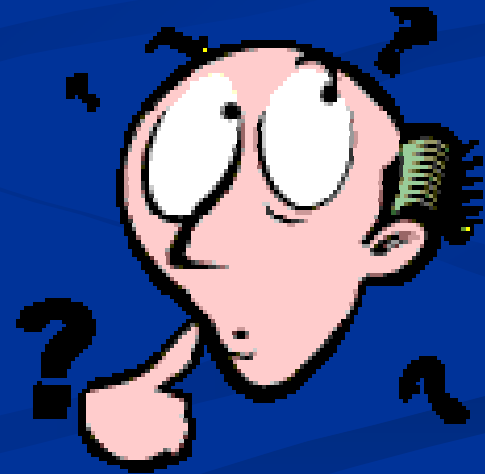
Safecar.gov (NHTSA, USA)

- *Is the same true for India?*
- *In-depth accident data collection is required.*

Identification of safety problems

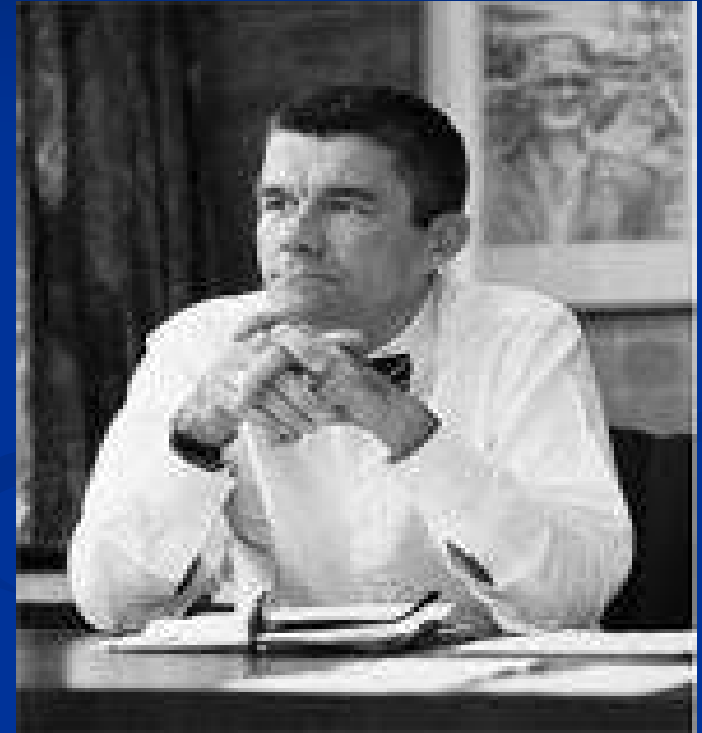
- A data-driven approach
- Study accidents as soon as they have occurred
- Collect accident/incident data systematically

*How to collect
accident data systematically?*



The Haddon Matrix

- Created by Dr. William Haddon Jr.
- A physician and doctor
- Widely considered to be the father of modern injury epidemiology
- Developed in the late 1950s



Dr. William Haddon Jr.

Source: www.icadts.org

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A structured approach

The Haddon Phase-Factor Matrix

	Human	Agent & Carrier	Environment	
			Physical	Social
Pre-Event				
Event				
Post-Event				

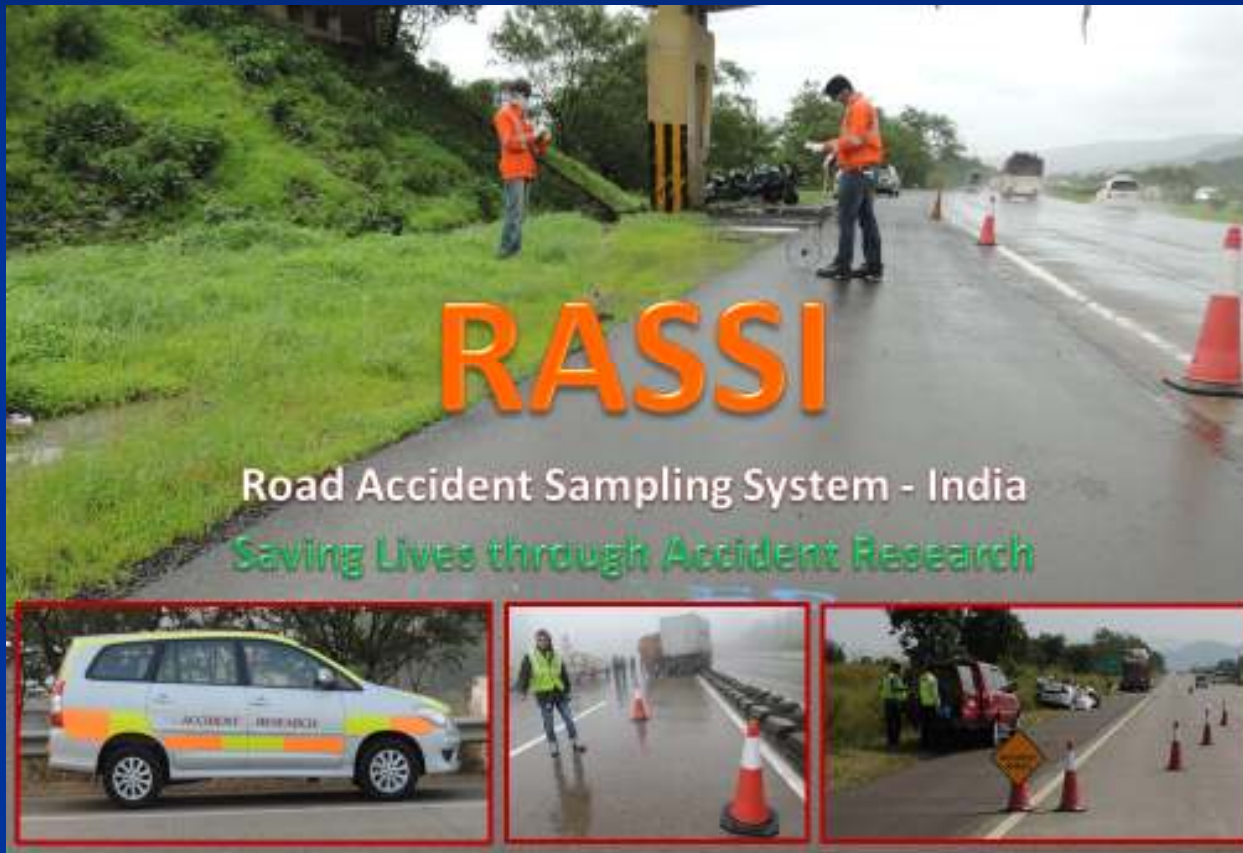
HADDON MATRIX FACTORS FALLS (EXAMPLE)				
PHASES	HUMAN	VEHICLES AND EQUIPMENT	ENVIRONMENT	
			PHYSICAL ENVIRONMENT	SOCIO-ECONOMIC ENVIRONMENT
PRE-INJURY PHASE (pre-event)	Age Alcohol or drug intoxication or use Training/experience Safety equipment Fatigue Size and strength of the worker	Type of ladder Size/weight/power ladder Safety equipment installed on scaffolding or ladder 1 st aid kit	Working condition Weather conditions (rain, snow, ice, heat, sleet, wind) Time of day Visibility (light conditions, fog, rain, time of day)	Laws and regulations Affordability of safety equipment (and type purchased) Insurance incentives Peer pressure Ladder safety course availability
INJURY PHASE (event)	Protective Equipment Experience Training Size of person	1 st aid kit	Type of loading surface	Place of fall Proximity to hospital/trauma center
POST-INJURY PHASE (post event)	Availability of EMS/1 st responders Training of EMS or 1 st responder personnel Condition of the worker	Availability of EMS personnel and equipment (ambulance, life-flight) Post-fall analysis First aid kit available on-site?	Weather conditions Visibility Working surface (gravel, dirt, mud, snow, ice etc...) Analysis of the physical conditions (construction site, walkways)	Ability to notify EMS (cell phones, 911) Laws implemented? Training and education of other workers?

Source:

http://blog.lib.umn.edu/muss0043/falls/assets_c/2011/04/Haddon%20Matrix%2004252011-79132.html

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The Haddon Matrix for Road Accidents



As part of our on-site crash investigation and accident data collection studies, JPRI researchers use the Haddon Matrix to understand and analyze accidents.

Initiated in 2011, the RASSI project is currently running in Coimbatore, Pune and Ahmedabad.

Hope to be in Kolkata soon!

www.jpresearchindia.com/rassi.html

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The Haddon Matrix for Road Accidents

		Factors		
Phase		Human	Vehicles and equipment	Infrastructure / Environment
Pre-crash	Crash prevention	Information Attitudes Impairment Police enforcement	Roadworthiness Lighting Braking Handling Speed management	Road design and road layout Speed limits Pedestrian facilities
Crash	Injury prevention during the crash	Use of restraints Impairment	Occupant restraints Other safety devices Crash protective design	Crash-protective roadside objects
Post-crash	Life sustaining	First-aid skill Access to medics	Ease of access Fire risk	Rescue facilities Congestion

Mumbai Pune Expressway Example

Pre-Crash

Human (81.5%)	Vehicle (19.5%)	Infrastructure (24.5%)
<ul style="list-style-type: none">• Driver Sleep/Fatigue (29%)• Speeding (30%)• Lane changing (8%)	<ul style="list-style-type: none">• Brake fade in trucks (11%)• Tire bursts (5%)	<ul style="list-style-type: none">• Poor road markings/signage (9%)• Narrow or no shoulders (8%)• Sharp curvature (7%)• Inadequate warning about accident/broken down vehicles (7%)

Crash Phase

Human (50%)	Vehicle (80%)	Infrastructure (41%)
<ul style="list-style-type: none">• Seat belt not used (46%)• Overloading (6%)	<ul style="list-style-type: none">• Passenger compartment intrusion (73%)• Seat belts not available/usable (16%)	<ul style="list-style-type: none">• Object impacts with roadside and median manmade structures (28%)• Roadside steep slopes / dropoffs (12%)

Source:

Mumbai – Pune Expressway Road Accident Study Report (2013),
JP Research India Pvt. Ltd.

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Summary

- Technology is cost effective in improving safety when:
 - It is not packaged with additional non-essential features.
 - The problem it hopes to solve is identified correctly with data.
- To identify the problems accurately and systematically it is important to:
 - Investigate accidents on-site and as soon as they occur, and
 - Determine accident and injury factors using the Haddon Matrix.

THANK YOU!

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