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THE AGA KHAN UNIVERSITY

Road Traffic Injuries Research Network

Establishing an injury surveillance system

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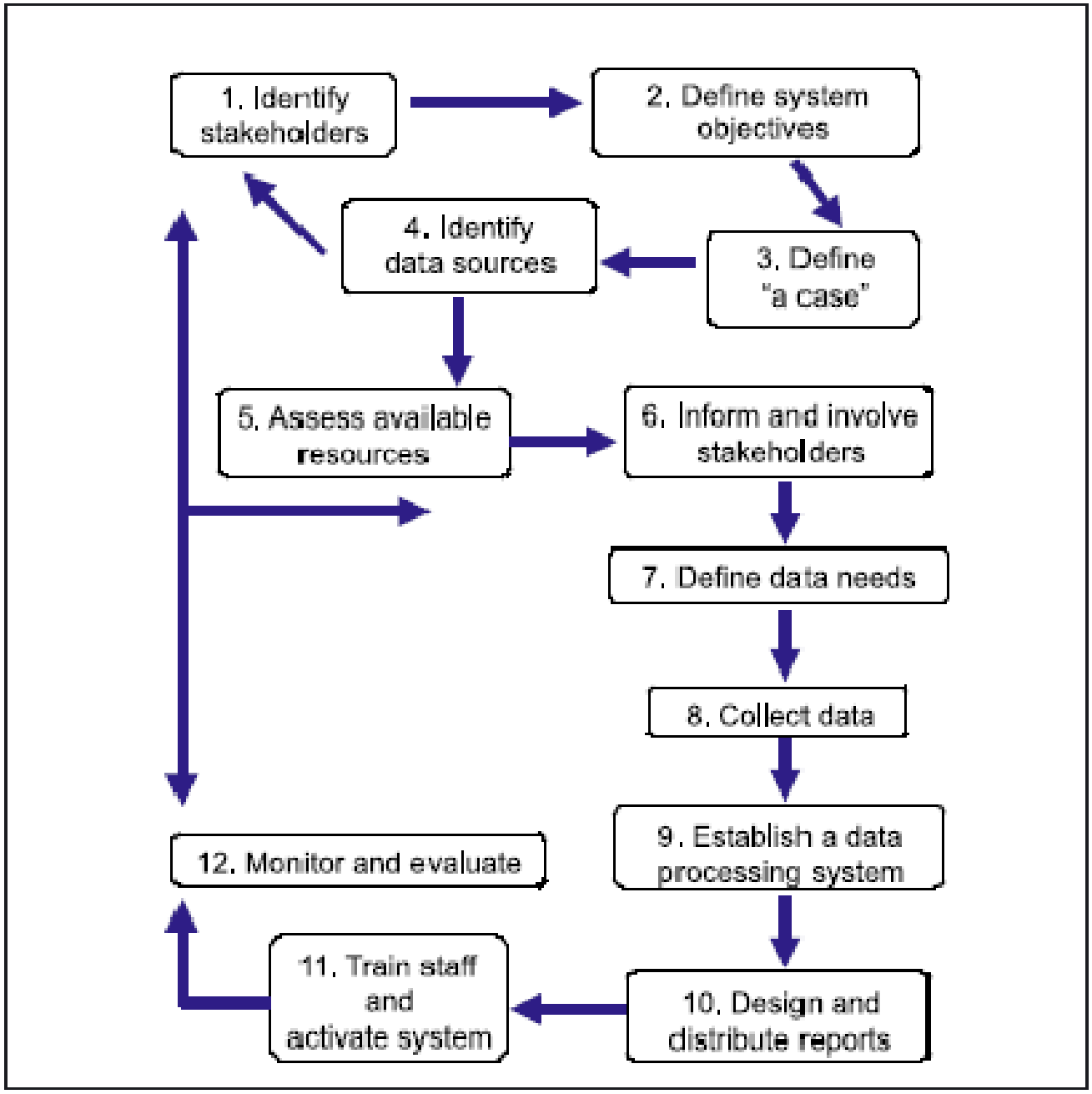
Session Overview

- Explore 12-Step process for the development of an injury surveillance system
- Discuss critical challenges to the development and maintenance of injury surveillance systems in LMICs
- Identify strategies for the effective implementation of injury surveillance systems



Planning

Design

Implementation

Evaluation

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Phase I: Planning

Step 1: Identify Stakeholders

- Any agency/individual concerned about injuries
  - Who wants/needs injury surveillance?
  - Who is best positioned to collect/has access to data?
  - Who may use injury surveillance data?

Step 2: Define System Objectives

Why do you and other stakeholders want an injury surveillance system?

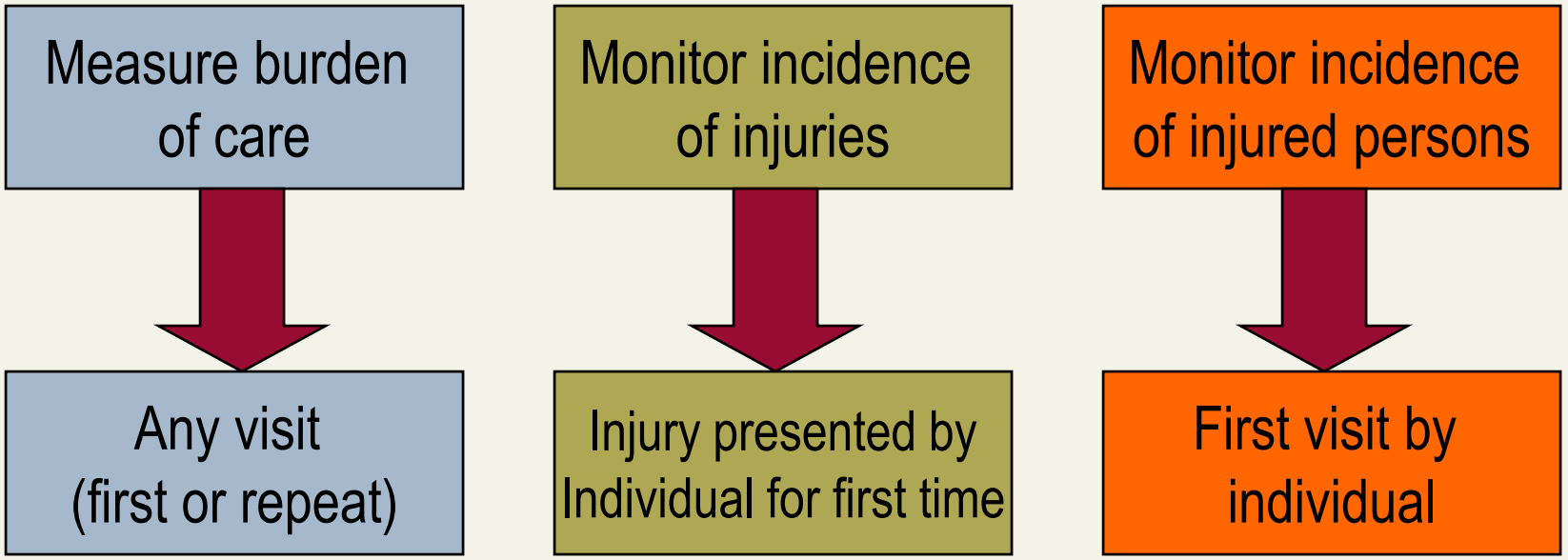
- to assess the burden of injuries or burden of care
- to determine incidence and characteristics of specific injury type
- to identify populations at high risk for particular injuries
- to identify areas where intervention is needed
- to monitor & evaluate interventions

Should the system be comprehensive or focus on particular injuries?

- the severity of injury
  - fatal, serious, slight
- the nature of the event resulting in the injury
  - motor vehicle, occupational, assault, suicide, war, terrorism
- the nature of the injury
  - Neuro-trauma, poisoning, burns

Step 3: Define a “case”

- Case definitions should be based upon system objectives:



Step 4: Identify potential data sources

- Where can one find data that is needed?
- Of what quality and reliability is the data?
- Are there existing systems for recording and processing the data? Are those systems electronic or manual?

Potential Data Sources

	No Injury	Mild	Moderate	Severe	Fatal
Household (community) surveys					
Health clinic records					
Family doctors' records					
ER records					
Ward admission records					
ICU admission records					
Death certificates					

Other potential data sources

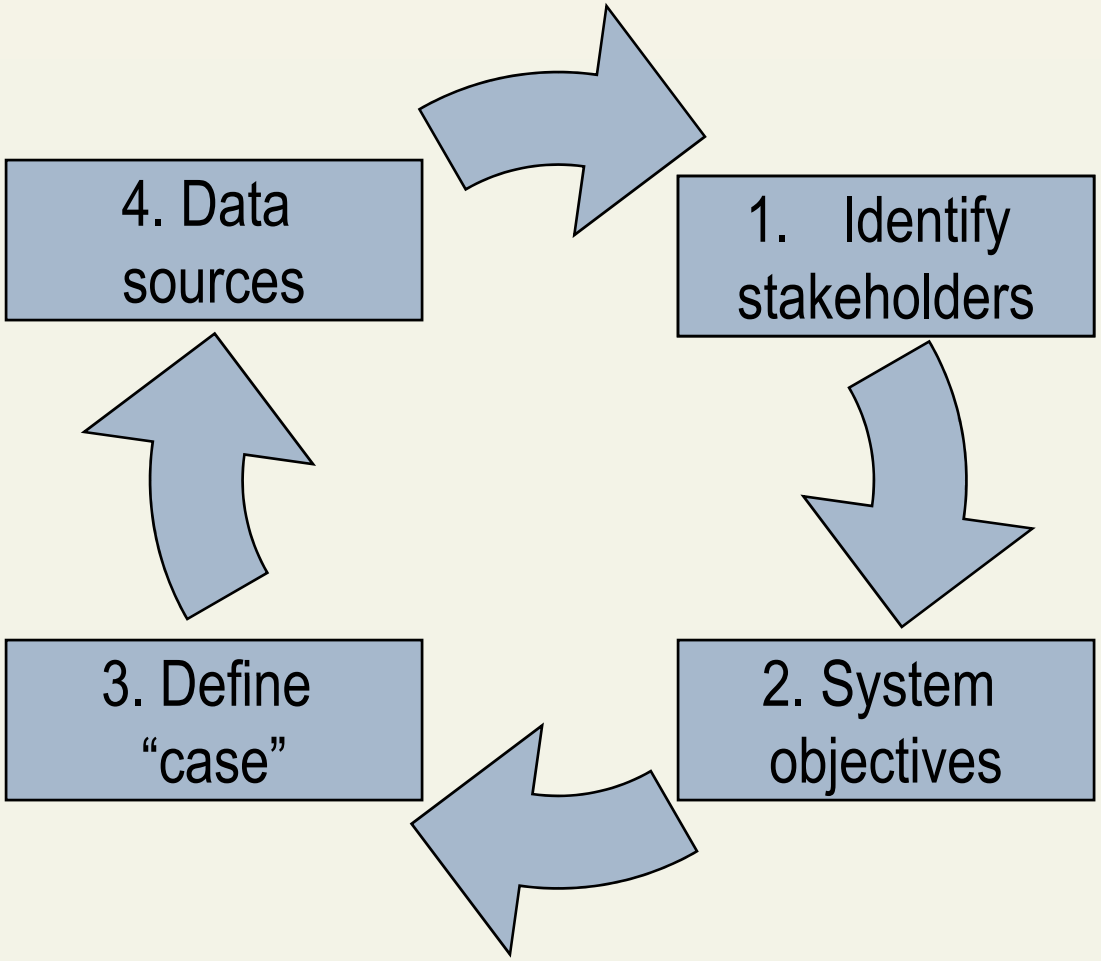
- For fatal injuries
  - Autopsy/pathology reports
  - Police reports
- For severe non-fatal injuries
  - Hospital in-patient records
  - Trauma registries
  - Ambulance or EMT records

- For motor vehicle injuries
  - Insurance records
  - Police reports
  - DOT records
- For violent injuries
  - Police reports
- For occupational injuries
  - Workplace records
  - Workers comp
  - Rehabilitation center

Assessing & selecting data sources

- Identify which sources have the most data of the kind that is needed
- Develop relationships with the agencies responsible for collecting these data
- Develop mechanisms for assembling, processing, interpreting, and reporting these data

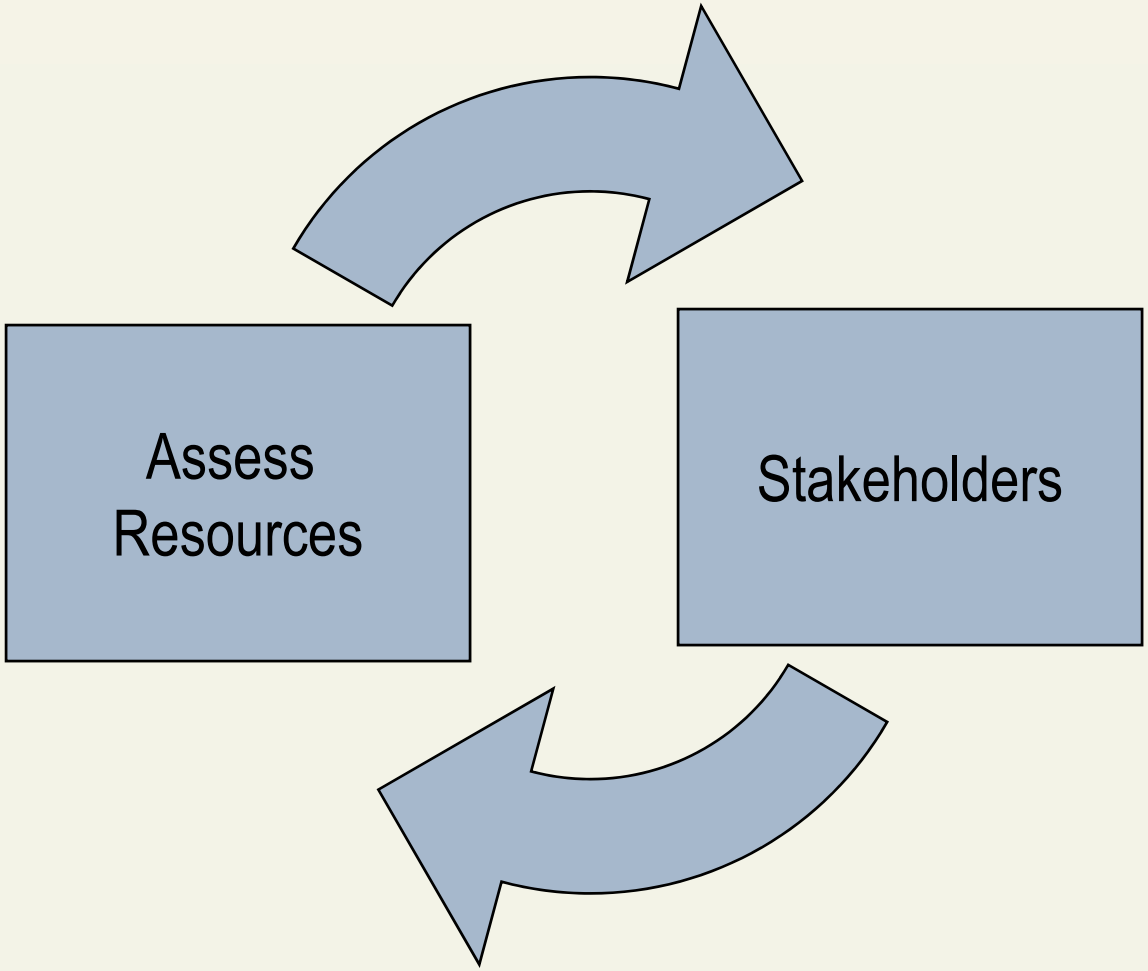
Repeat Steps 1- 4



Step 5: Assess available resources

- Personnel with sufficient expertise
- Equipment & supplies
- Environmental factors and considerations

Assess available resources



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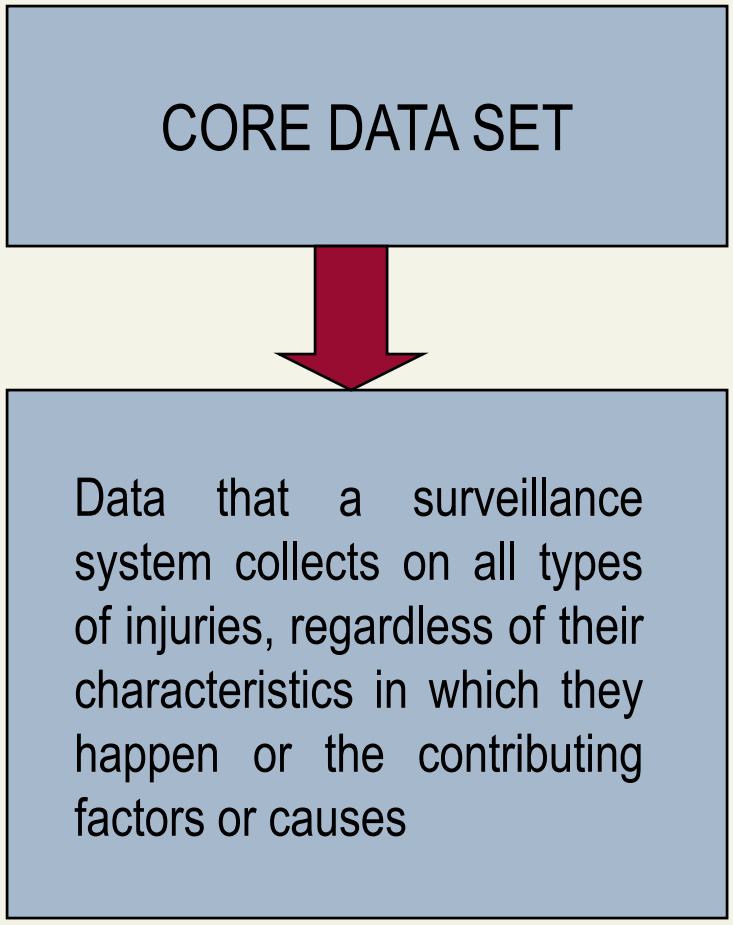
Phase II: Design

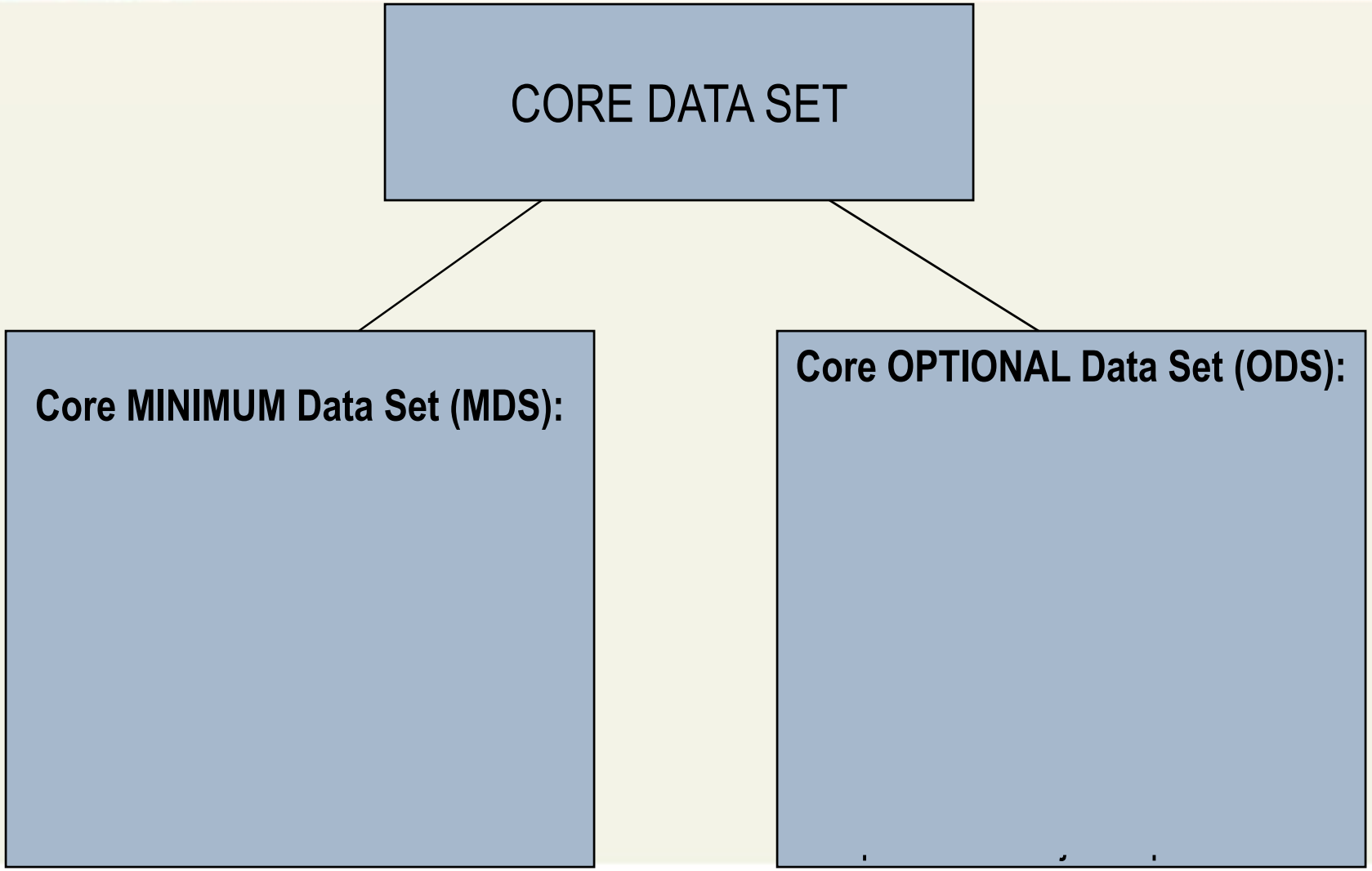
Step 6: Inform & involve stakeholders

- Secure commitment and buy-in from stakeholders
- Involve stakeholders in the design and establishment of the surveillance system
- Involvement and buy-in is critical to long term sustainability of the surveillance system

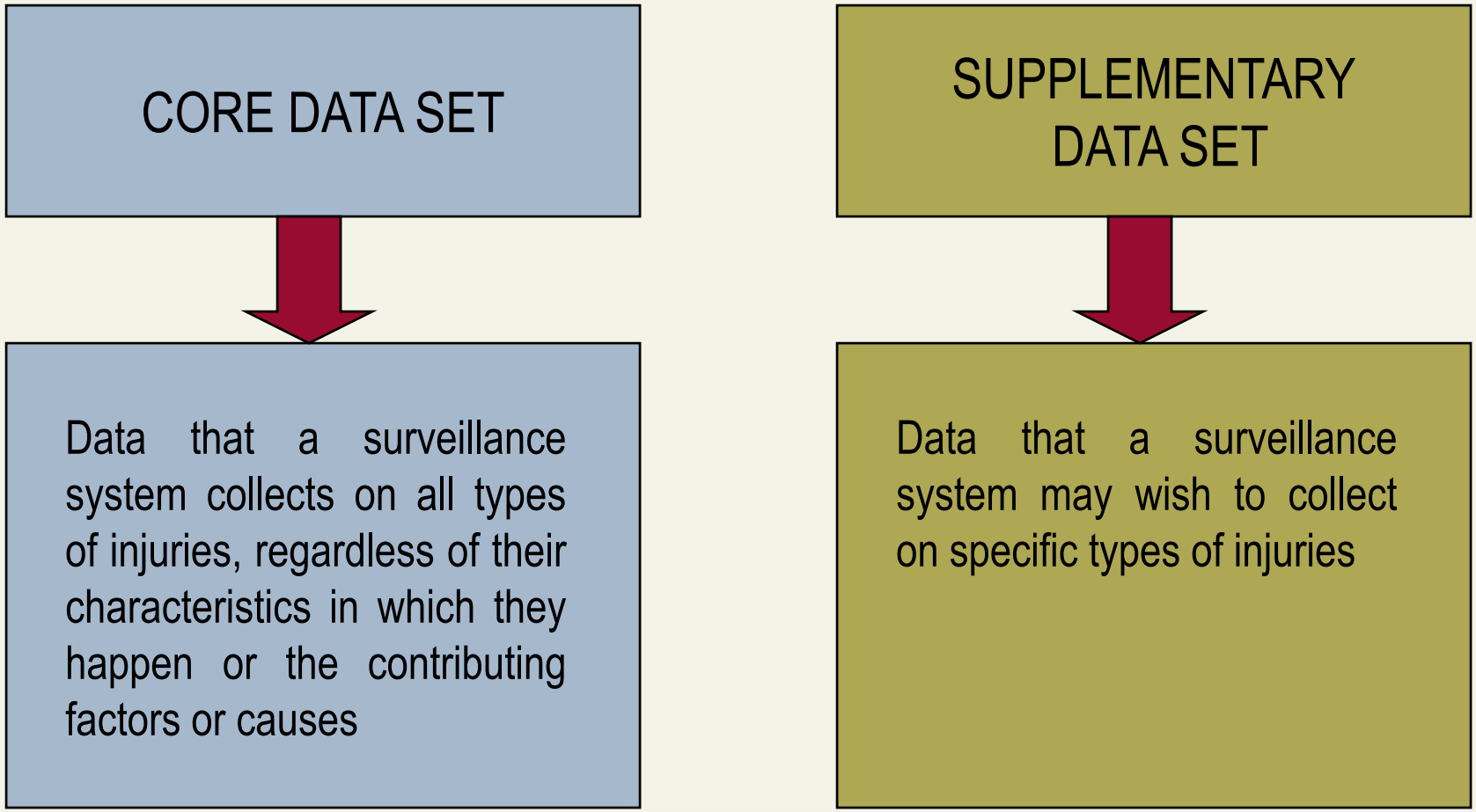
Step 7: Define data needs



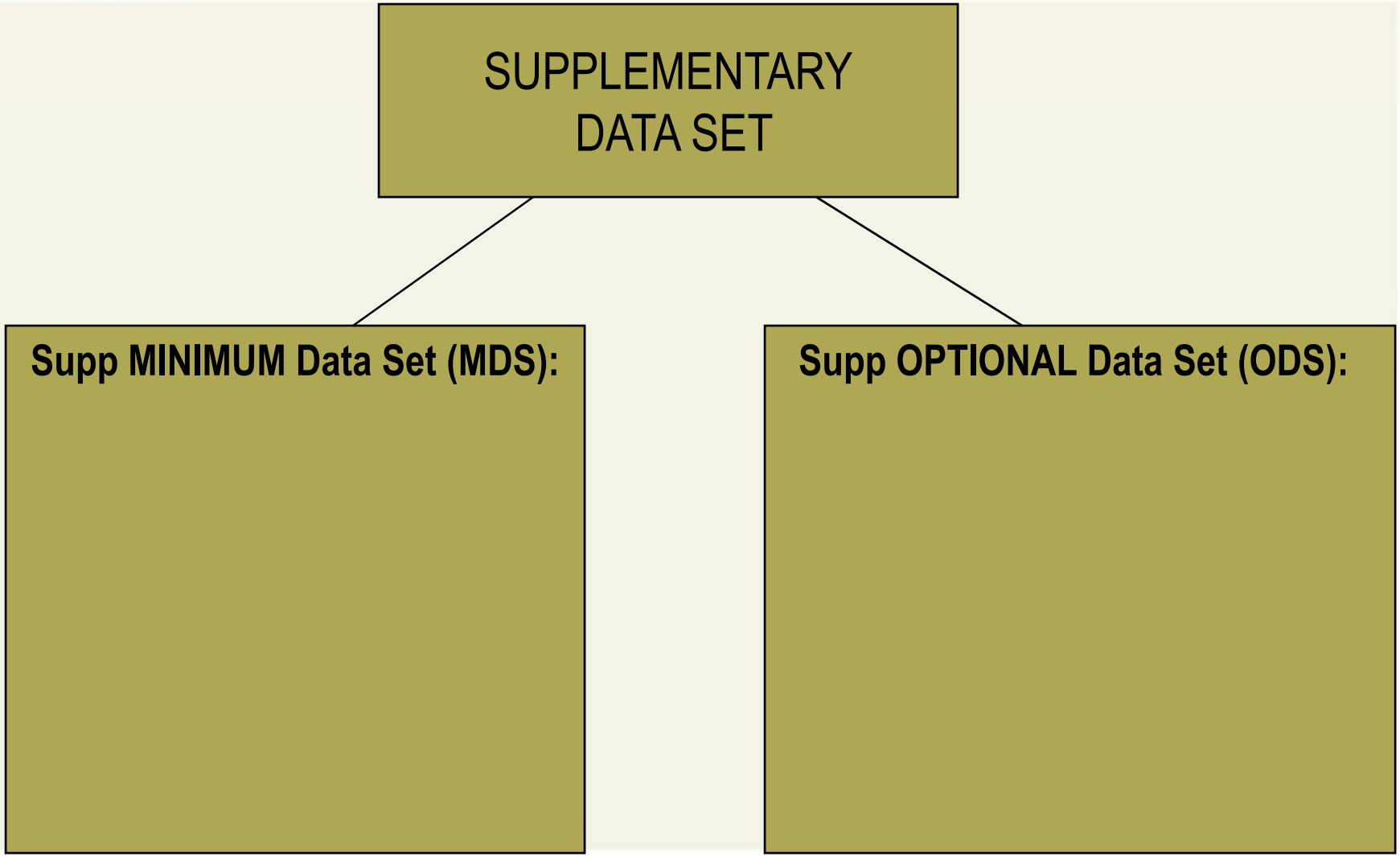
Core Data Set



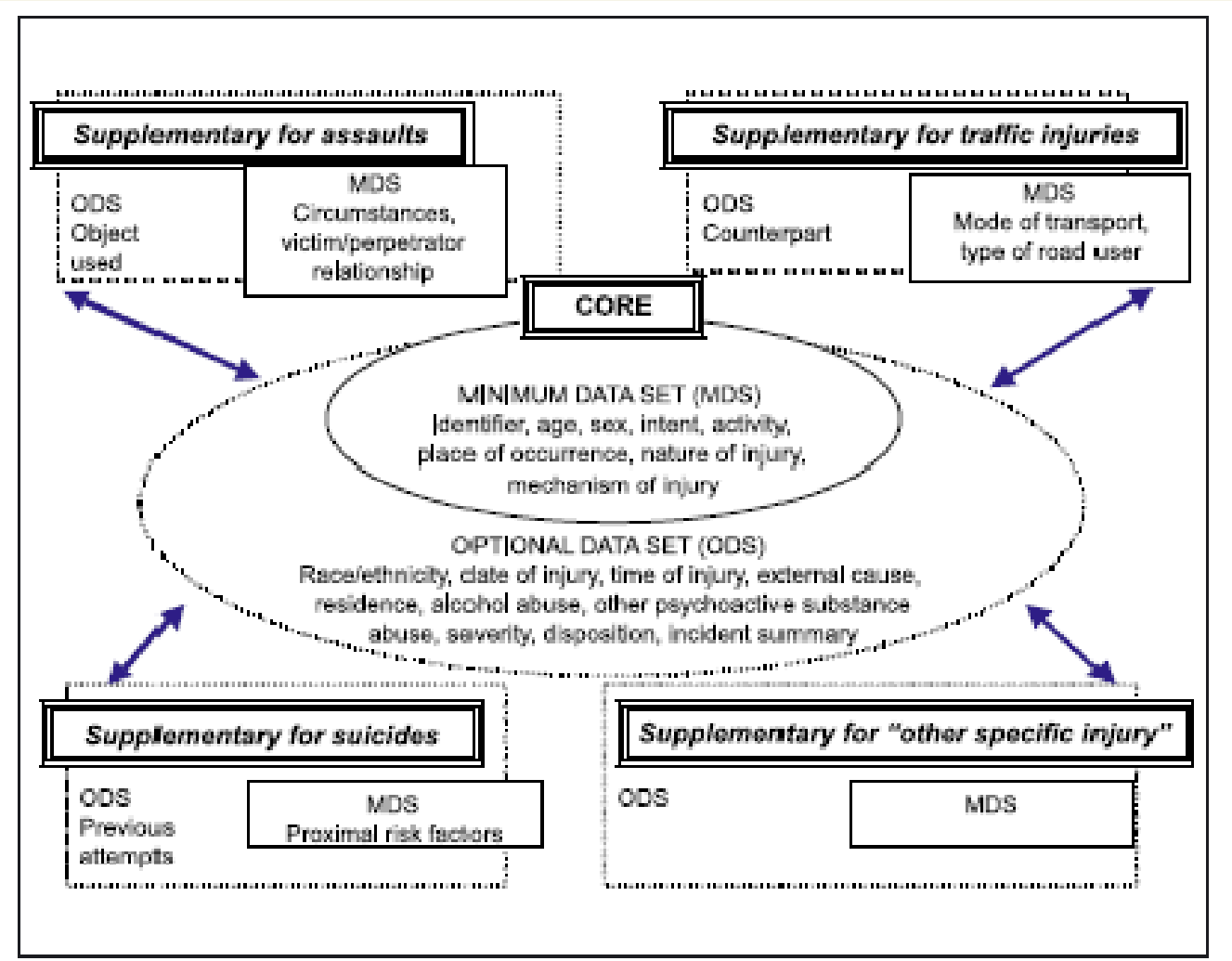
Step 7: Define data needs



Supplementary Data Set



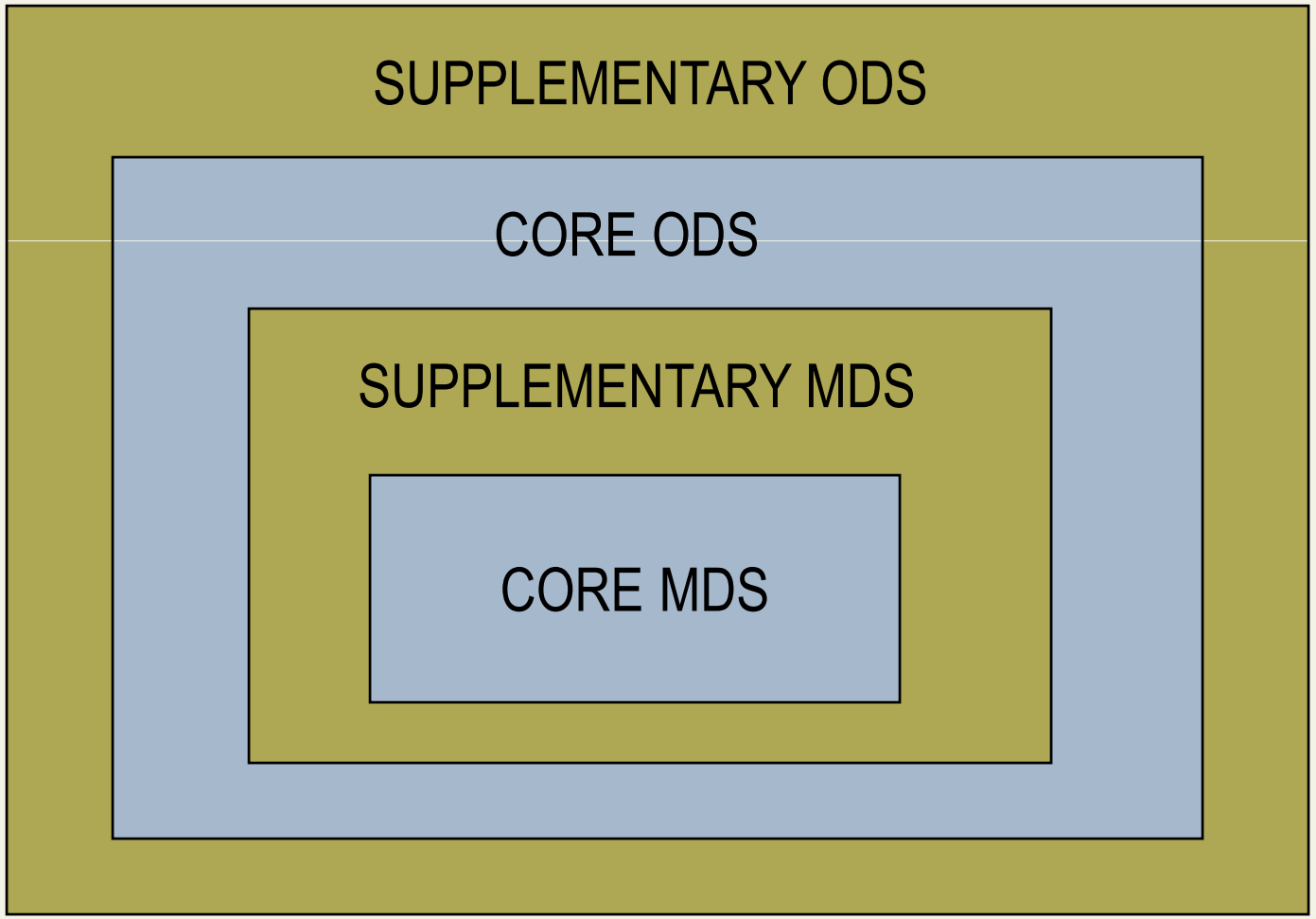
Data Sets


Supplementary for assaults
ODS
Object
used
MDS
Circumstances,
victim/perpetrator
relationship
Supplementary for traffic injuries
ODS
Counterpart
MDS
Mode of transport,
type of road user
CORE
MINIMUM DATA SET (MDS)
Identifier, age, sex, intent, activity,
place of occurrence, nature of injury,
mechanism of injury
OPTIONAL DATA SET (ODS)
Race/ethnicity, date of injury, time of injury, external cause,
residence, alcohol abuse, other psychoactive substance
abuse, severity, disposition, incident summary
Supplementary for suicides
ODS
Previous
attempts
MDS
Proximal risk factors
Supplementary for "other specific injury"
ODS
MDS

Choosing data sets and data

- Your objectives
- The limitations imposed by the available resources
- Concerns and sensitivities of the injured persons

Building up the surveillance system



Data classification and codes

- Using standard classifications and codes facilitates comparisons community-by-community; country-by-country comparisons
  - International Statistical Classification of Diseases and Related Health Problems
  - International Classification of the External Causes of Injury (ICECI)

Classifying & Coding Data

- BASIC TERMINOLOGY:
  - "Class" indicates the type of information or data sought
  - "Definition" describes the class
  - "Obligation" indicates whether data is mandatory, optional, or conditional
  - "Code type" indicates numeric, character, or string

Example: core MDS

CLASS: Identifier

DEFINITION: something that uniquely identifies each case and is used to avoid double counting. An identifier may be assigned by the agency responsible for surveillance or it can be something that is specific to the person injured such as a national ID number with a date attached.

OBLIGATION: Mandatory

CODE TYPE: Numeric

Example: core ODS

CLASS: Disposition

DEFINITION: Action taken or injured person's status after arrival at health facility

OBLIGATION: Optional

CODE TYPE: Numeric

CODE CHOICES: 1 (treated & discharge), 2 (admitted or referred to hospital), 3 (died), 8 (other), 9 (unknown)

Example: Supplementary MDS (RTI)

CLASS: Road User

DEFINITION: the role of the injured person

OBLIGATION: Conditional

CONDITION: If the injury event involved a vehicle, this information is necessary

CODE TYPE: Numeric

CODE CHOICES: 1 (pedestrian), 2 (driver), 3 (passenger), 8 (other), 9 (unknown)

Example: Supplementary ODS (assault)

CLASS: Context

DEFINITION: The factor(s) the predicated the assault

OBLIGATION: Conditional

CONDITION: If the injury event resulted from assult, this information is mandatory

CODE TYPE: Numeric

CODE CHOICES: 1 (quarrel, fight), 2 (drug related), 3 (sexual assault), 8 (other), 9 (unknown)

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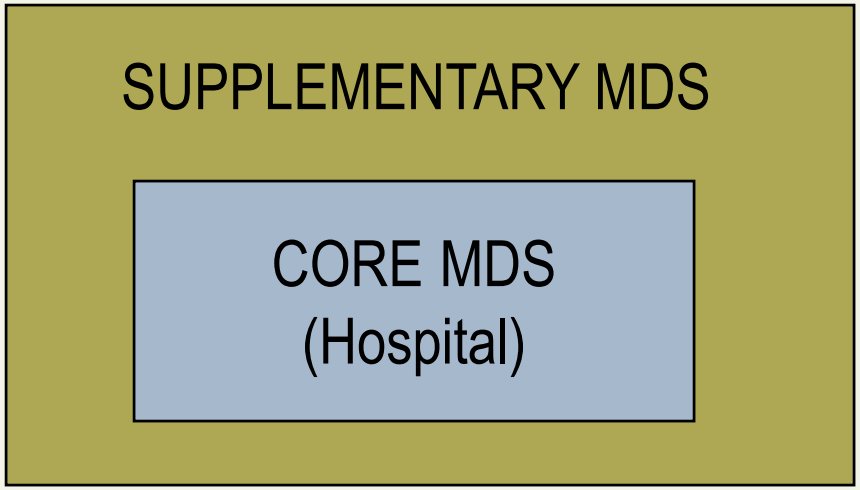
Phase III: Implementation

Step 8: Collect Data

- How will you collect data?
  - Choosing best locations for data collection
  - Designing data collection forms
- Who will collect data?
  - Physician
  - Triaging officer/nurse
  - Patient

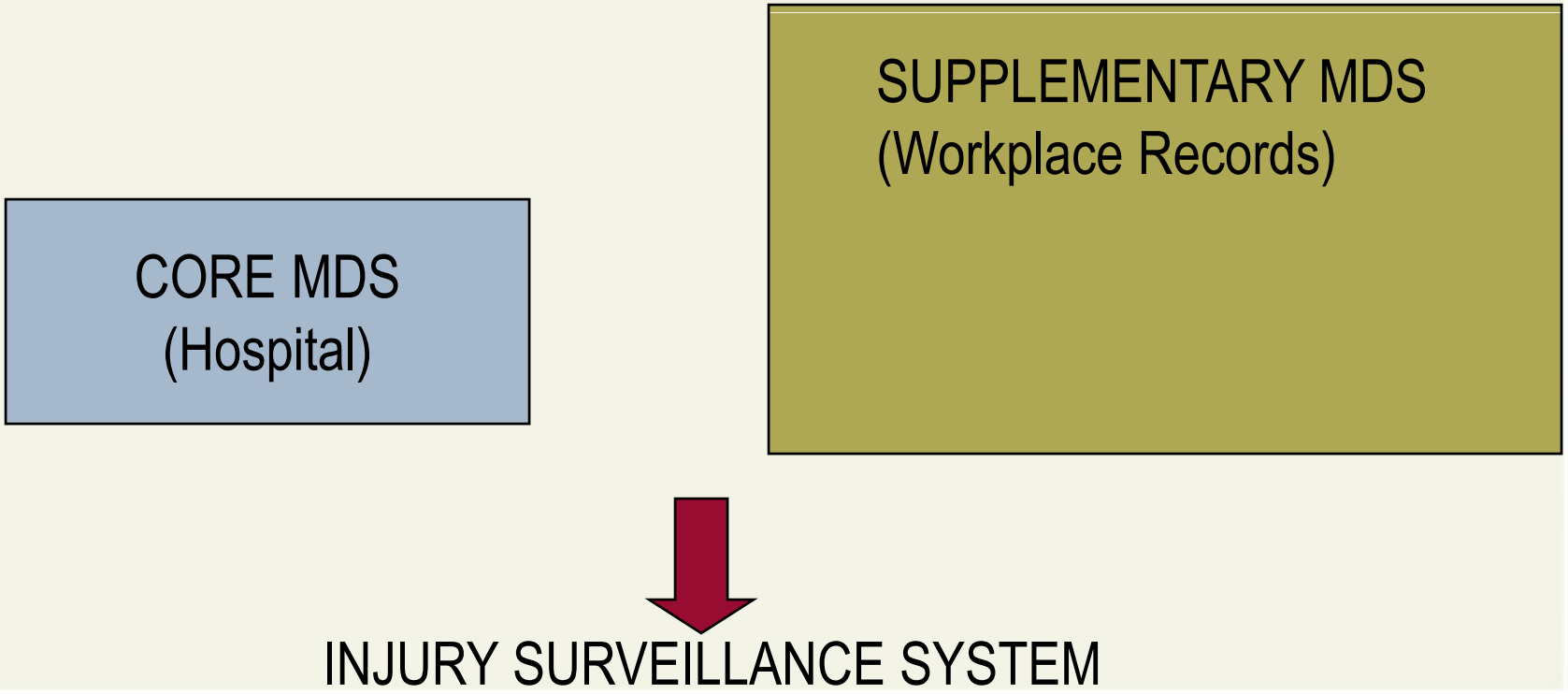
Collecting Data

- Build upon existing systems whenever possible. It may be possible to extend an existing system that is already collecting most of the desired data



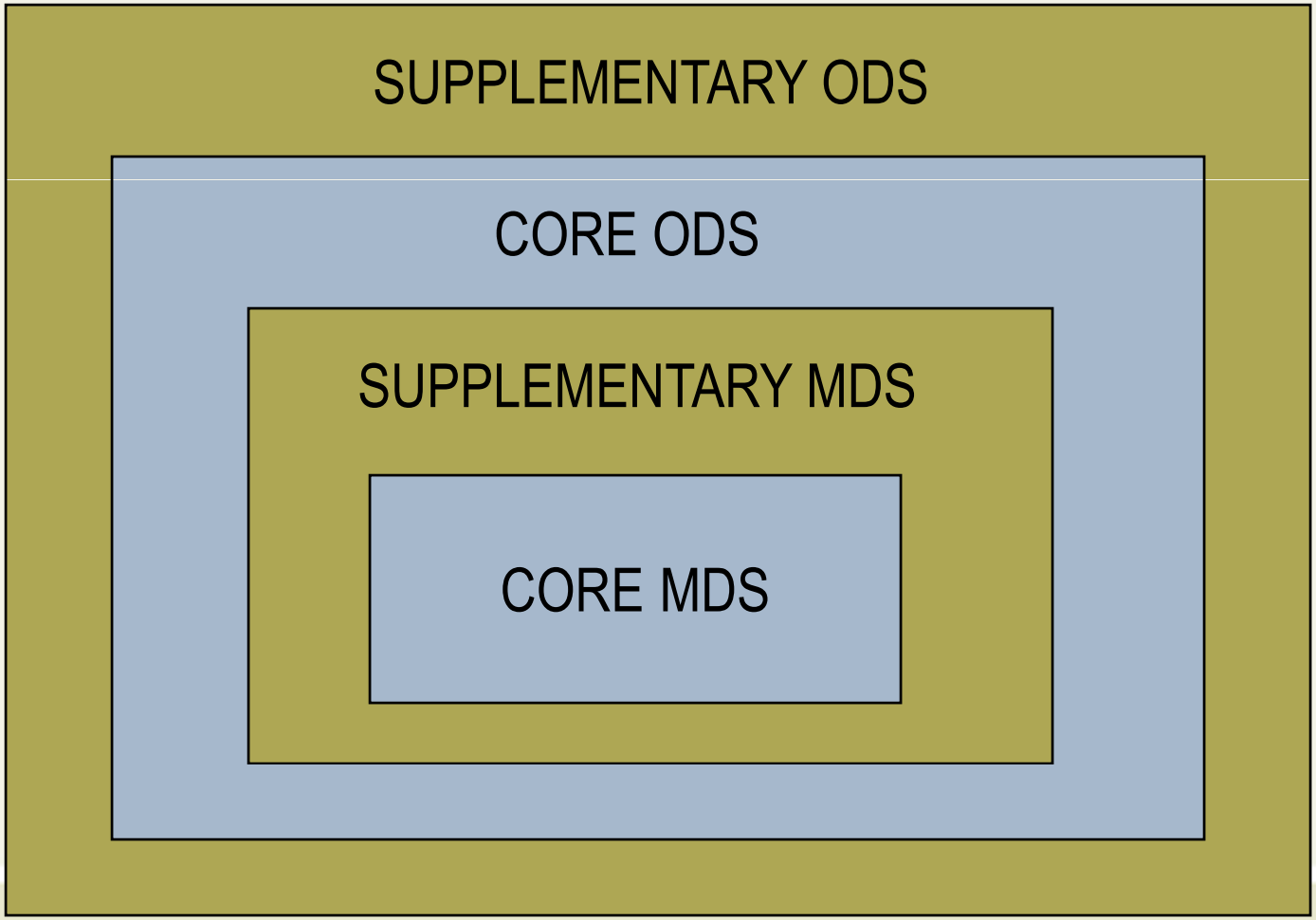
Collecting Data

- Coordinate several existing systems that are individually collecting different pieces of the desired data



Collecting Data

- Establish a new system



Example: Core MDS Collection Form

Registration or Identification Number	

Age: ☐☐

Sex: Male | Female | Unknown

Place : *Where were you when you were injured?*		
1. Home	2. School	3. Highway/Street
8. Other (specify)		9. Unknown

Activity : *What were you doing when you were injured?*		
1. Work	2. Education	3. Sport
4. Travelling	8. Other (specify)	9. Unknown

Mechanism : *How were you hurt? Or How was the injury inflicted?*		
1. Traffic injury	2. Sexual Assault	3. Fall
4. Other Blunt Force	5. Stab/Cut	6. Gun Shot
7. Fire, heat	8. Choking/hanging	9. Drowning
10. Poisoning	98. Other (specify)	99. Unknown

Intent:		
1. Unintentional	2. Self-Harm	3. Intentional (assault)
8. Other (specify)		9. Unknown

Nature of Injury		
1. Fracture	2. Sprain/Strain	3. Cuts, bite, open wound
4. Bruise	5. Burn	6. Concussion
7. Organs system injury	8. Other (specify)	9. Unknown

Example: Core ODS Collection Form

Registration or Identification Number	Date: d d m m y y y y	Time: h h m m

Age: ☐☐ Residence: ☐

Sex: ☐ Male ☐ Female ☐ Unknown

Place: *Where were you when you were injured?*		
1. Home	2. School	3. Highway/Street
8. Other (specify)		9. Unknown

Activity: *What were you doing when you were injured?*		
1. Work	2. Education	3. Sport
4. Travelling	8. Other (specify)	9. Unknown

Mechanism: *How were you hurt? Or How was the injury inflicted?*		
1. Traffic injury	2. Sexual Assault	3. Fall
4. Other Blunt Force	5. Stab/Cut	6. Gun Shot
7. Fire, heat	8. Choking/hanging	9. Drowning
10. Poisoning	88. Other (specify)	99. Unknown

Intent		
1. Unintentional	2. Self-Harm	3. Intentional (assault)
8. Other (specify)		9. Unknown

Alcohol Use: *Did you use alcohol within 6 hours of the incident?*	
1. Suspected by report or confirmation	2. No information

Substance Use: *Did you use a mood-altering substance?*	
1. Suspected by report or confirmation	2. No information

Injury Severity			
1. No injury	2. Minor	3. Moderate	4. Severe

Disposition		
1. Treated and discharged	2. Admitted/referred to hospital	3. Died
8. Other (specify)		9. Unknown

Nature of Injury		
1. Fracture	2. Sprain/Strain	3. Cute, Bite, open wound
4. Bruise	5. Burn	6. Concussion
7. Organ system injury	8. Other (specify)	9. Unknown

Step 9: Establish a data processing system

- Electronic
  - Computers are already in use
  - Staff know how to use computers or be trained to
  - There is reliable electricity
  - Reliable maintenance
- Manual
  - Simple card systems
  - Simple, cheap, effective way of processing data

Step 10: Design and distribute reports

- Reports should convey basic results of surveillance to stakeholders and should therefore reflect the needs of stakeholders
- Design reports and agree upon frequency of distribution

Sample: Surveillance Report

Age & Sex	0-4 yrs		5-14 yrs		15-19 yrs		20-24 yrs		25-44 yrs		45-64 yrs		>65 yrs		unknown		TOTAL		
Intent	**M**	**F**	**M**	**F**	**M**	**F**	**M**	**F**	**M**	**F**	**M**	**F**	**M**	**F**	**M**	**F**	**M**	**F**	**Both**
Unintentional																			
Self-harm																			
Assaults																			
Other																			
Unknown																			
TOTAL																			

Step 11: Train staff & activate system

Training Level	Target Audience	Training Content
I	Everyone concerned with surveillance, from supervisors and staff who operate the system to end users of the information produced by the system	Introduction to injury surveillance and epidemiology; an overview of the system including its objectives and potential uses

Step 11: Train staff & activate system

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I	Everyone concerned with surveillance, from supervisors and staff who operate the system to end users of the information produced by the system	Introduction to injury surveillance and epidemiology; an overview of the system including its objectives and potential uses
II	Anyone who will complete forms or process data	Detailed review of the form(s) with emphasis on understanding the classes of data and their coding; how to elicit the required data from patients; and how to conform to agreed procedures; including ones that guarantee confidentiality

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II	Anyone who will complete forms or process data	Detailed review of the form(s) with emphasis on understanding the classes of data and their coding; how to elicit the required data from patients; and how to conform to agreed procedures; including ones that guarantee confidentiality
III	Anyone who will code and process data, manually or electronically; anyone who should be familiar with data processing methods and software	Hands-on practice in extracting data from forms and coding it; and operating the manual or electronic data processing system

Step 12: Monitor and Evaluate

- The ability of the system to identify each injury case and to record it correctly
- The accuracy and quality of the reporting
- The ease of use of the forms and data processing system
- The relevance and usefulness to the end users

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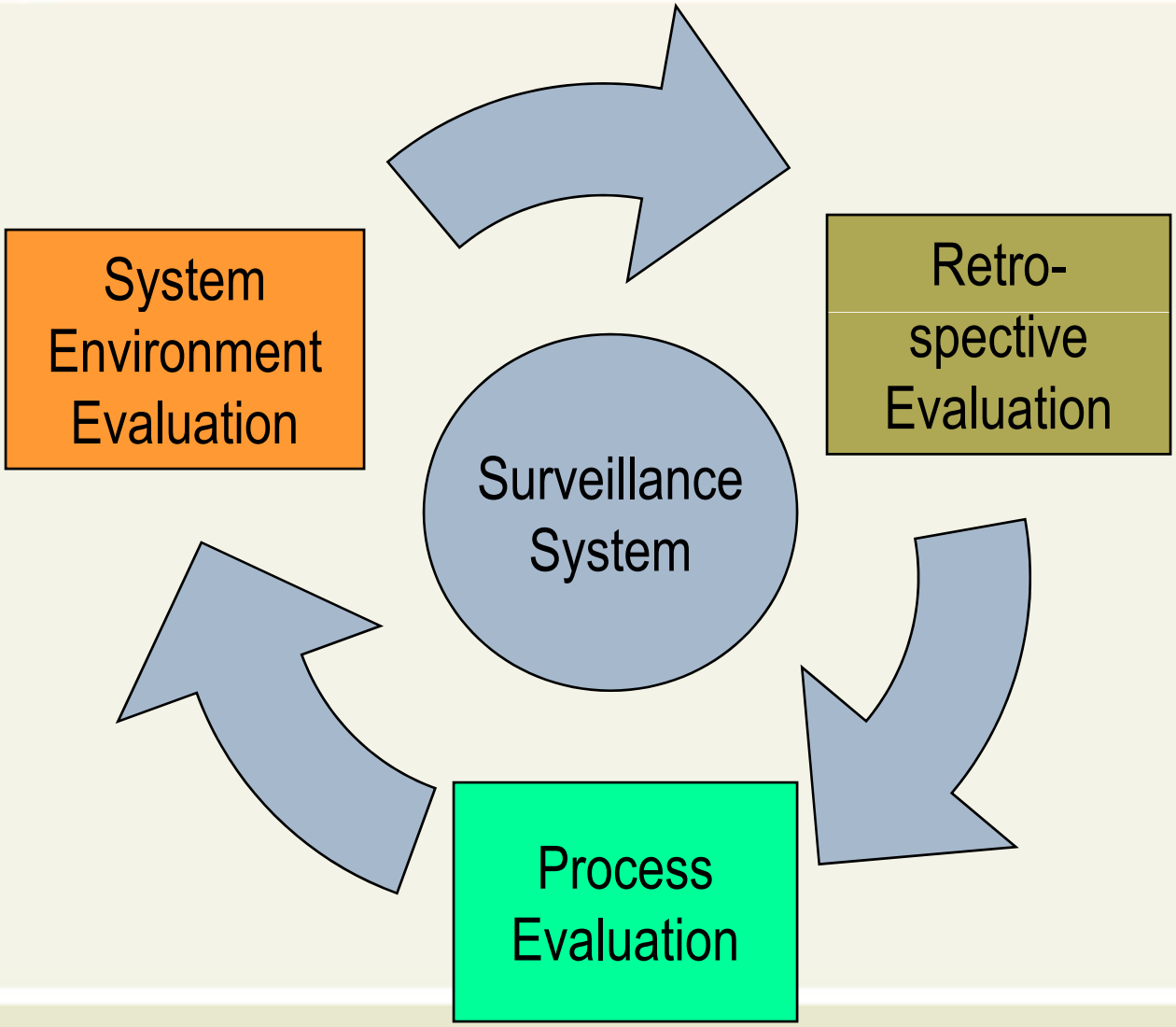
Phase IV: Evaluation

Evaluating surveillance system



Retrospective evaluation of injury surveillance system

- Measures the accuracy of the surveillance system
- Measures the predictive value of the surveillance system
- Measures the rate of error of the system

Evaluating the surveillance system

Attribute	#
No. of all cases (injury or not)	A
No. of injury cases detected by evaluator	B
No. of injuries reported by surveillance	C
No. of non-injuries reported as injuries	D
No. of injuries with missing data	E
No. of injuries with incorrect coding	F

Evaluating the surveillance system

Attribute	#
No. of all cases (injury or not)	A
No. of injury cases detected by evaluator	B
Injury rate (% of all cases that are injuries)	B/A
No. of injuries reported by surveillance	C
No. of non-injuries reported as injuries	D
Accuracy of injury surveillance system	C/B
Predictive value of injury surveillance system	C/(C+D)
No. of injuries with missing data	E
No. of injuries with incorrect coding	F
Accuracy rate (% of injuries accurately coded)	(C-E-F)/C

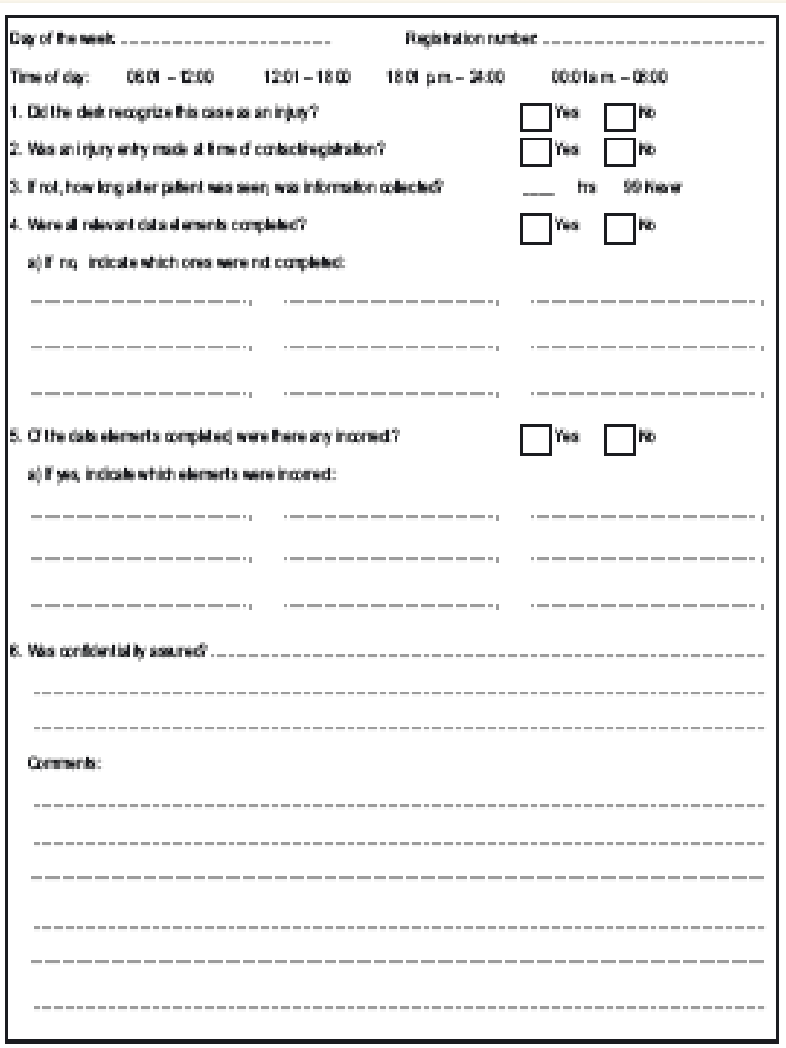
Evaluating the surveillance system

Attribute	#	Indicator (%)
No. of all cases (injury or not)	A	
No. of injury cases detected by evaluator	B	
Injury rate (% of all cases that are injuries)	B/A	(B/A)*100
No. of injuries reported by surveillance	C	
No. of non-injuries reported as injuries	D	
Accuracy of injury surveillance system	C/B	(C/B)*100
Predictive value of injury surveillance system	C/(C+D)	[C/(C+D)]*100
No. of injuries with missing data	E	
No. of injuries with incorrect coding	F	
Accuracy rate (% of injuries accurately coded)	(C-E-F)/C	[(C-E-F)/C]*100

Process evaluation of an injury surveillance system

- Viewing the operation of the surveillance at different periods of a workday, follow at least 6 cases that present themselves and complete a process evaluation form, carefully checking the following:
  - Duplicate cases
  - Wrongfully classified cases (cases that did not meet inclusion criteria that were included)
  - Missed cases
  - Incorrect codes

Sample Process Evaluation Form



Day of the week: _____ Registration number: _____

Time of day: 08:01 – 12:00 12:01 – 18:00 18:01 p.m. – 24:00 00:01a.m. – 08:00

1. Did the clerk recognize this case as an injury? ☐ Yes ☐ No
2. Was an injury entry made at time of contact/registration? ☐ Yes ☐ No
3. If not, how long after patient was seen, was information collected? ___ hrs 99 if never
4. Were all relevant data elements completed? ☐ Yes ☐ No

   a) If no, indicate which ones were not completed:

   _____, _____, _____,

   _____, _____, _____,

   _____, _____, _____,

5. Of the data elements completed, were there any incorrect? ☐ Yes ☐ No

   a) If yes, indicate which elements were incorrect:

   _____, _____, _____,

   _____, _____, _____,

   _____, _____, _____,

6. Was confidentiality assured? _____

   _____

   _____

Comments:

_____

_____

_____

_____

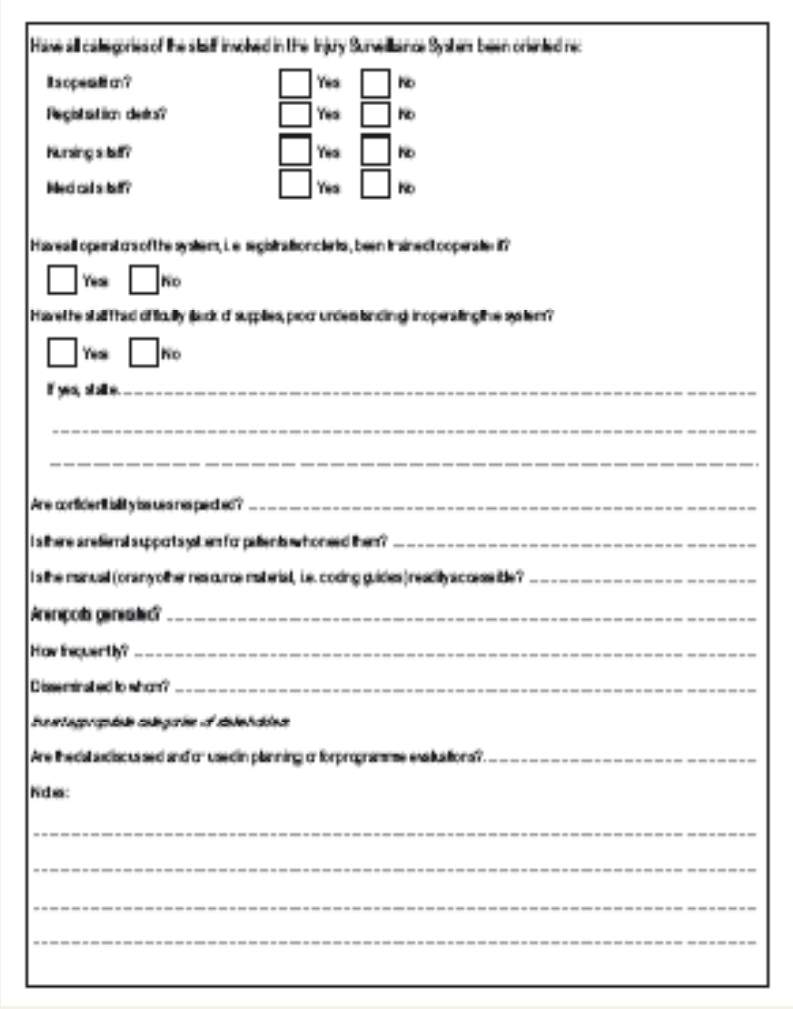
_____

_____

System environment evaluation of injury surveillance system

- A systems evaluation looks at how well staff are able to operate the system conducted through interviews of staff.

Sample questionnaire for system environment evaluation



Have all categories of the staff involved in the Injury Surveillance System been oriented re:

Its operation?	☐ Yes	☐ No
Registration clerks?	☐ Yes	☐ No
Nursing staff?	☐ Yes	☐ No
Medical staff?	☐ Yes	☐ No

Has all operators of the system, i.e. registration clerks, been trained to operate it?

☐ Yes ☐ No

Have the staff had difficulty (lack of supplies, poor understanding) in operating the system?

☐ Yes ☐ No

If yes, state: _____

_____

_____

Are confidentiality issues respected? _____

Is there an referral support system for patients who need them? _____

Is the manual (or any other resource material, i.e. coding guides) readily accessible? _____

Are reports generated? _____

How frequently? _____

Disseminated to whom? _____

Insert appropriate categories of stakeholders

Are the data discussed and/or used in planning or for programme evaluations? _____

Notes:

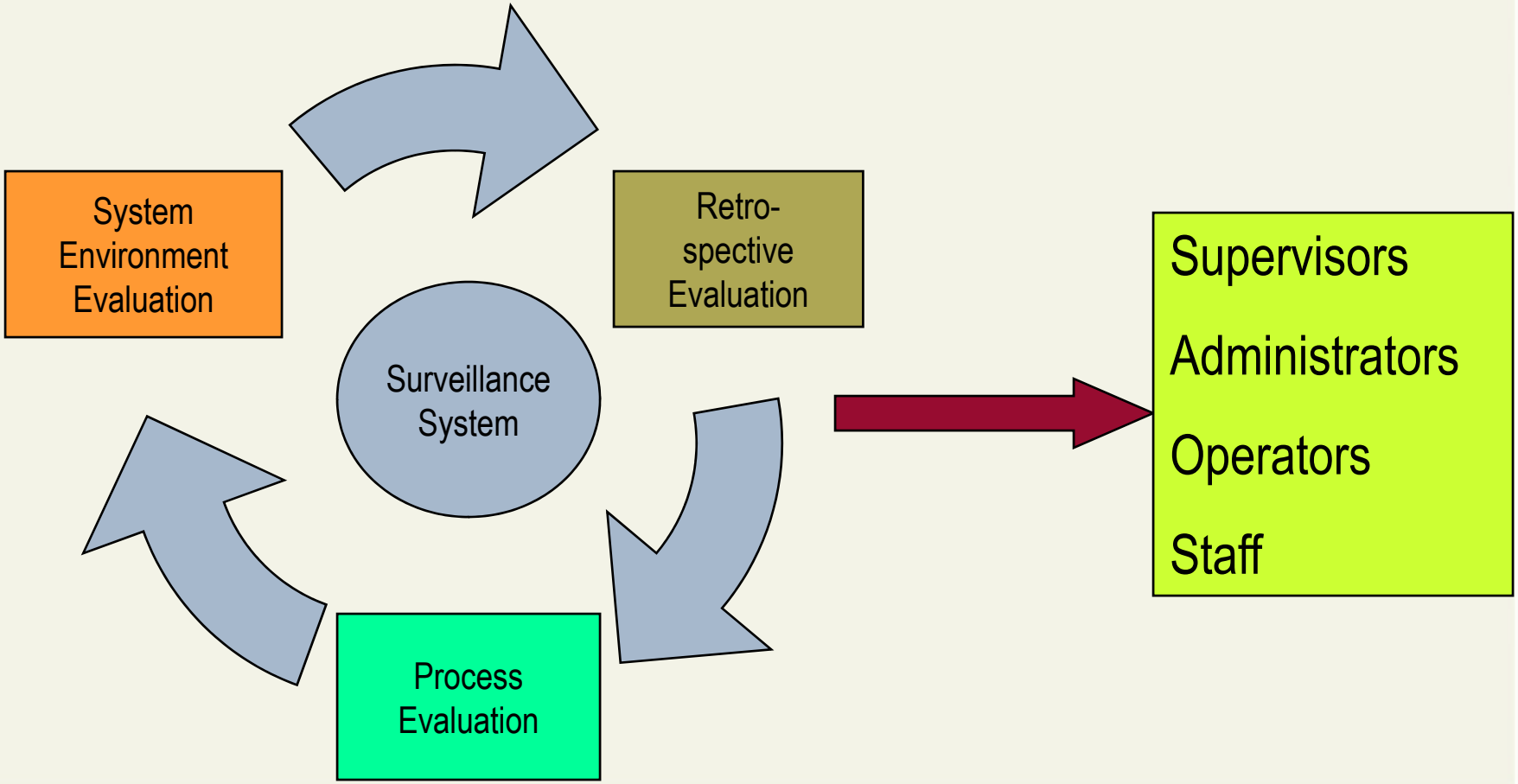
_____

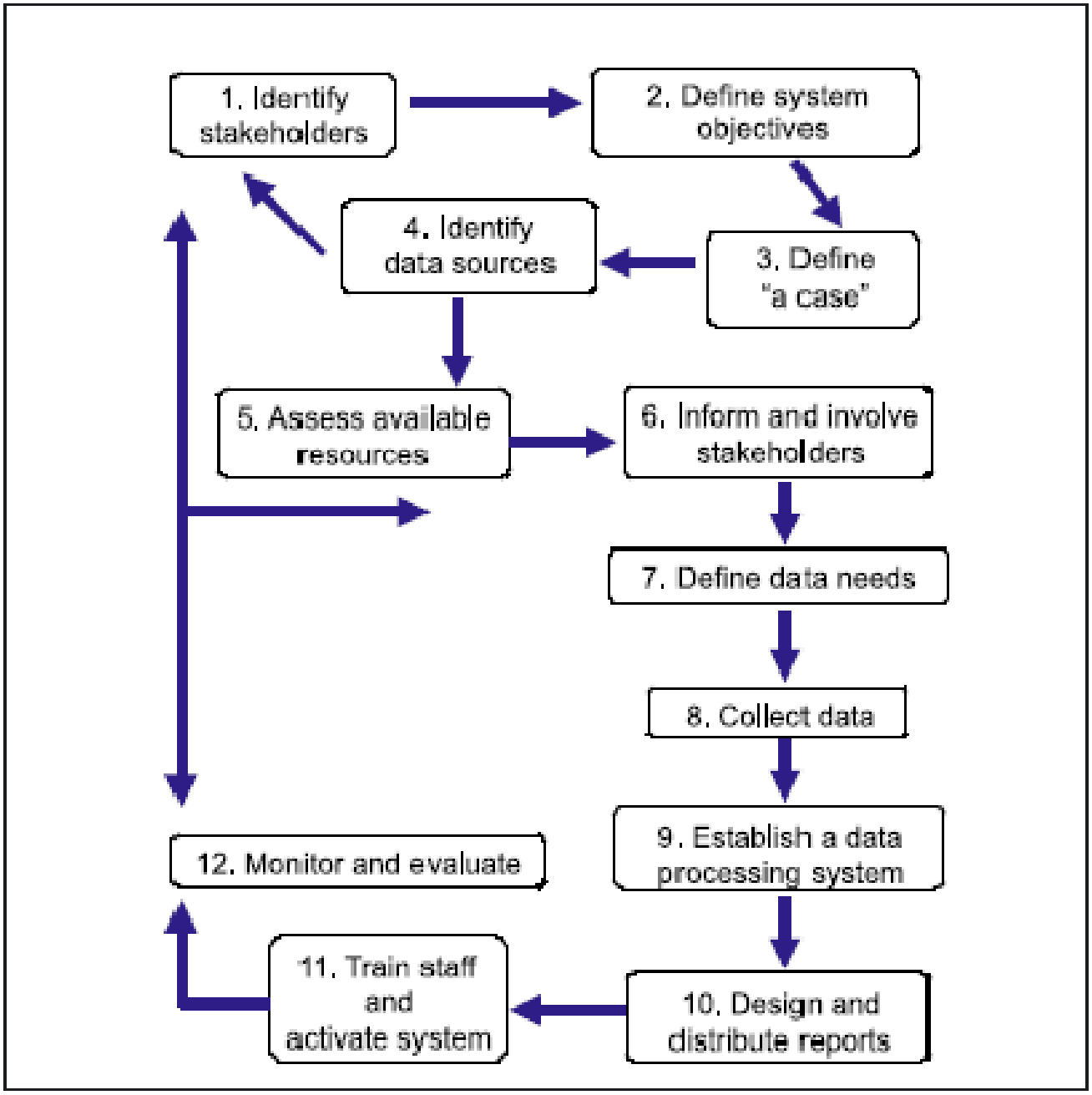
_____

_____

_____

Surveillance system evaluation




1. Identify stakeholders
2. Define system objectives
3. Define "a case"
4. Identify data sources
5. Assess available resources
6. Inform and involve stakeholders
7. Define data needs
8. Collect data
9. Establish a data processing system
10. Design and distribute reports
11. Train staff and activate system
12. Monitor and evaluate