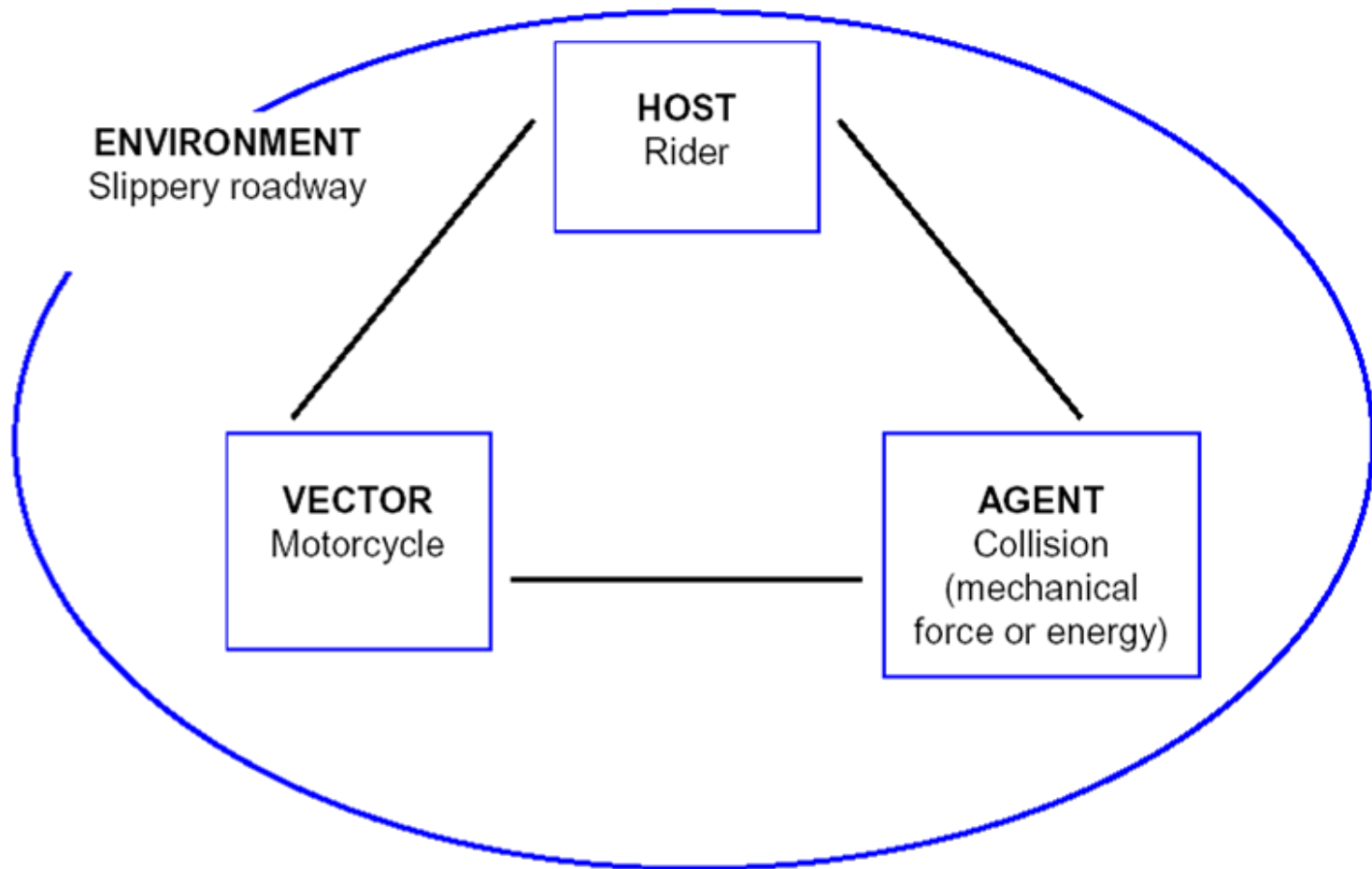# Injury Epidemiology

Epidemiology

- Epidemiology is the study for the distribution and determinants of disease frequency in man

  Macmahon and Pugh(1970)
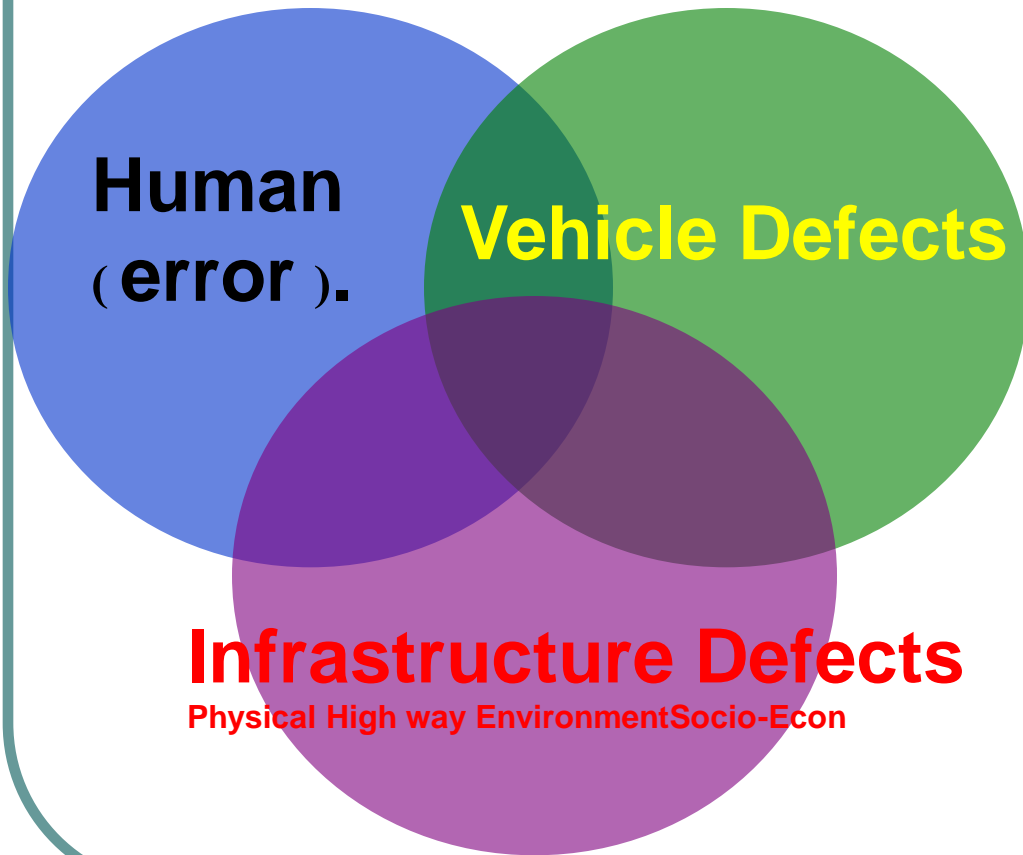
Epidemiological Triangle

INJURY

" AN INJURY IS THE PHYSICAL DAMAGE THAT RESULTS WHEN A HUMAN BODY IS SUDDENLY OR BRIEFLY SUBJECTED TO *INTOLERABLE LEVELS OF ENERGY*. IT CAN BE A BODILY LESION RESULTING FROM ACUTE EXPOSURE TO ENERGY IN AMOUNTS THAT EXCEED THE THRESHOLD OF PHYSIOLOGICAL TOLERANCE , AND IT CAN **BE** *AN IMPAIRMENT OF FUNCTION RESULTING FROM LACK OF ONE OR MORE VITAL ELEMENTS(I.E.,AIR,WARMTH*) AS IN DROWNING,STRANGULATION OR FREEZING. *THE TIME BETWEEN EXPOSURE TO THE ENERGY AND THE APPEARANCE OF AN INJURY IS SHORT*"
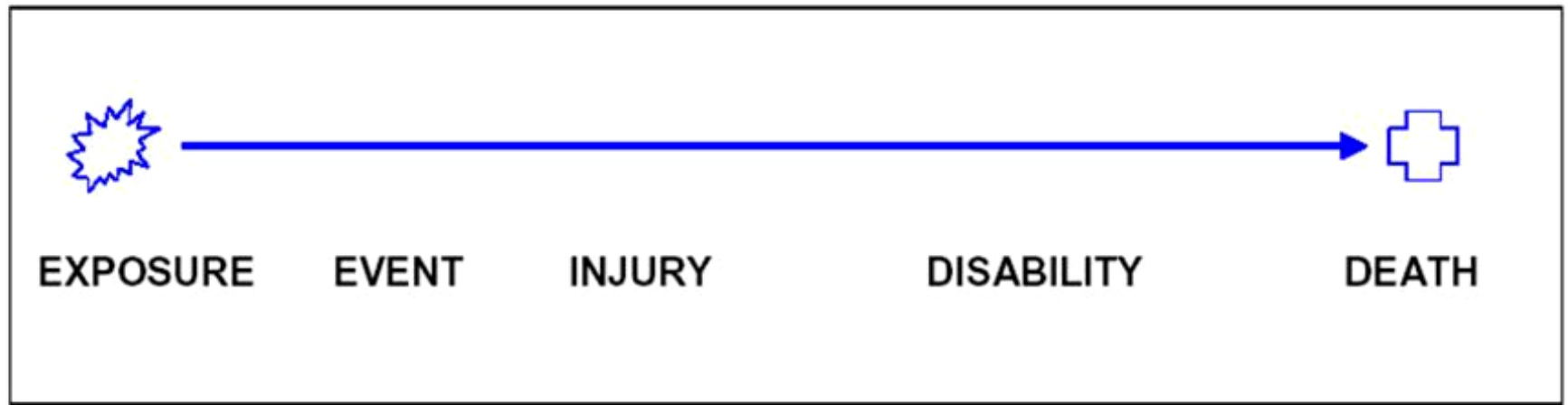
Epidemiology the tool of Road Traffic Injury

Human (**error**).

Vehicle Defects

Infrastructure Defects
Physical High way EnvironmentSocio-Econ

Who

What

When

Why

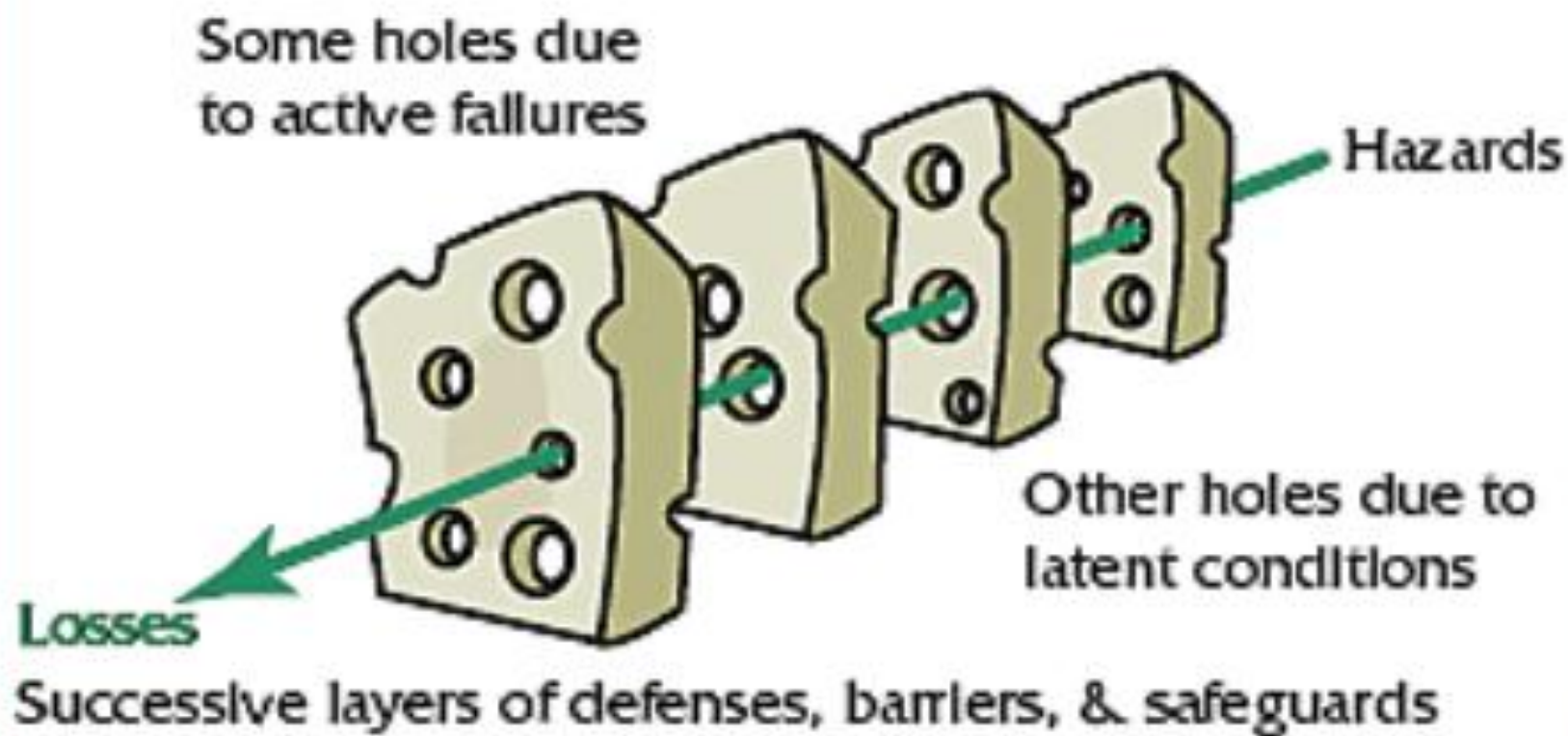Where

How

Injury Spectrum

EXPOSURE　　EVENT　　INJURY　　DISABILITY　　DEATH

ระดับการป้องกัน **Prevention levels**
- **Primary**
- **Secondary**
- **Tertiary**

The Swiss Cheese Model of Accident Causation

Some holes due to active failures

Hazards

Other holes due to latent conditions

Losses

Successive layers of defenses, barriers, & safeguards

Haddon's Matrix

	Human	Vehicle	Environment Physical Socio-Econ.
Pre-event	• SUBSTANCE MISUSE • POOR DRIVING HABITS	• FAULTY BRAKES • BALD TYRES	• SLPPERY ROAD • SOCIAL ACCEPTANCE OF ALCOHOL USING
Event	• NOT WEARING SEAT BELT	• NO AIR BAG	• TREE TOO CLOSE TO THE ROAD
Post-event	• ELDERLY MAN • PRE-EXISTING MEDICAL CONDITION		• SLOW EMERGENCY RESPONSE

	Host	Agent	Environment
Pre – event	Alcohol Use, Education, Enforcing Laws Risk –taking behavior, Medications, Cognitive function,	Technology of safety measures – Brake systems, air bags, tether systems, tire quality, Load weight, Ergonomic controls, Center of gravity, Speed capability	Visibility of hazards, Road condition, Weather, Speed limits, Intersections, Coefficient friction, Signalization Drunk driving laws
Event	Seatbelt use Age, Sex, Bone Density, Stature	Speed of impact, Direction of impact, Vehicle size, Automatic restraints, Airbag, Whiplash lessening seats and head rests,	Speed limits of traffic, Recovery areas, Guard rails, Characteristics of fixed objects, Median barriers, Roadside embankments ts
Post - event	Age, Sex, Medications, Preexisting medical and physical conditions, Social situation	Non collapsible vehicles, Accessibility to evacuate, Alert systems,	911 access, EMS response, Location & quality of ED, D, Access to definitive care, re, Access to rehabilitation n care

Proposed three dimensional Haddon matrix.
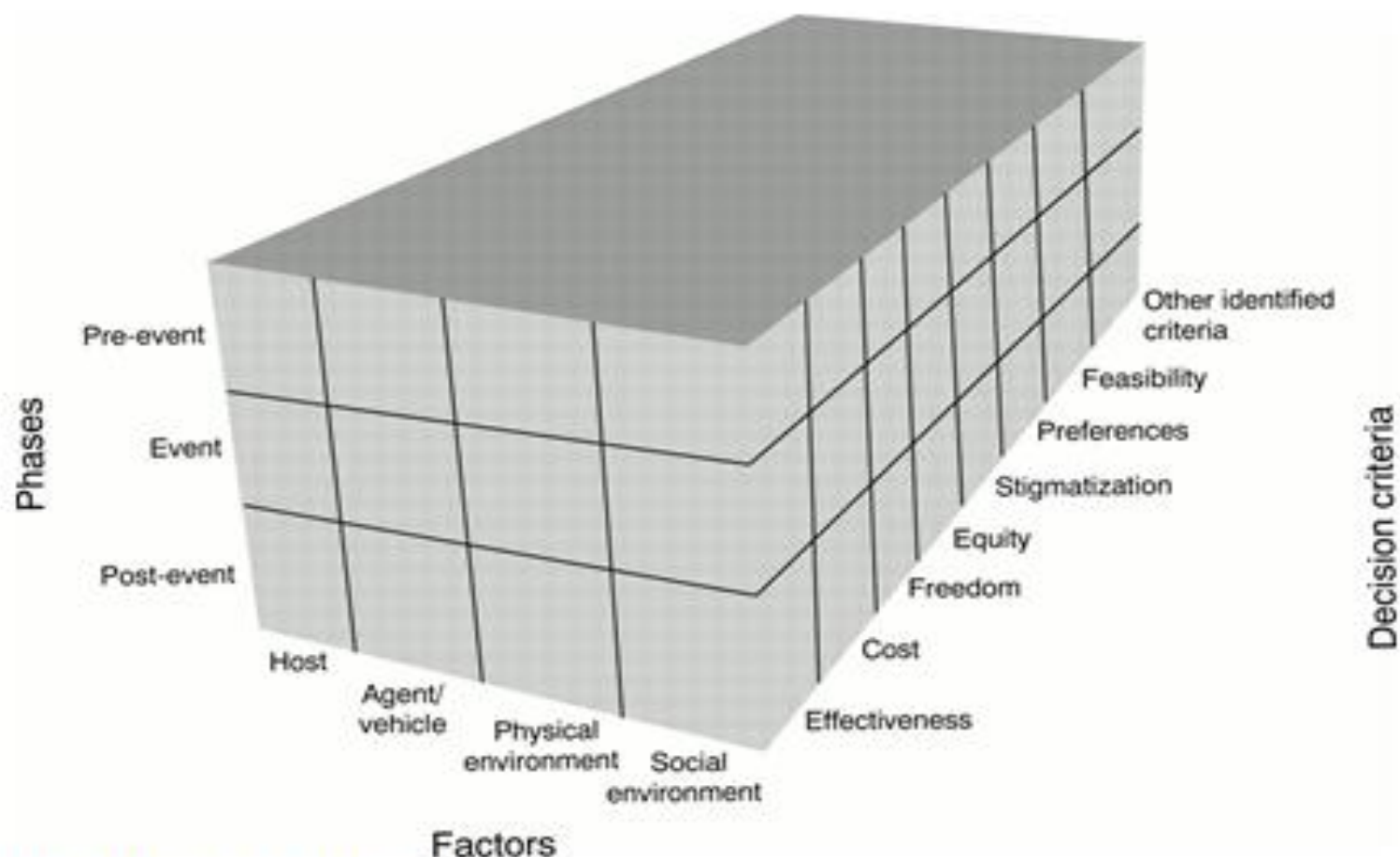
Runyan C W Inj Prev 1998;4:302-307

"**Surveillance serves as the brain and nervous system for programs to prevent and control disease**".

D.A. Henderson,1976

"... one of the highest priorities in injury prevention and treatment is to improve ... capabilities for injury surveillance, interpreting injury data and translating data into policy-relevant terms, and predicting and measuring the effects of interventions."

DEFINITION OF SURVEILLANCE

- Systematic ongoing collection,collation and analysis of data and the timely dissemination of information to those who need to know so that action can be taken.
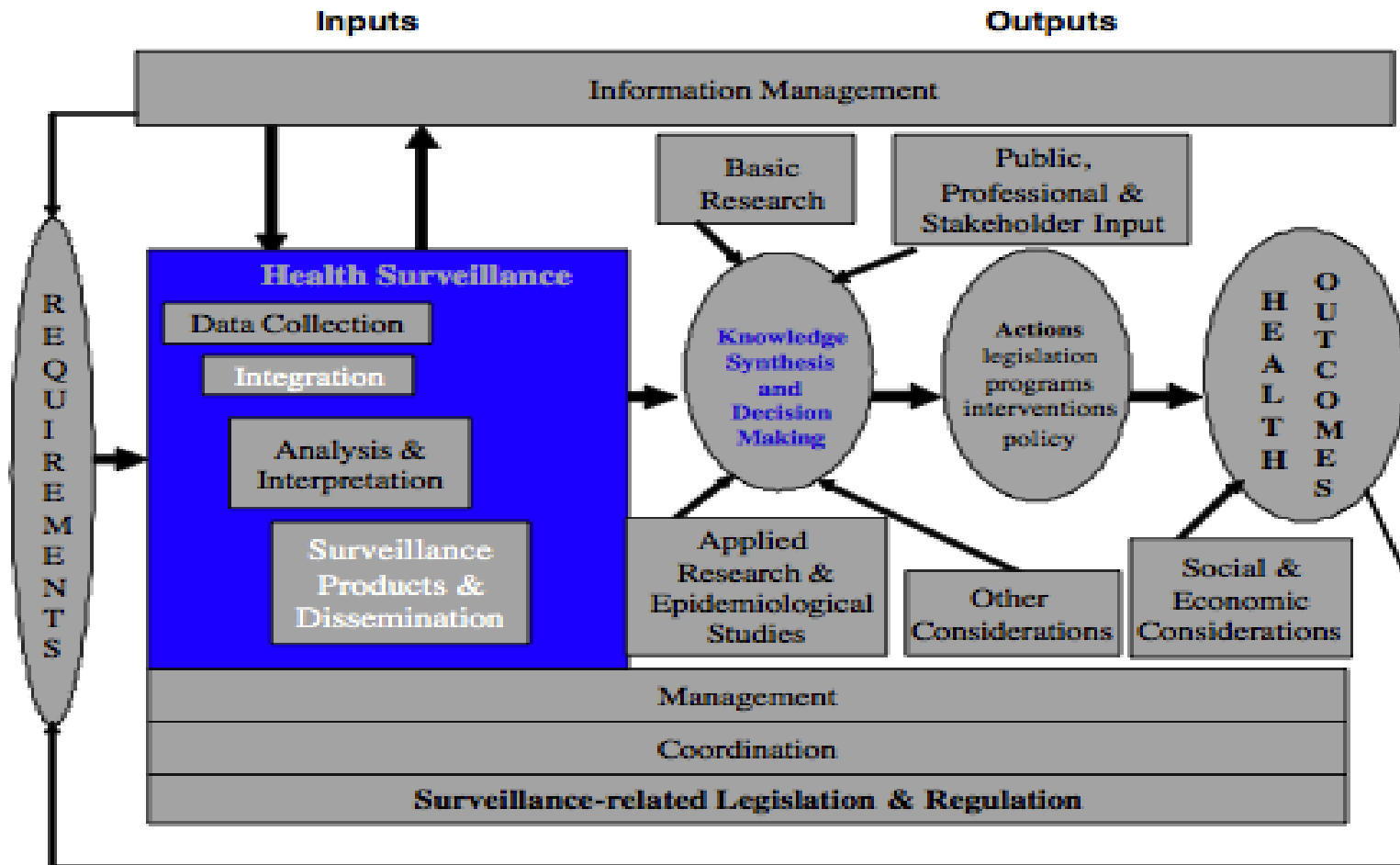
(source: John M Last ,dictionary of Epidemiology4 th Ed.,2001)

TYPE OF SURVEILLANCE

- ACTIVE SURVEILLANCE

- PASSIVE SURVEILLANCE

SENTINEL SURVEILLANCE

A Model of Public Health Surveillance with Application to Injury

Figure 1   High Level Surveillance Model

Effective surveillance requires:

• Data and information management;

• Communications infrastructure;

• Policy agreements on data access and use; and

• Commitment by stakeholders to develop and maintain distributed, interoperable information systems that can use components developed within the health care sector or outside it .

Injury surveillance is essential for:

- ✓ Systematic monitoring of injury trends and risk and protective factors;
- ✓ Identification of clusters or emerging injury issues;
- ✓ Policy and program-based management of injury risks;
- ✓ Planning of health services;
- ✓ Evaluation of policies, programs and services and the individual and collective empowerment of people with the information to take action to reduce the risk of injury.

Table 5   Overview of National Surveillance Data Sources*

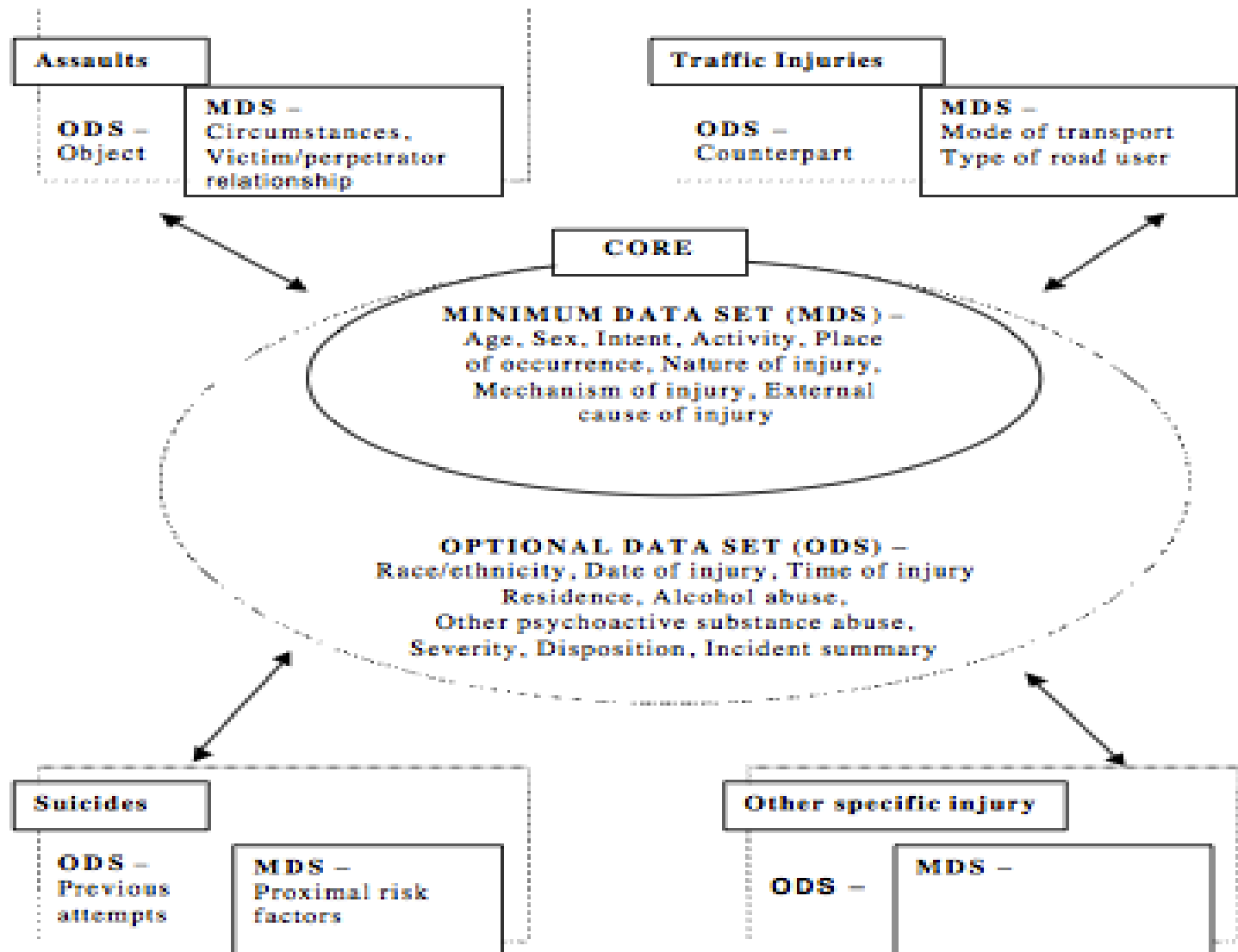|	Fatal Injuries	Serious Injuries		Injuries Treated in Hospital Emergency Departments	Other Treated and Untreated Injuries	Injury-Related Impairments and Disabilities
		Severe Trauma	Hospitalized			
Minimum Detail Population-based Surveillance	Mortality data from Death Certificates	National Trauma Registry – Minimum Data Set		National Ambulatory Care Reporting System[+]		
Moderate/Expanded Detail Using Samples	National Coroner Medical Examiner Database[※]	National Trauma Registry – Comprehensive Data Set[+]		Canadian Hospitals Injury Reporting and Prevention Program		
Moderate/Expanded Detail Using Periodic Collection					Canadian Incidence Study of Reported Child Abuse and Neglect	
Moderate/Expanded Detail Focus on Specific Injury Types	National Surveillance System for Water-related Fatalities	Canadian Agricultural Injury Surveillance Program[#] Traffic Accident Information Database[#]				
Population Surveys		National population health surveys (Canadian Community Health Survey (CCHS), etc.)				Health and Activity Limitation Survey

* Adapted from Herbert M and Mackenzie SG. Model of an injury surveillance system. Health Canada. Personal correspondence.
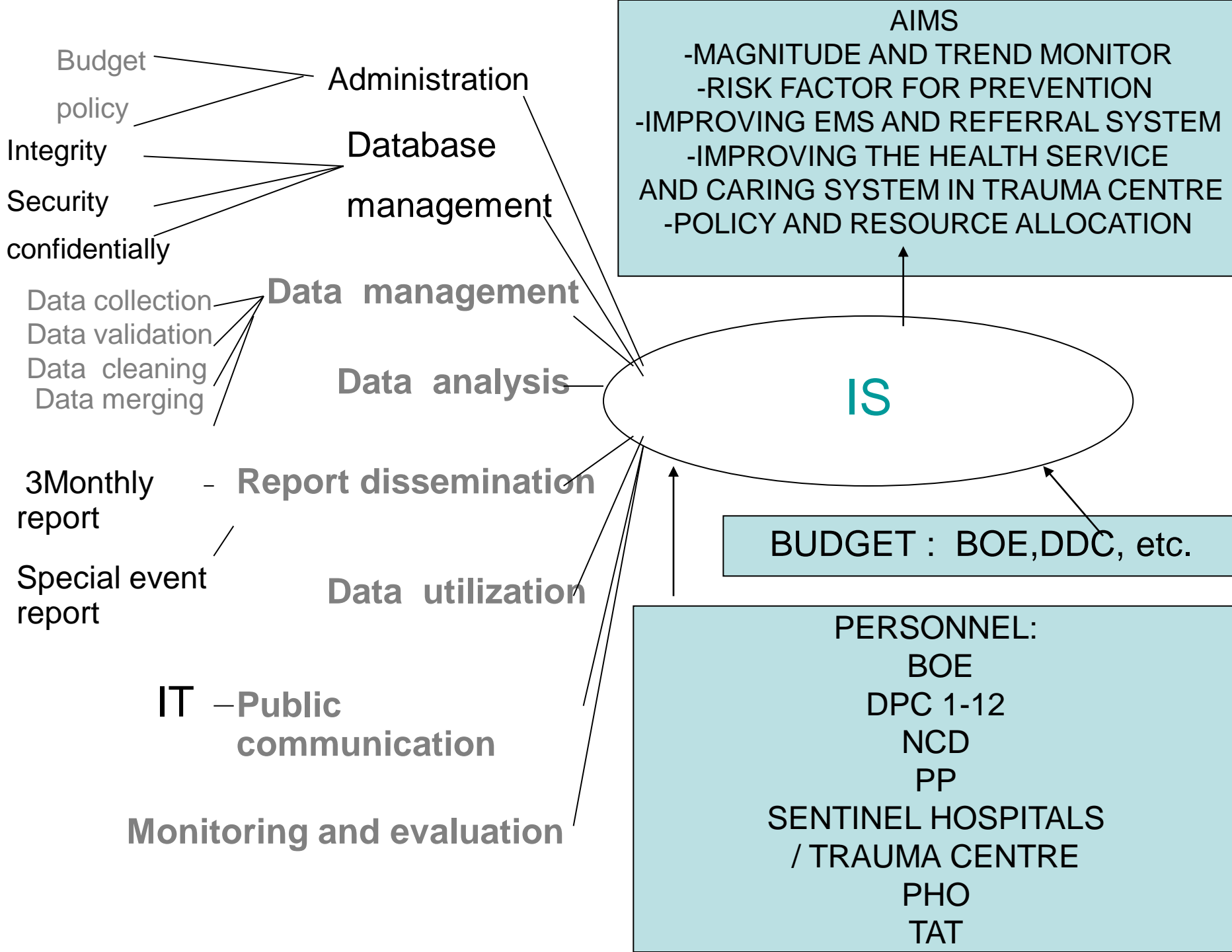
[※] Data source is under development

[+] Data source developed; not yet implemented in all provinces.

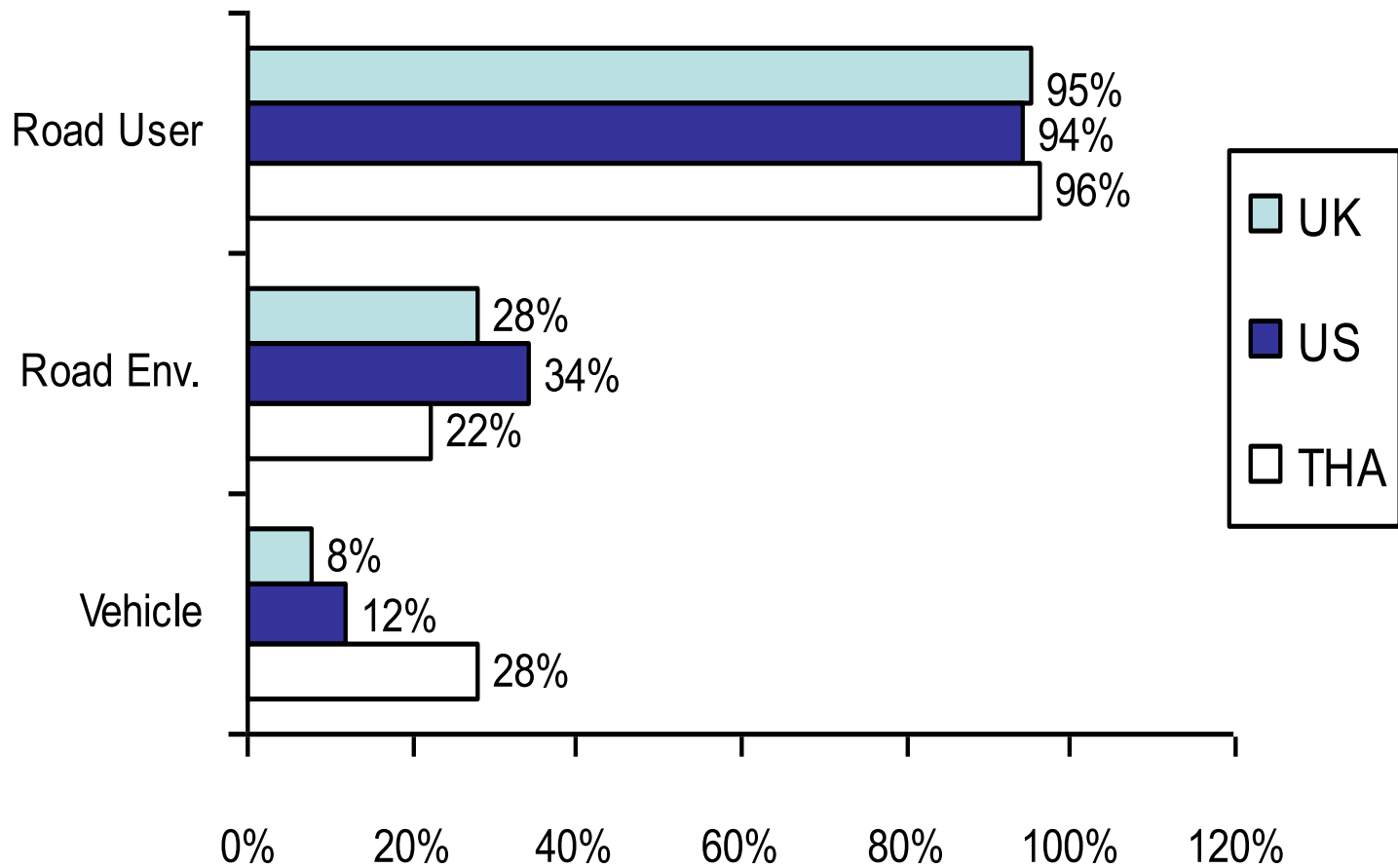[#] Also collect information on fatal injuries.

Building Block Data Sets (Injury Surveillance Guidelines, WHO, 2001)

Assaults

ODS – Object

MDS – Circumstances, Victim/perpetrator relationship

Traffic Injuries

ODS – Counterpart

MDS – Mode of transport Type of road user

CORE

MINIMUM DATA SET (MDS) – Age, Sex, Intent, Activity, Place of occurrence, Nature of injury, Mechanism of injury, External cause of injury

OPTIONAL DATA SET (ODS) – Race/ethnicity, Date of injury, Time of injury Residence, Alcohol abuse, Other psychoactive substance abuse, Severity, Disposition, Incident summary

Suicides

ODS – Previous attempts

MDS – Proximal risk factors

Other specific injury

ODS –

MDS –

AIMS
-MAGNITUDE AND TREND MONITOR
-RISK FACTOR FOR PREVENTION
-IMPROVING EMS AND REFERRAL SYSTEM
-IMPROVING THE HEALTH SERVICE
AND CARING SYSTEM IN TRAUMA CENTRE
-POLICY AND RESOURCE ALLOCATION

Budget
policy
Administration

Integrity
Security
confidentially
Database
management

Data management

Data collection
Data validation
Data cleaning
Data merging

Data analysis

IS

3Monthly
report
Report dissemination

BUDGET : BOE,DDC, etc.

Special event
report
Data utilization

IT — **Public
communication**

PERSONNEL:
BOE
DPC 1-12
NCD
PP
SENTINEL HOSPITALS
/ TRAUMA CENTRE
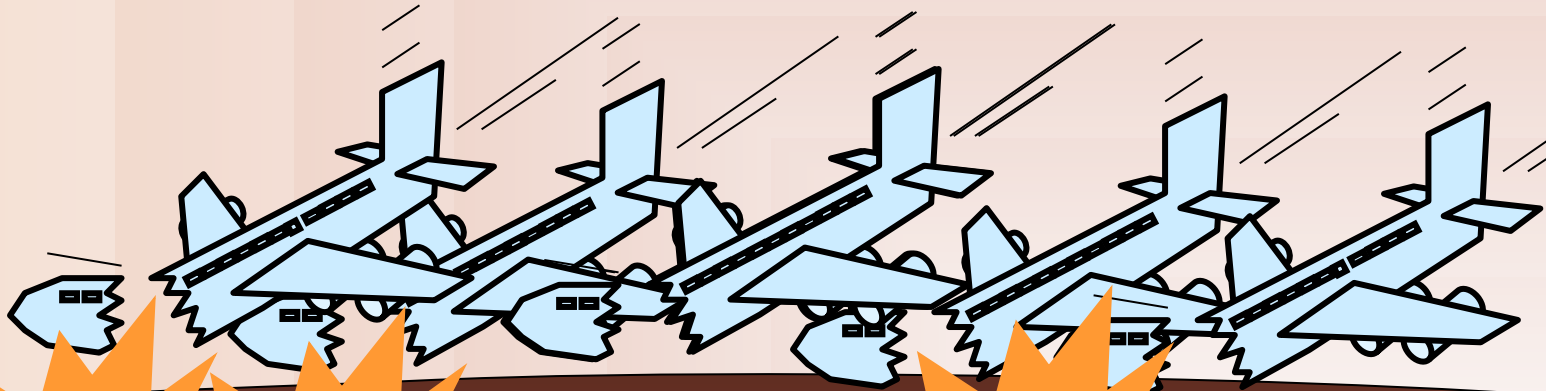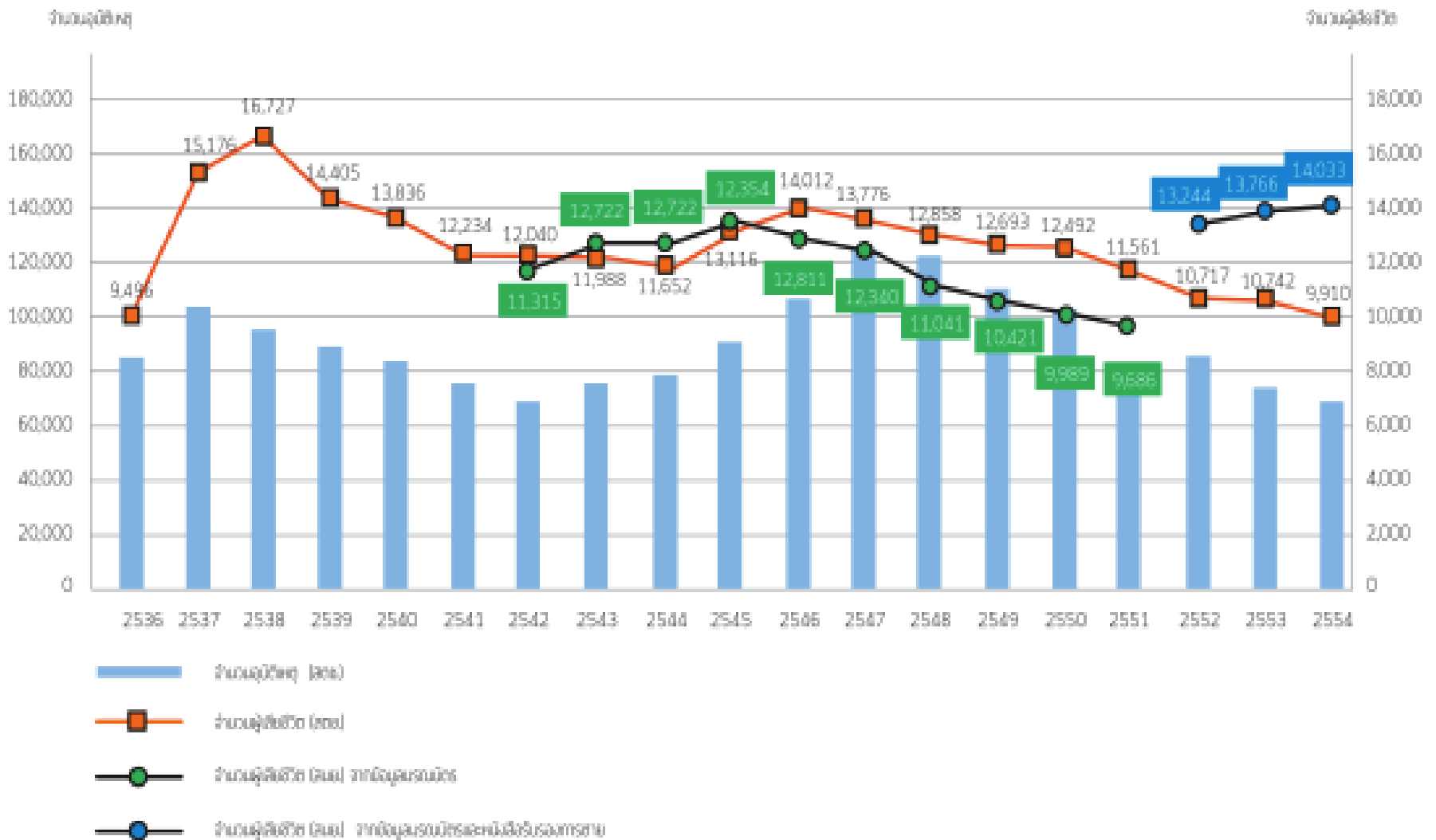PHO
TAT

Monitoring and evaluation

ROAD TRAFFIC INJURIES

FACTORS OF RTI IN THAILAND UK AND USA

THAI PEOPLE DEAD FROM RTI

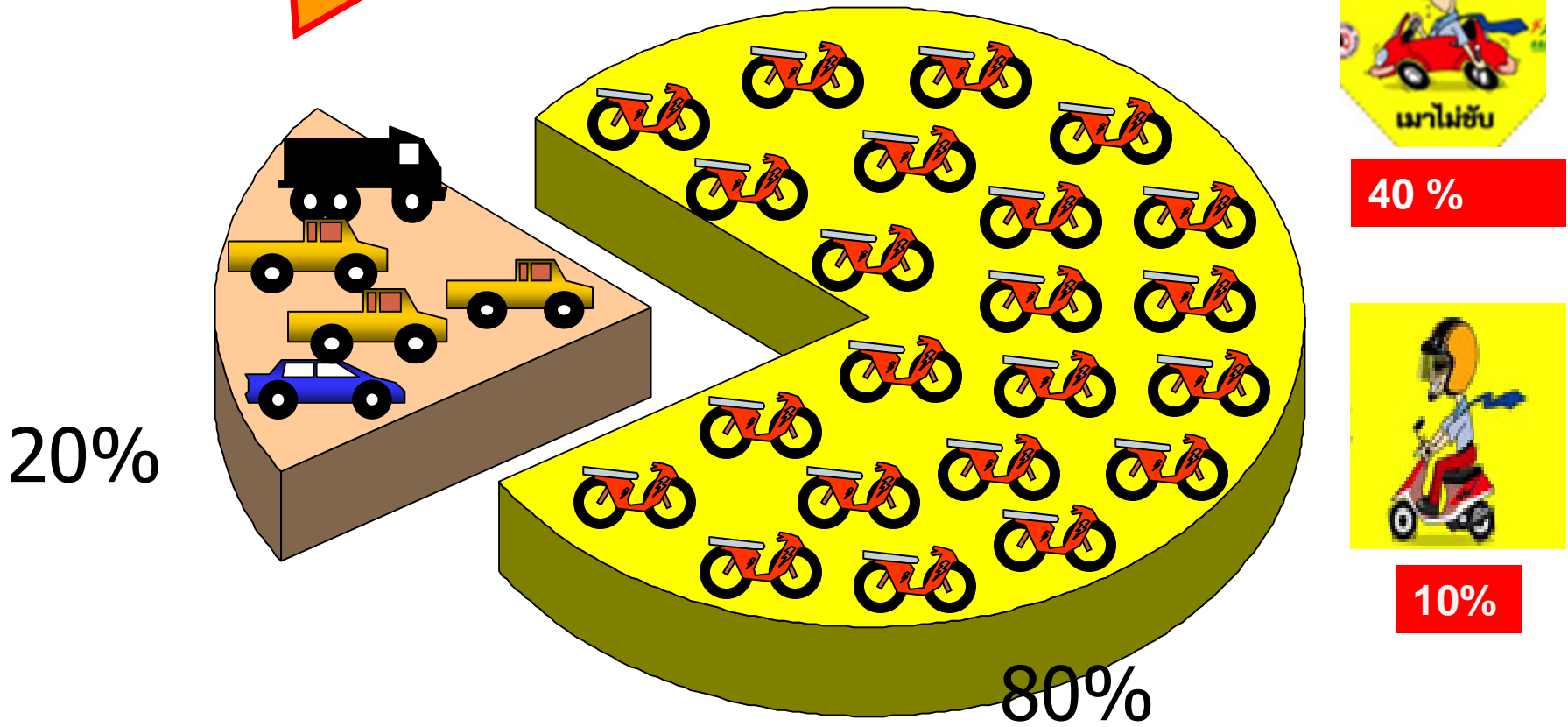**รูปที่ 1-1 แนวโน้มจำนวนอุบัติเหตุทางถนนและผู้เสียชีวิต พ.ศ. 2536 - 2554**

เหล่งข้อมูล : สำนักงานตำรวจแห่งชาติ (สถิติคดีอุบัติเหตุจราจร ปี 2536 - 2554)

และ สำนักนโยบายและยุทธศาสตร์ กระทรวงสาธารณสุข

(ข้อมูลจากมรณบัตร ปี 2542 - 2551 และข้อมูลจากมรณบัตรร่วมกับหนังสือรับรองการตาย ปี 2552 - 2554)

ที่มา รายงานสถานการณ์อุบัติเหตุทางถนน ของประเทศไทย 2554 มูลนิธิไทยโรดส์

ROAD TRAFFIC INJURIES

เมาไม่ขับ

40 %

10%

20%

80%

5 STEPS OF PREVENTION AND CONTROL

- **CHARACTERISTICS OF INJURIES OCCUR**
- **RISK IDENTIFICATION**
- **PLAN**
- **IMPLEMENTATION**
- **EVALUATION**

PREVENTION 4 E'S(5)

- EDUCATION
- ENFORCEMENT
- ENGINEERING
- ECONOMICS INCENTIVES AND PENALTIES
- ENVIRONMENT

PREVENTION AND CONTROL

WHO : 5 key areas

- Speed
- Alcohol
- Seat Belt
- Helmet
- Carseat