



Digital Product Safety: Rejecting Software as Magic

August 2025



ENIGMA.

A USENIX CONFERENCE

INTERNET
SAFETY
//ABS

A 501(c)3 non-profit organization 84-4115719

Internet Safety Labs 2025



magic

/məj'ɪk/

noun

1. The exercise of sleight of hand or conjuring, as in making something seem to disappear, for entertainment.



Magic as metaphor.



“Any sufficiently advanced technology is indistinguishable from **magic**.”

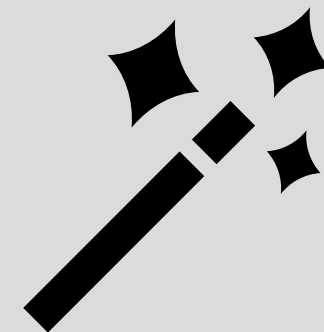
– Arthur C. Clarke



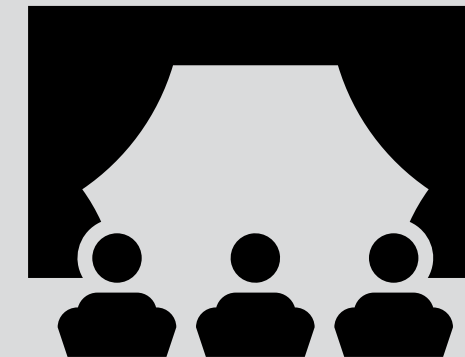
Magic is deliberate deception.



The Deceiver



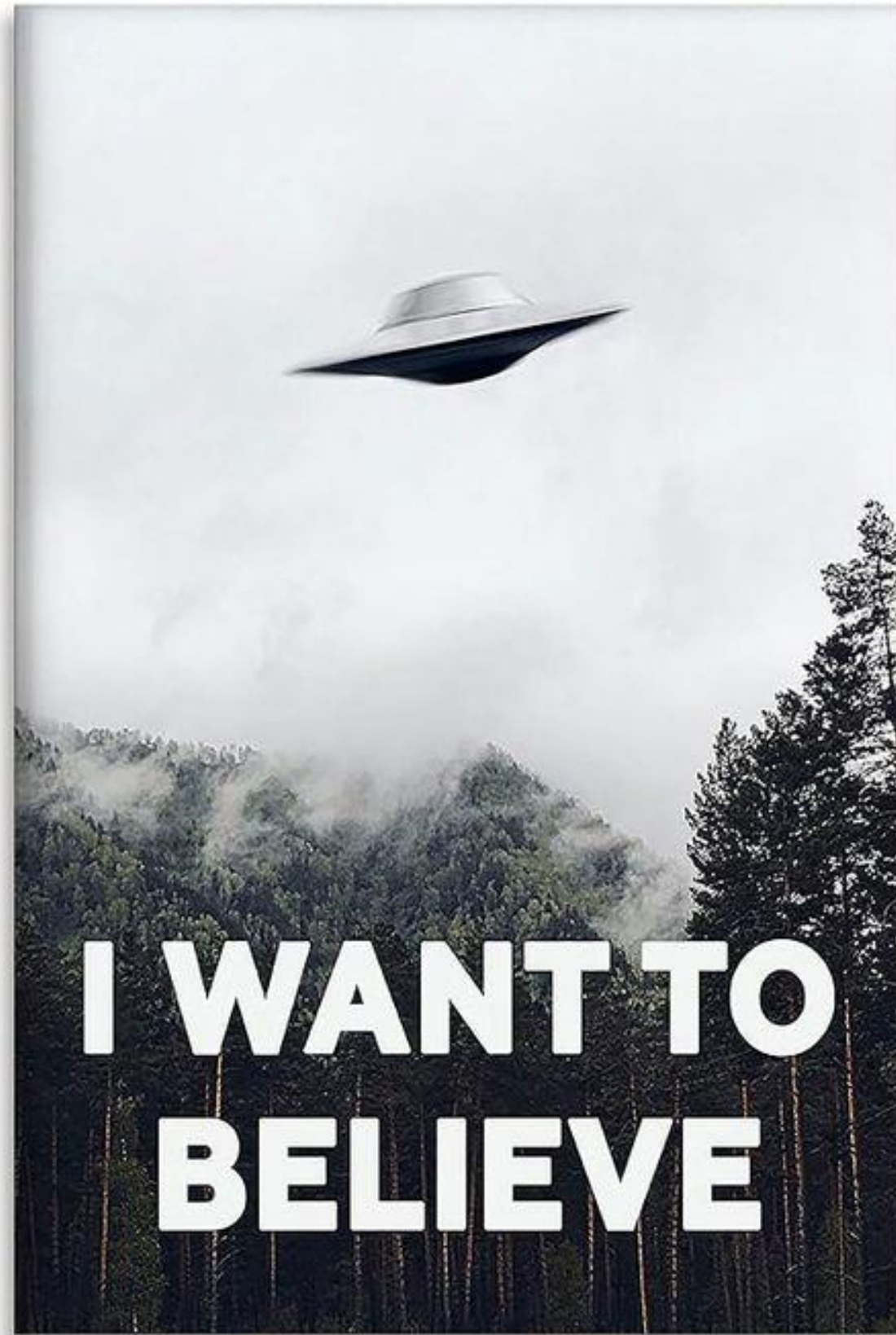
The Deception
(or Trick)



The Deceived




We know we're being
deceived.

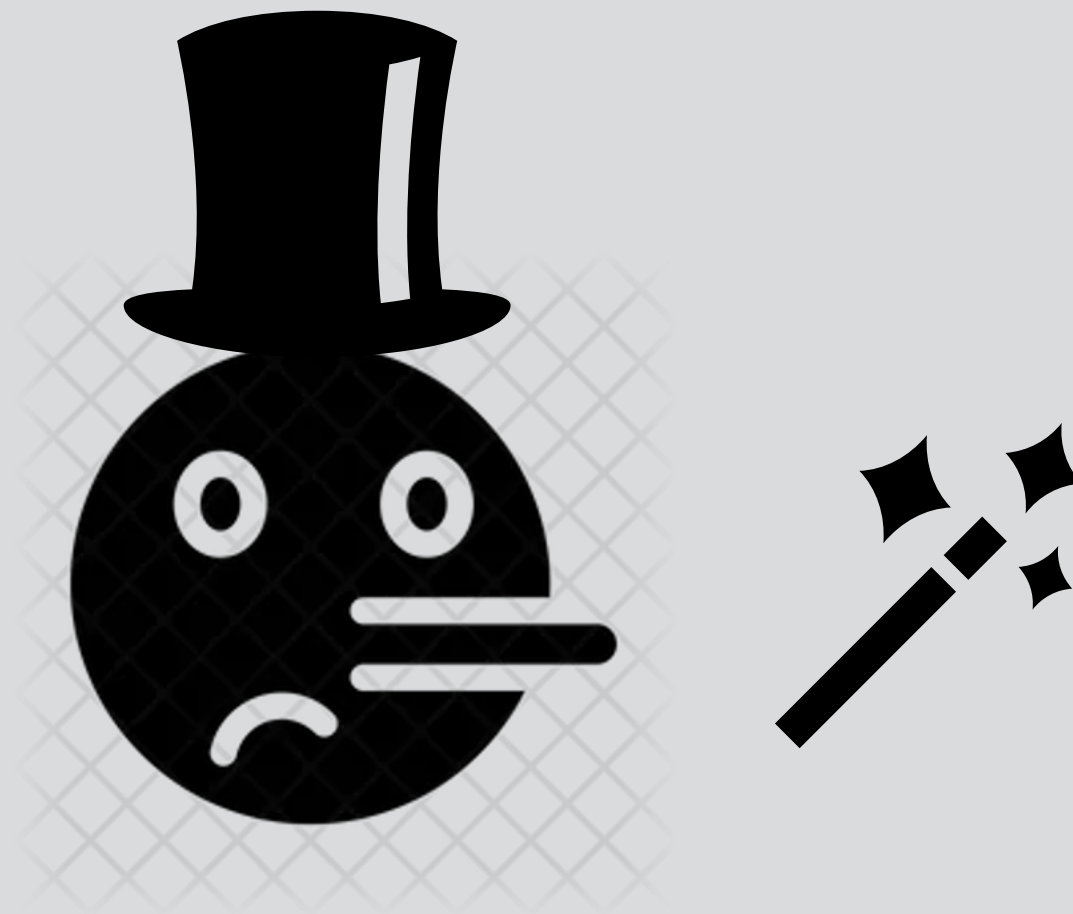




The spell is broken
when we
understand the trick.



What about when deception is masked?



The Deceiver

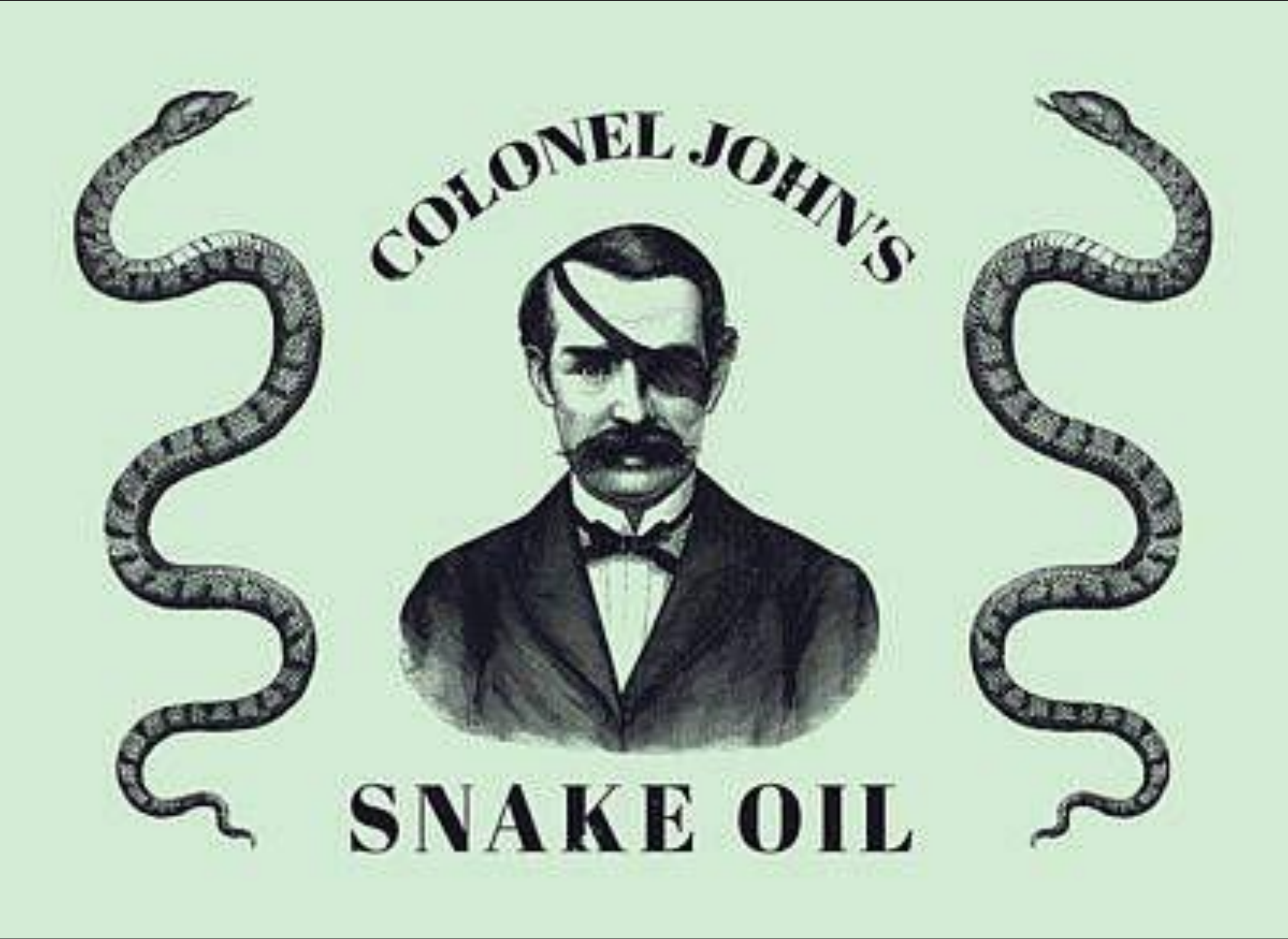


swindle

/swɪn'dl/

intransitive verb

1. To cheat or defraud of money or property.
2. To obtain by fraudulent means.
3. To practice fraud as a means of obtaining money or property.



Edward Bernays




- ◆ Bacon (early 1920s)
- ◆ American Tobacco Company (1928)
 - ◆ “Torches of Freedom”
- ◆ Authored:
 - ◆ *Crystallizing Public Opinion* (1923)
 - ◆ *Propaganda* (1928)
 - ◆ “Manipulating Public Opinion: The Why and the How” (1928)
 - ◆ *The Engineering of Consent* (1955)



“Our product is doubt.”

– The tobacco industry 1953



2006

V. DEFENDANTS DEvised AND EXECUTED A SCHEME TO DEFRAUD CONSUMERS AND POTENTIAL CONSUMERS OF CIGARETTES IN MOST, BUT NOT ALL, OF THE AREAS ALLEGED BY THE GOVERNMENT 219

A. Defendants Have Falsely Denied, Distorted and Minimized the Significant Adverse Health Consequences of Smoking for Decades 219

1. Cigarette Smoking Causes Disease 219

2. Scientific Research on Lung Cancer up to December 1953 222

a. Scientists Investigating the Rise in the Incidence of Lung Cancer Linked Smoking and Disease before 1953 222

b. By 1953, Defendants Recognized the Need for Concerted Action to Confront Accumulating Evidence of the Serious Consequences of Smoking 232



Industry “magic”.

Tobacco's Product Safety Resistance Playbook

- ◆ Obfuscate, deny, and sow doubt
 - ◆ **Discredit and weaponize science**
 - ◆ Attack research
 - ◆ Personally attack researchers
 - ◆ Fund academic “experts” & research
 - ◆ Spread fear of loss of personal agency and socialism
 - ◆ **Trade secrets**
- ◆ Deflect
 - ◆ **User’s fault, “DIY Safety”**
- ◆ Control
 - ◆ **Industry-funded standards**
 - ◆ **Influence of government / government capture**
 - ◆ **Unclear regulatory owner**
 - ◆ **Weaponize advertising**
- ◆ Foster addiction

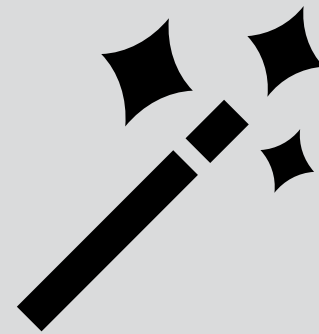
Recent Updates to the Playbook

- ◆ Notice and consent (DIY Safety)
- ◆ Fragmentation
 - ◆ “Privacy” and “Cybersecurity” (Unclear regulatory ownership)
- ◆ “Unknowable” [[Facebook architects 2022](#)]
- ◆ Secrecy in the name of customer privacy
- ◆ Commercial surveillance
 - ◆ Digital / surveillance advertising
 - ◆ “Personalize your website visitor’s experience”

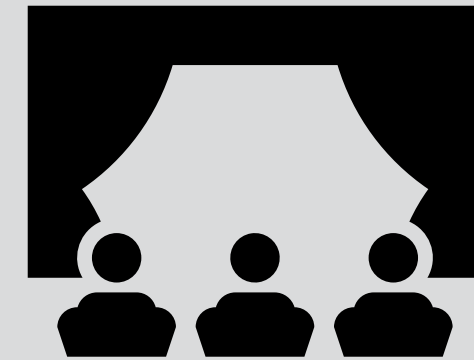
Product Safety: exposing the truth.



The Deceiver



The Deception
(or Trick)



The Deceived



What is product safety?





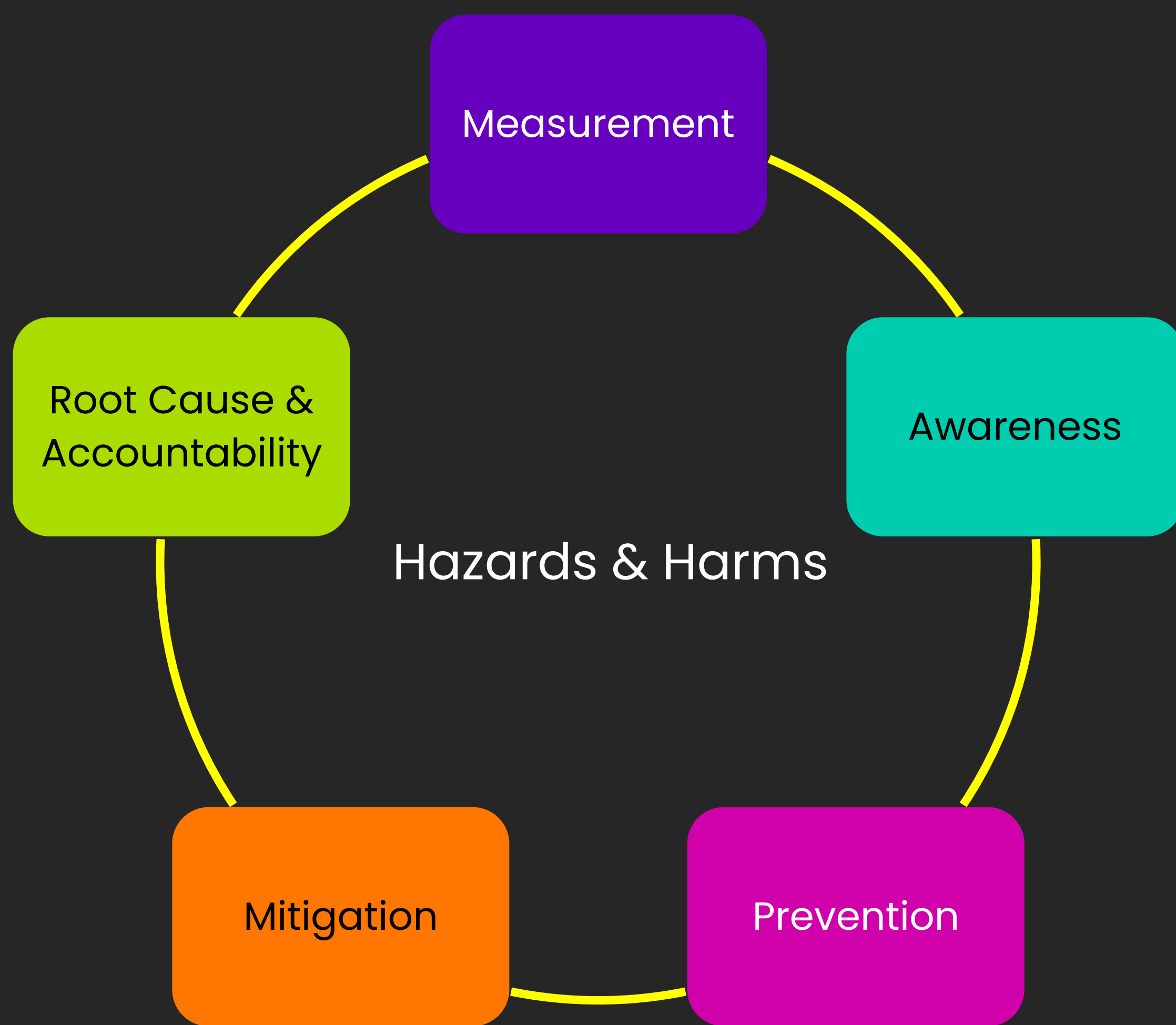
Harms



We want
reasonably safe
products.



Product safety
is a process.





Awareness

HEALTH AND SAFETY SECURE AREA ENTRY CONDITIONS



Port Safety Induction required.



Flashing Beacon and Head Lights ON at all times.



Children Not Permitted.



Speed Limited to 20km/h.



No Public Entry: Authorised Port users only.



Extreme Caution: Heavy Machinery Operating.



No hand held cell phones or mobile devices are to be used while operating vehicles.



Drug and alcohol free site.



Hi Vis Approved Clothing and Protective Footwear must be worn - done up or as designed.



No Bicycles.

HAZCHEM

HAZARDOUS SUBSTANCES PRESENT ON THIS SITE



IN AN EMERGENCY DIAL 111 (FIRE),



Prevention





Mitigation



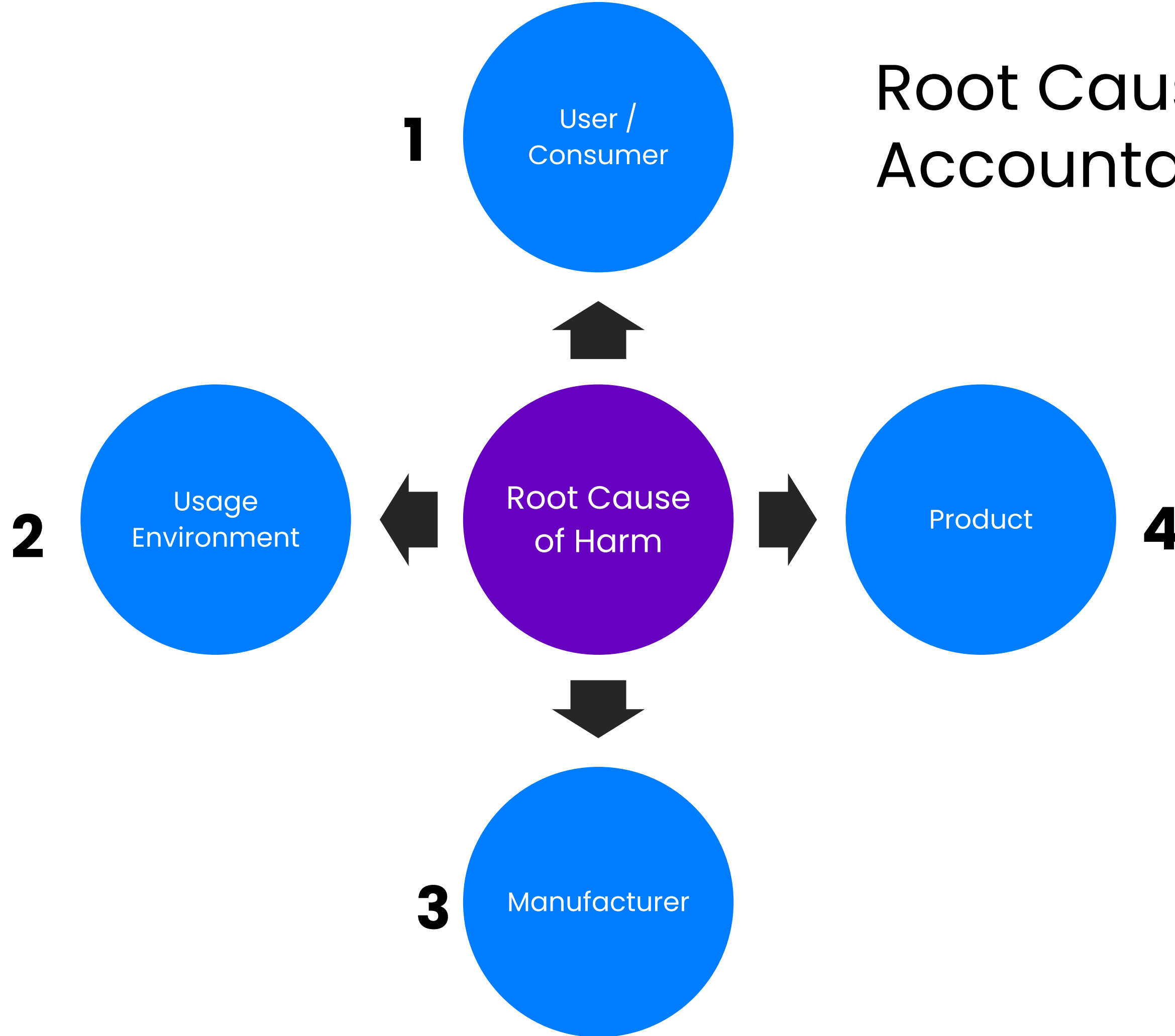


Root Cause & Accountability





Root Cause & Accountability





Product Safety Factors & Actors Automobiles



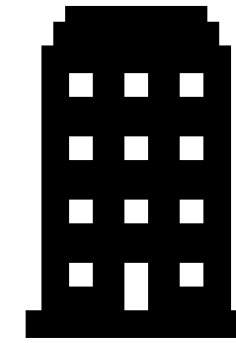
Driver Behavior

- Earliest days of “governance” and research focused on driver behavior.
- Police accident investigations didn’t look at potential vehicle contributions to accidents.
- Auto industry continues to focus on driver education.



Road Conditions

- Auto industry funded both research and road improvement projects



Manufacturer Behaviors

- Corporate responsibility took the form of the funding driver safety and road safety efforts.
- Also creating professional organizations and self-governance standards like the Society of Automotive Engineers, the Automobile Manufacturers Association, etc.



Vehicle Behaviors

- First public call for vehicle accountability in 1935¹. Didn’t happen until the 60s/70s.
- Design scrutiny highly resisted by auto industry.
- Longer term trend (industry push) away from design standardization towards performance standardization.

Measurement

EPA DOT Fuel Economy and Environment Gasoline Vehicle

Fuel Economy MIDSIZE CARS range from 12 to 136 MPG. The best vehicle rates 136 MPG.

32 MPG
combined city/hwy **28** city **37** highway
 3.1 gallons per 100 miles

You save \$1,250
 in fuel costs over 5 years compared to the average new vehicle.

Annual fuel cost \$1,250

Fuel Economy & Greenhouse Gas Rating (tailpipe only) **Smog Rating** (tailpipe only)

7 / 10 7 / 10

GOVERNMENT 5-STAR SAFETY RATINGS

Overall Vehicle Score Based on the combined ratings of frontal, side and rollover. Should ONLY be compared to other vehicles of similar size and weight.	Not Rated
Frontal Crash Based on the risk of injury in a frontal impact. Should ONLY be compared to other vehicles of similar size and weight.	Not Rated
Side Crash Based on the risk of injury in a side impact.	Not Rated
Rollover Based on the risk of rollover in a single-vehicle crash.	Not Rated

DELIVERY

VEHICLE COLORS:
 EXT: 2TONEWHTBLKROOF
 INT: SPORT

FINAL ASSEMBLY POINT:
 AGUAS(ABV.)MEX

TRANSPORT METHOD:
 TRUCK

DEALER:
 NISSAN NORTH AMERICA, INC
 1 NISSAN WAY
 FRANKLIN TN
 37067

Security+Plus Extended Protection Plan
 The only service agreement backed by Nissan Extended Services North America! Ask your dealer for details, or call 1-800-NISSAN-1 for more information.

VIN: 3N1AB8DV8LY206263
 EMS: 50 STATE EMISSIONS
 MDL: 12210-206263 XAB-Z
 OPT: D-P01N92C03E08L92

20200117091606RLCV11

WWL-4-NNA-BlueBar (3/1)

Nutrition Facts

8 servings per container
Serving size 2/3 cup (55g)

Amount per serving

Calories 210

% Daily Value*

Total Fat 8g	10%
Saturated Fat 1g	5%
Trans Fat 0g	
Cholesterol 0mg	0%
Sodium 160mg	7%
Total Carbohydrate 37g	13%
Dietary Fiber 4g	14%
Total Sugars 12g	
Includes 10g Added Sugars	20%
Protein 3g	
Vitamin D 2mcg	10%
Calcium 260mg	20%
Iron 8mg	45%
Potassium 235mg	6%

2022 FORD ESCAPE

SUV FWD

IMAGE NOT AVAILABLE **8** RECALLS **2** INVESTIGATIONS **165** COMPLAINTS **★★★★★** OVERALL SAFETY RATING

2022 FORD ESCAPE SUV FWD

IMAGE NOT AVAILABLE

8 RECALLS **2** INVESTIGATIONS **165** COMPLAINTS

★★★★★ OVERALL SAFETY RATING

Safety Ratings.
 NHTSA's 5-Star Safety Ratings help consumers compare vehicle safety when searching for a car. More stars mean safer cars.



FRONTAL CRASH SIDE CRASH ROLLOVER

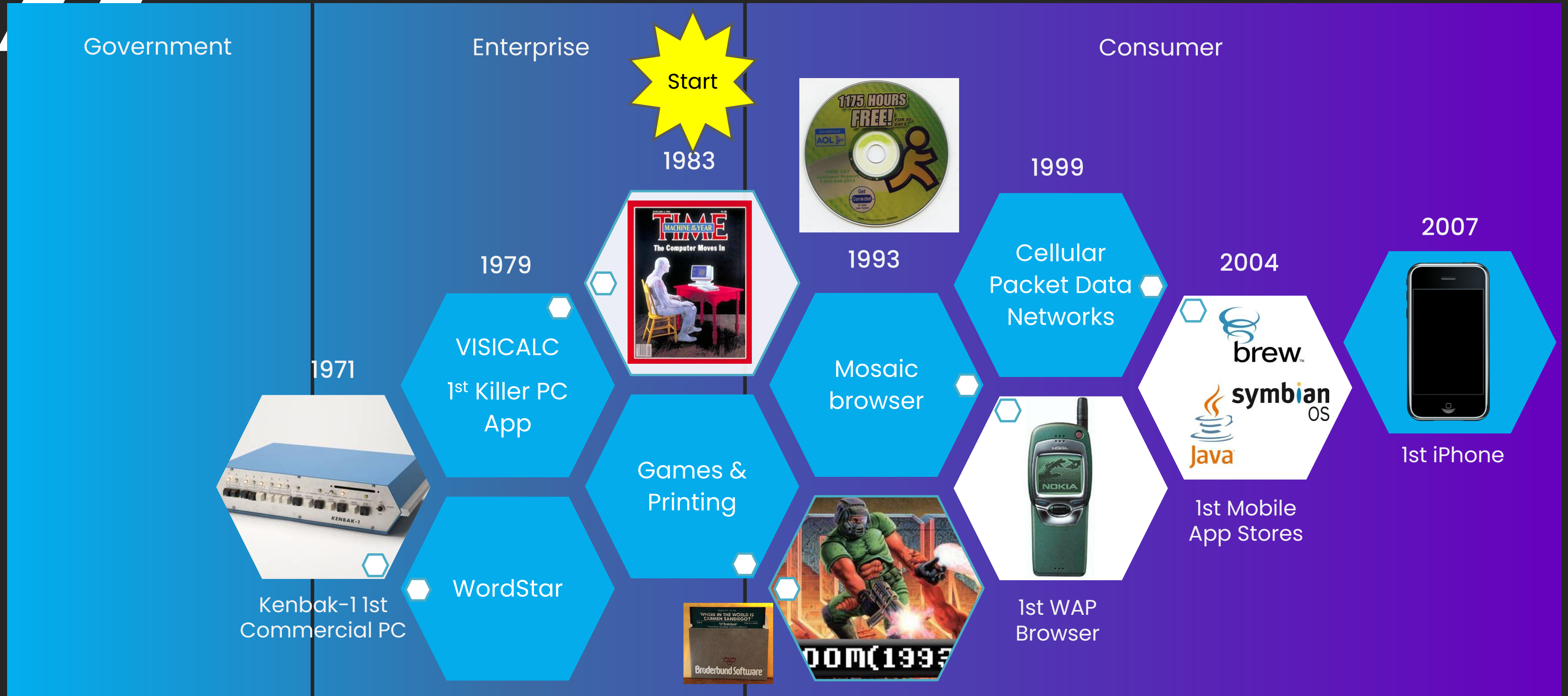
Overall Frontal Star Rating ★★★★★
 Combines driver and front passenger frontal barrier ratings into a single frontal rating. Frontal Barrier Star Ratings: The frontal barrier test simulates a head-on collision between two similar vehicles. The test vehicle is crashed into a flat, rigid barrier at 35 mph.

Frontal Barrier Star Ratings	Driver	★★★★★
	Passenger	★★★★★



Product safety
regulations emerge
50 years after
mass production.

HISTORY OF CONSUMER DIGITAL PRODUCTS



# PCs (cum. ww sales)	1.04M	10.9M	169.6M	618.5M	1,372M	2,101M
# Video Game Consoles (cum. ww sales)	0.87M	15.5M	194.0M	368.3M	578.8M	673.5M
# Mobile Phones (cum. ww sales)	0	0	14M	704.8M	3,134M	6,095M



Digital products
are
a **new** ballgame.



Digital Products

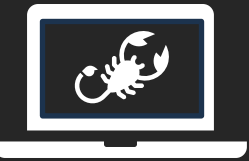


- ◆ Software
 - ◆ Hardware substrate
- ◆ Internet-connected
 - ◆ Needs infrastructure
- ◆ Interact with human users
 - ◆ Hardware-enabled



Since software can
behave,
it can **harm**.

Landscape of Digital Product Hazards & Harms

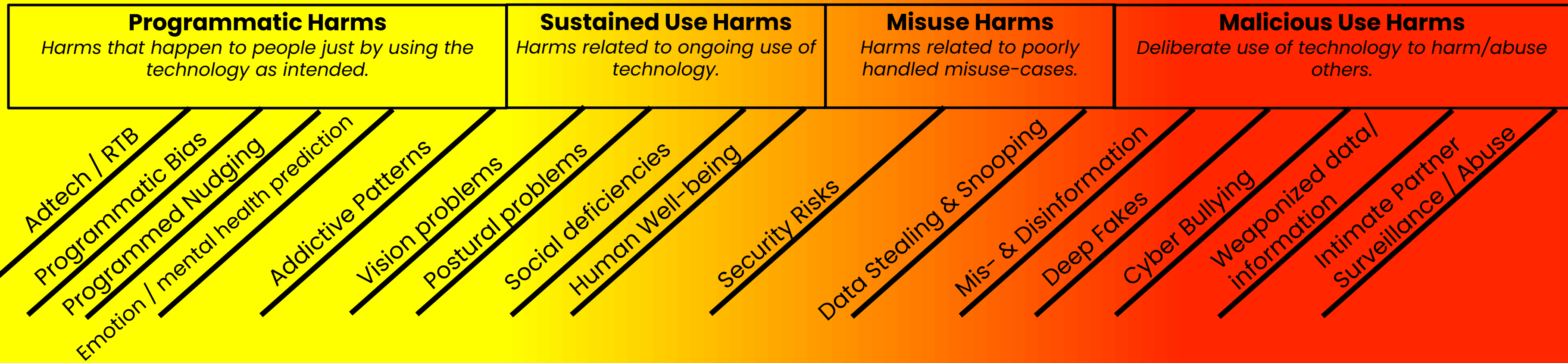


Hazardous or Harmful **Product** Behavior

Harmful **Human** Behavior

Programmatic Harms

Cybercrime





When is she going
to talk about
cybersecurity?



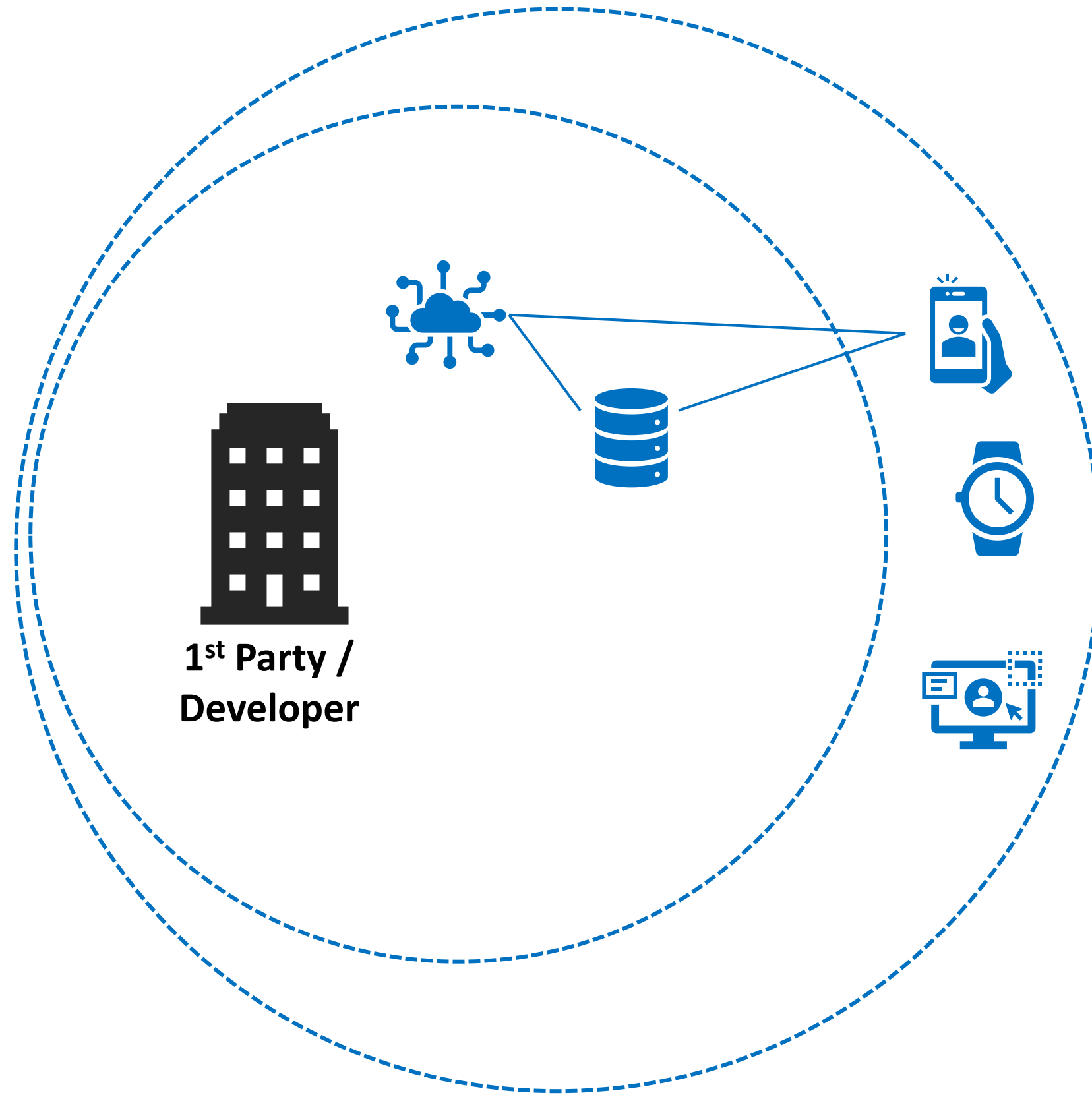
Safety and security are
not
the same thing.



“Risk”
for whom?



Cybersecurity is
harm risk management from the
business'
point of view.



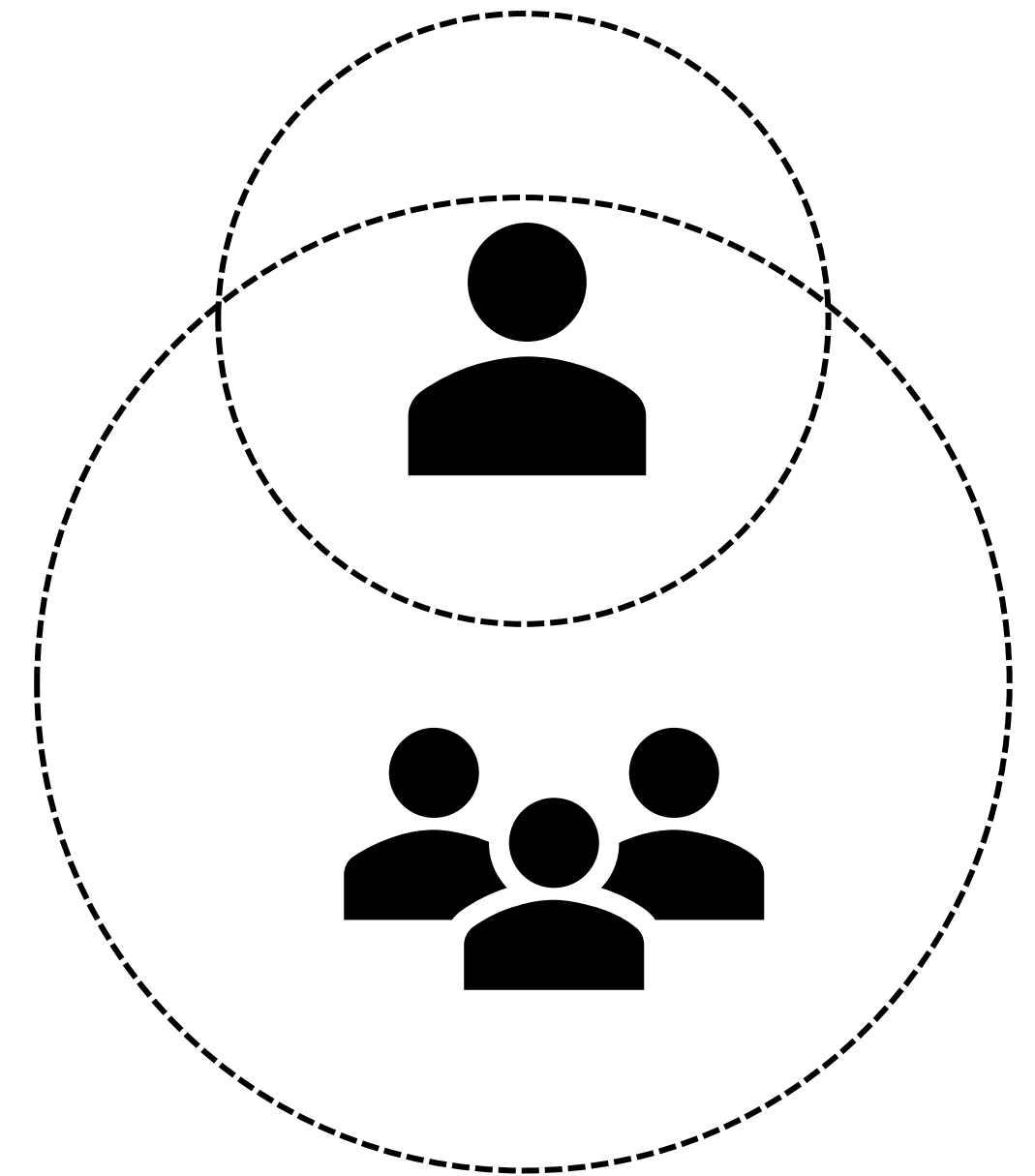
Cybersecurity ensures the product behaves as intended.



Safety is
harm risk management from the
human's
point of view.



Product safety ensures that the intended product behavior isn't unreasonably harmful.



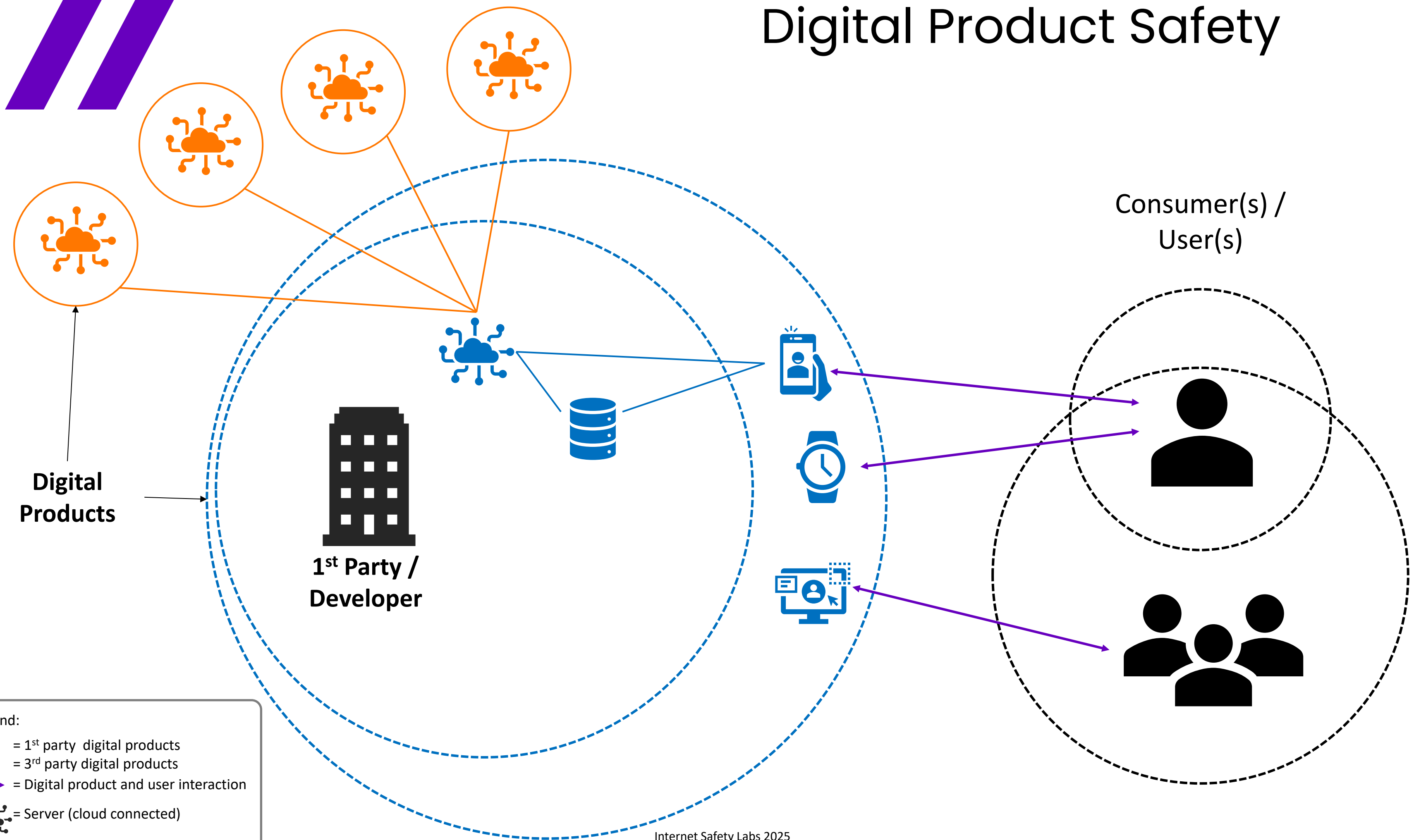


Digital Product Safety and Security

	Security	Safety
Risk minimization / orientation	<p>Most focus on external threats.</p> <p>Root cause analysis.</p> <p>Threat modeling.</p>	<p>Most focus on intrinsic hazards of product.</p> <p>Root cause analysis <i>plus</i> downstream effects of hazards.</p> <p>Harm modeling.</p>
Adversely impacted by software complexity.	<p>Software behavior increasingly difficult to predict.</p> <p>Deterministic but not predictable.</p>	
Control of third-party software behavior.	<p>Mature security standards. Efficacy of standards and compliance?</p>	<p>Inadequate safety requirements and monitoring of compliance.</p>
Unique risks related to user identification.	<p>Attack surfaces.</p>	<p>Surveillance.</p>
User interface/experience challenges.	<p>Finding balance on right amount of friction.</p> <p>Changing user ideas around friction. "Friction reduces risk."</p>	

RSA 2022 "Where Humane Technology and Secure Technology Meet"
<https://internetsafetylabs.org/resources/presentations/isl-rsaconference-2022-where-humane-technology-secure-technology-meet/>

Digital Product Safety



Product Safety Mechanisms

<p>Markets</p>	<p>Insurance Corporate Governance Consumer Education Product Engineers & Development Norms Industry Standards / Voluntary Standards</p>
<p>Judicial System - private law</p>	<p>Contract Law Tort Law Administrative Law</p>
<p>Political System - public law</p>	<p>Product Safety Regulation Mandatory standards: Design originally, now more performance related Content & Information Labels Warning Labels Mandatory accident/incident disclosure Bans Recalls General Criminal Law Environmental or labor law</p>
<p>Consumer Action</p>	<p>Boycotts Awareness and Safety Demands</p>

Adapted from "Product safety regulation", Luke Nottage, pg. 264, *Handbook of Research on International Consumer Law*, 2010.



De-magic.





<https://appmicroscope.org/>

App Safety Facts - Privacy Risk Details

3RD PARTY SHARING DETAILS

Observed Network Traffic ⓘ

Aggregator Platforms Receiving Data:

Facebook
Google
Twitter
Amazon
Microsoft
Adobe

Risk	Company	# of Domains	Categories	App Outbound Call %
	Lotame	3	Advertising / Marketing (2), Ad Tracking	0.4%
	Bombora	1	Advertising / Marketing	0.1%
	Media.net	6	Advertising / Marketing (6)	0.5%
	Nielsen Marketing	5	Advertising / Marketing (5)	0.5%
	Yahoo	9	Advertising / Marketing (6), SSP, Content Delivery Network (2)	1.7%
	OpenX	4	Advertising / Marketing (3), Ad Network	0.6%
	Oracle	2	Advertising / Marketing (2)	0.2%
	Taboola	9	Ad Tracking (2), Advertising / Marketing (7)	1.2%
	Zeta Global	1	Advertising / Marketing	0.1%
	MaxPreps	3	Advertising / Marketing (3)	0.8%
	Twitter	2	Advertising / Marketing (2)	0.2%
	GumGum	5	Advertising / Marketing (4), Ad Network	0.7%
	Freewheel	5	Advertising / Marketing (5)	0.8%
	Magnite	3	Advertising / Marketing (3)	1.1%
	Wunderkind	3	Advertising / Marketing (3)	0.4%
	AdRoll	1	Advertising / Marketing	0.2%
	LiveRamp	2	Advertising / Marketing, Location / Proximity / Beacon / Geofencing	0.2%
	PubMatic	11	Advertising / Marketing (11)	1.6%
	Adobe	4	Ad Tracking, Advertising / Marketing (3)	0.6%
	Tapad	3	Advertising / Marketing (3)	0.4%
LiveIntent	4	Advertising / Marketing (4)	0.5%	
Intent IQ	3	Advertising / Marketing (2), Ad Tracking	0.3%	
Criteo	2	Advertising / Marketing (2)	0.7%	
The Trade Desk	4	Advertising / Marketing (4)	0.3%	
PulsePoint	1	Advertising / Marketing	0.2%	
Merkle Marketing	1	Advertising / Marketing	0.1%	
LoopMe	1	Advertising / Marketing	0.1%	
Outbrain	1	Advertising / Marketing	0.1%	
Zeotap	2	Advertising / Marketing (2)	0.2%	
Microsoft	4	Advertising / Marketing (4)	0.5%	
Comcast	1	Advertising / Marketing	0.3%	
Treasure Data	1	Advertising / Marketing	0.1%	
Eyeota	1	Advertising / Marketing	0.1%	
StackAdapt	1	Ad Tracking	0.2%	
BounceX	1	SSP	0.2%	
Tealium	1	Advertising / Marketing	0.1%	
ID5	1	Advertising / Marketing	0.2%	

Palm Beach County School Dist - Android
Education Technology > Community Engagement Platform
Owner: Intrado Corporation
Last Tested: April 18, 2022
Schools Using (2022): 1 Elem, 1 Middle, 0 High
Privacy Policy Covers Children Under 13: No

Very High Risk

Score Triggers: ⓘ

- High Risk SDK
- Webview
- Google
- Behavioral Ads
- Facebook
- MaxPreps

App Safety Facts - Summary

PRIVACY RISKS				
Observed Network Traffic ⓘ	This App	App Category Average n=414 ⓘ		
Aggregator Platforms	6	3.7		
Total # of Companies	149	19.9		
Total # of Domains	482	57.9		
Risky Domains	331	29.1		
Data Broker Domains	24	3.7		
Total # of SDKs ⓘ	21	9.2		
Risky SDKs	15	5.2		
Data Broker SDKs	1	0.1		
Risky Behaviors ⓘ	This App	App Category % ⓘ		
Ads	Yes	23.2%		
Behavioral Ads	Yes	11.1%		
Webview	Yes	84.5%		
User Data ⓘ				
Sensitive Permissions	Location, Phone Service, Physical Environment, Files, Join User Identifiers, User Behavior, Social Information			

Digital Product Safety Playbook

- ◆ “Ingredient” Labels
 - ◆ Include all 3rd party libraries/SDKs/APIs in app store labels.
- ◆ Information Labels
- ◆ Warning Labels (they’re coming)
- ◆ Machine-generated behavior reporting
 - ◆ **Software Bill of Materials**
 - ◆ **Record of Processing Activities**
 - ◆ Machine created / machine readable
 - ◆ Include 3rd party

Product Safety Mechanisms

<p>Markets</p>	<p>Insurance Corporate Governance Consumer Education Product Engineers & Development Norms Industry Standards / Voluntary Standards</p>
<p>Judicial System - private law</p>	<p>Contract Law Tort Law Administrative Law</p>
<p>Political System - public law</p>	<p>Product Safety Regulation Mandatory standards: Design originally, now more performance related Content & Information Labels Warning Labels Mandatory accident/incident disclosure Bans Recalls General Criminal Law Environmental or labor law</p>
<p>Consumer Action</p>	<p>Boycotts Awareness and Safety Demands</p>

Digital Product Safety Hazards & Harms

DIGITAL PRODUCT SAFETY HAZARDS AND HARMS			
HAZARD / HARM	HAZARD / HARM TYPE	POTENTIAL INJURY	LABEL TYPE(S)
Personal Information Leakage	<ul style="list-style-type: none"> • Product Behavior Risk • Product Ingredient Risk 	Information weaponization, with every kind of harm from financial to death; manipulation; coercion.	Warning, Ingredient
User Manipulation	<ul style="list-style-type: none"> • Product Behavior Risk 	Buying unwanted things; sharing too much information; coerced consent; psychological manipulation, potentially fatal.	Information, Warning
Unfair treatment of user	<ul style="list-style-type: none"> • Product Behavior Risk 	Unfair pricing; job loss; housing or credit loss.	Information, Warning
Cybercrime facilitation; facilitated predation, bullying, or other malicious behaviors.	<ul style="list-style-type: none"> • Product Behavior Risk • Usage Risk 	Sexual exploitation, abduction, financial crimes, death.	Warning
Misinformation, Disinformation [creation and dissemination]	<ul style="list-style-type: none"> • Information Risk 	Varies from minor to catastrophic, fatal.	Ingredient
Deepfakes (fabricated content) [creation and dissemination]	<ul style="list-style-type: none"> • Information Risk 	Varies from minor to catastrophic, fatal.	Ingredient
Product Information Errors	<ul style="list-style-type: none"> • Product Misinformation 	Varies from minor to catastrophic, fatal.	Information
Risk of product addiction	<ul style="list-style-type: none"> • Usage Risk 	Varies from minor to catastrophic, fatal.	Warning

Digital Product Safety Playbook (cont'd)

⚡ Minimize risks of:

⚡ Personal information leakage

- ⚡ By the product behavior
- ⚡ By malicious external actors

← Privacy

← Security

⚡ Manipulation of user

⚡ Product addiction

⚡ Unfair treatment of user by automated decision-making

⚡ Using product for criminal activity

⚡ Creation & propagation of:

- ⚡ Misinformation, disinformation, and deepfakes

⚡ Product labeling errors and omissions



Technology is NOT Magic

- ◆ Technology is ongoing, cumulative innovation



Technology is NOT Magic

- Technology is ongoing, cumulative innovation
- Transparency is the antidote.



Technology is NOT Magic

- Technology is ongoing, cumulative innovation
- Transparency is the antidote.
- Safety and security aren't the same thing, but they are kin.



Technology is NOT Magic

- Technology is ongoing, cumulative innovation
- Transparency is the antidote.
- Safety and security aren't the same thing, but they are kin.
- Product safety is ongoing, cumulative measurement and innovation.



Technology is NOT Magic

- Technology is ongoing, cumulative innovation
- Transparency is the antidote.
- Safety and security aren't the same thing, but they are kin.
- Product safety is ongoing, cumulative measurement and innovation.
- You have the power to build safer digital products**



We can build a
Digital Product Safety Playbook
together.

Digital Product Safety: Rejecting Software as Magic

Thank You!

Lisa LeVasseur
Internet Safety Labs
lisa.levasseur@internetsafetylabs.org

August 13, 2025
USENIX Enigma 2025