

STAMPEDES ARE COMMUNITY AVERTIBLE CROWD DISASTERS

“anything that can go wrong, will go wrong” Murphy’s Principle

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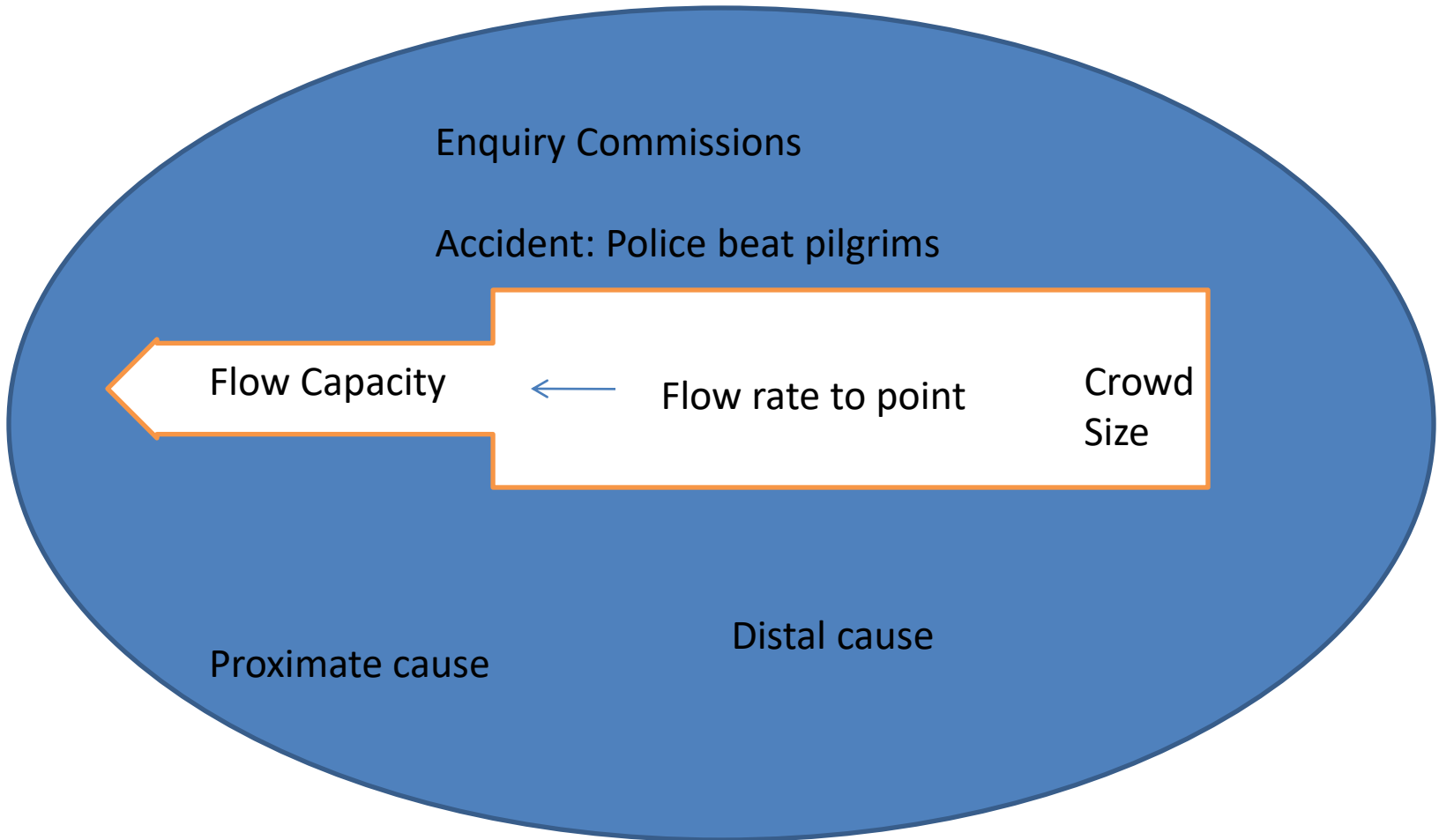
Ministry of Human Resource Development

Government of India



Experiment-Flow rate

Bottleneck/Narrow Point



- Individuals try to move at their normal speed (if they can), but will reduce their walking speed if conditions dictate (e.g. stairs, slopes, rough ground, congestion, navigating obstacles, etc.).
 - *Focal routes: A focal route is shortest path (i.e. that requiring least effort) an individual can take to reach their destination.*
 - *Multiple path interference: This occurs when two or more focal routes cross, where crowds would converge, cross flow or counter flow.*
-*High Density formation*

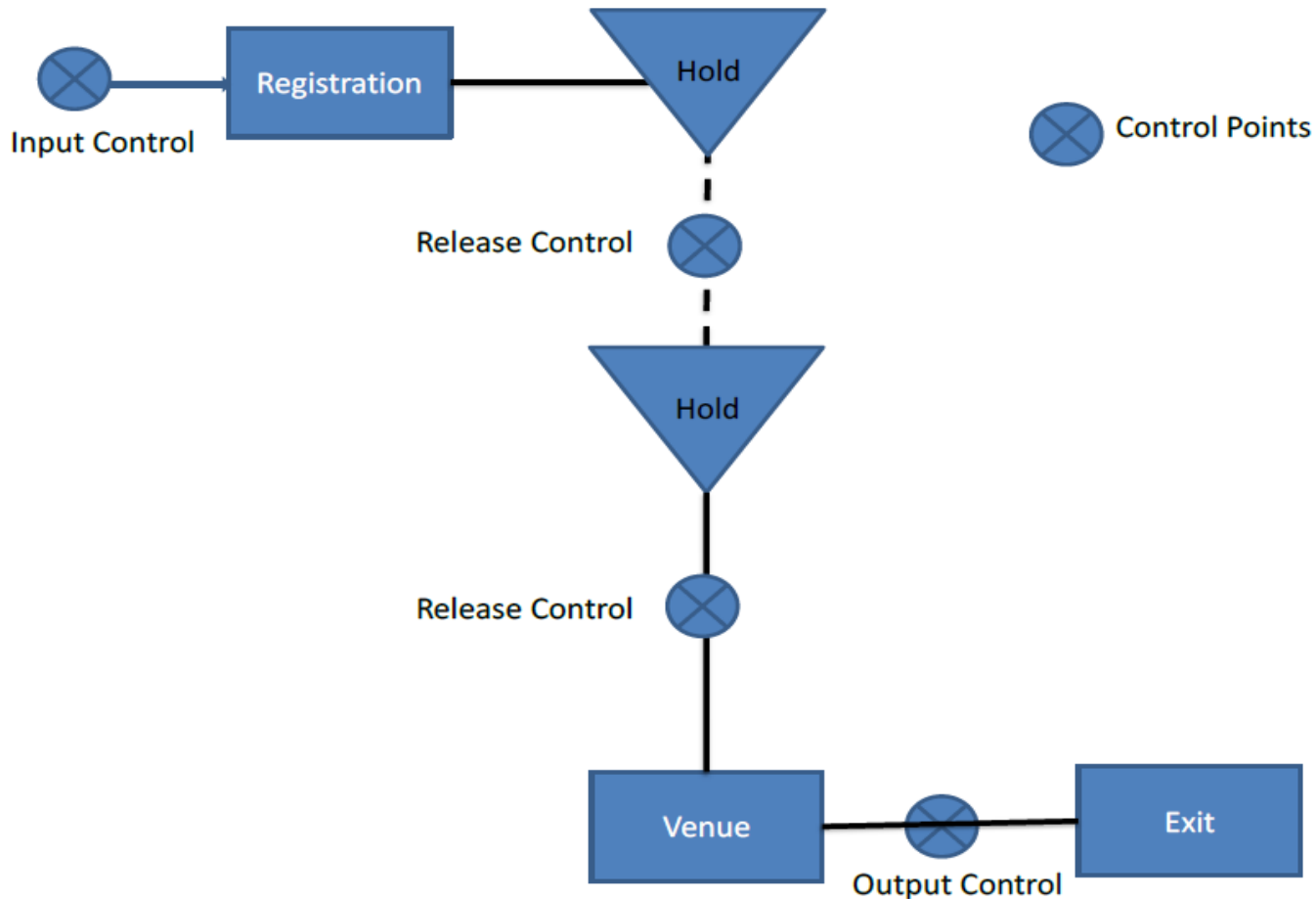
RAMP ANALYSIS

- Route
 - Directions, moving around, leaving
- Area
 - High, medium, low dense
 - Capacity
- Movement
 - Rate of flow
- Profile
 - Demography, age, mix
 - Exercise-Drawings for 50% crowd, 100%, 200%
 - Ingress and egress emergencies
 - Zoning

Understanding Demand - Supply

Managing Demand-Supply Gaps

Guiding Principles: i) Control the crowd inflow, ii) Regulate the crowd at the venue, and iii) Control the outflow, if needed.



Vulnerability Assessment

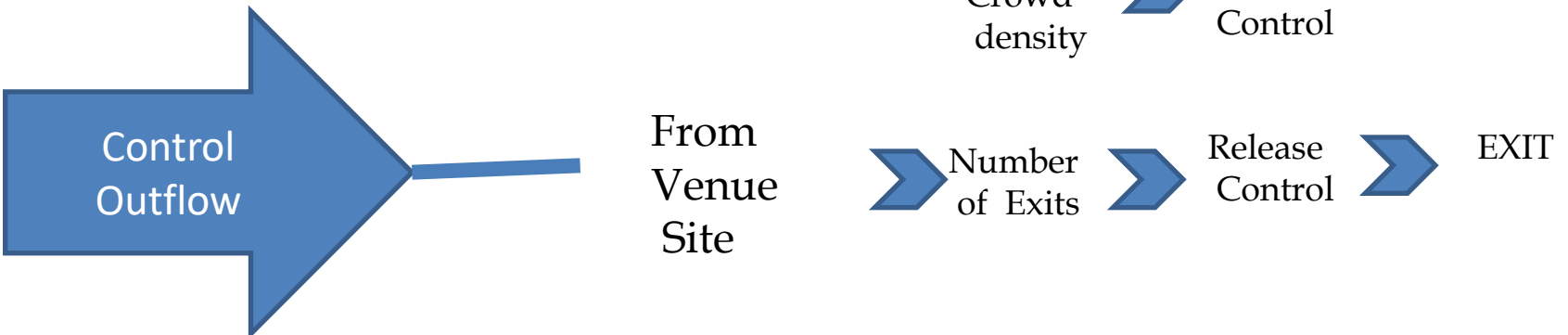
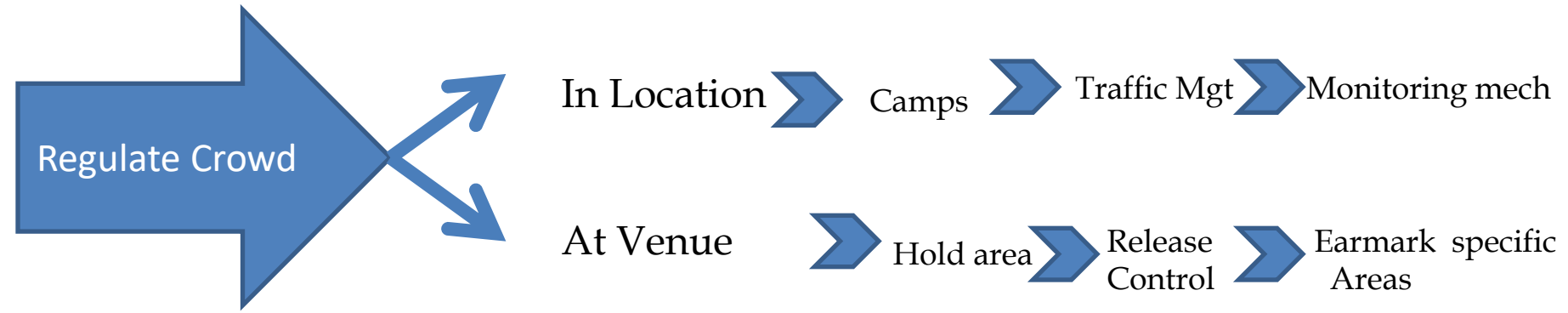
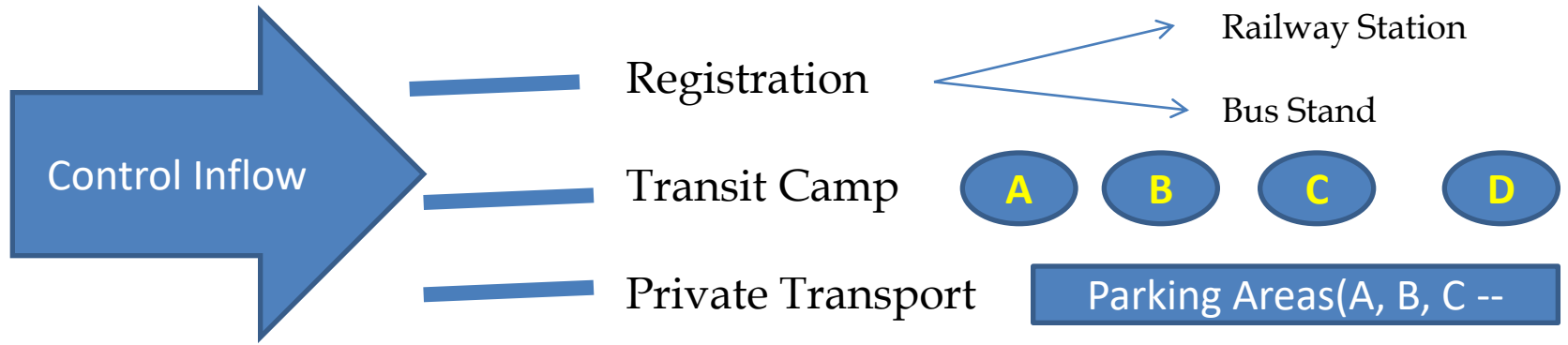
Crowd Crush

- ▣ People need at least 1 square yard of space each to control their movements.
- ▣ Most people who die in crowds die from asphyxiation while standing upright, not from trampling.
- ▣ Compounded force of 5 people crushing in can kill a person.
- ▣ As crowds become more dense, compression increases exponentially.
- ▣ Humans lose consciousness after being compressed for just 30 seconds, they can be brain dead within 6 minutes.
- ▣ Most die without ever falling down.

Crowd Densities

Sq. Ft.	Minimal Mobility Requirements
10	Walking significantly restricted, speed noticeably reduced
4.95	Max. capacity of corridor or walkway, moving at a shifting gait
<4.95	Individual pedestrian mobility is increasingly restricted
3	Involuntary contact and brushing against others, generally avoided
<2	Dangerous crowd forces and psychological pressures begin to develop

Guiding Principle: Crowd Control



Managing Demand Supply Gaps

Know Demand:

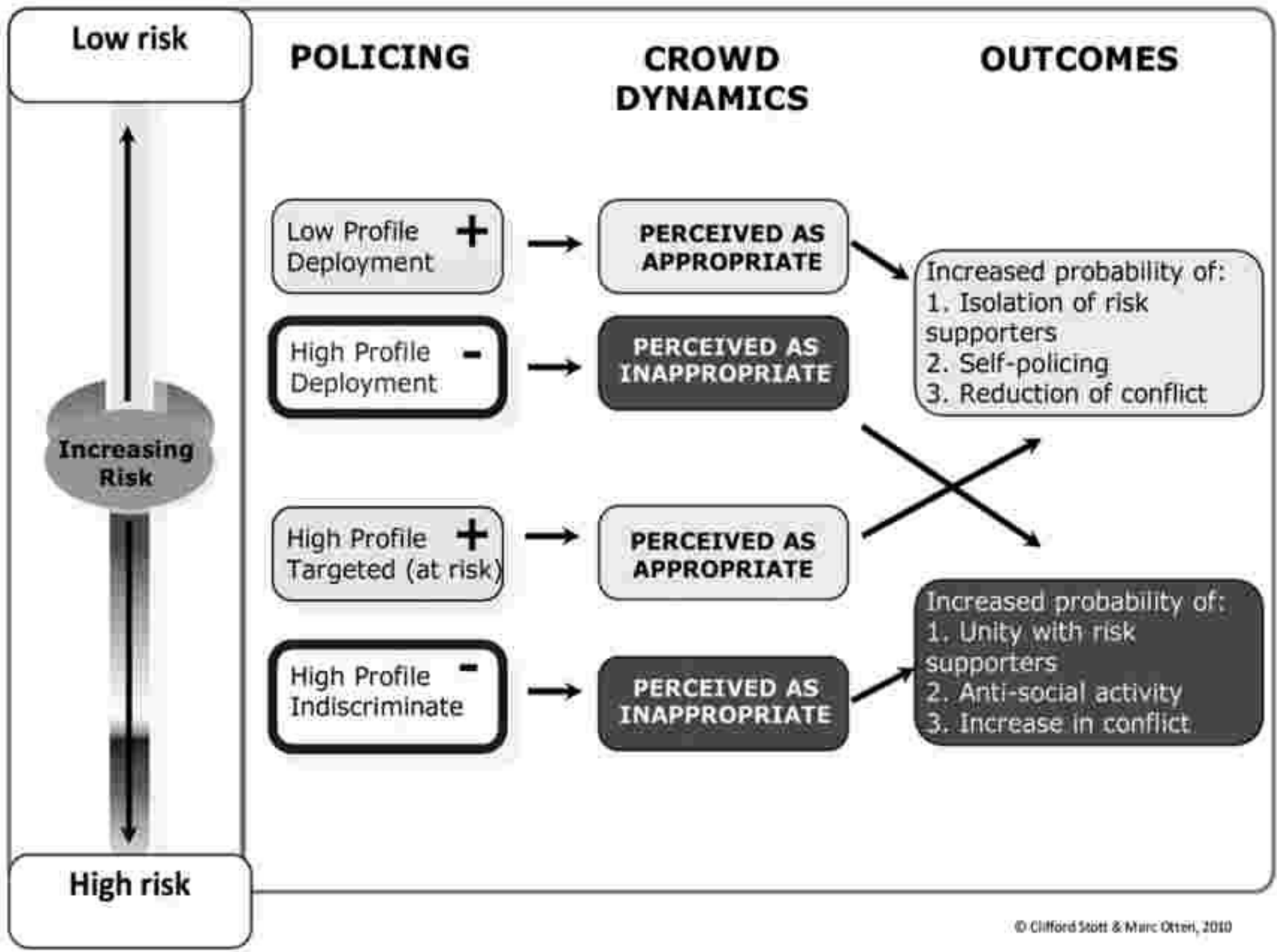
Crowd Volume--Type/ Pattern of Crowd--- Arrival Pattern ----- Duration of Stay
(No of Pilgrims) Mode of Transport

Know Supply:

Accommodation----- Holding capacity-----
Tents/ Barracks, Venue/ Ghats, Rly Stn/ Bus Stand, Darshan Route

----- Resource Availability -----

Manpower, Equipment, Transport, Facilities, Medical, Food & water, Commn



Eight Point Crowd Planning Model

- 1. Investigation: Data collection**
- 2. Analyzing: Data collected and identify variables**
- 3. Plan: Written plan that list goals and objectives for event and which sets counteract measures to curtail unwanted variables that maintains a desired event environment**
- 4. Communication: Meetings, briefings through various forms; written, radio, promoters, stakeholders, external interest groups**
- 5. Execution: Putting plan in motion, and directing show.**
- 6. Supervising Plan: Role of each manager/supervisor in plan. And chain of command for making adjustments to plan as needed?**
- 7. Crisis Management Program: Should something happen what's the plan? Who will respond, who's in charge? Suggested reading – “Day of Event Cancellation Procedures” and “The Manger on Duty” and other emergency preparedness books**
- 8. Assessing the Plan: Debriefings, walk-through facility, review incident, guest complaints, financial, medical and reports**

Disaster Management Act 2005

Disaster Management Act for crowd management.

- Sections 24 and 34: Powers to control and restrict vehicular and human traffic to/from vulnerable and affected area.
- Section 33: District authority to require any officer or any department at district or local level, if necessary, for disaster management tasks.
- Section 41: Function of local authority to ensure that all construction projects under its jurisdiction conform to extant standards and specifications.
- Sections 51, 52, 53: Obstruction in discharge of duties, false claims for obtaining benefits consequent to disaster, and false warning on disasters punishable offence.
- Section 58: Company/individual in charge of conduct of business at time of disaster to be guilty of contravention.
- Section 65: Power of requisition of resources, provisions, vehicles for rescue operations





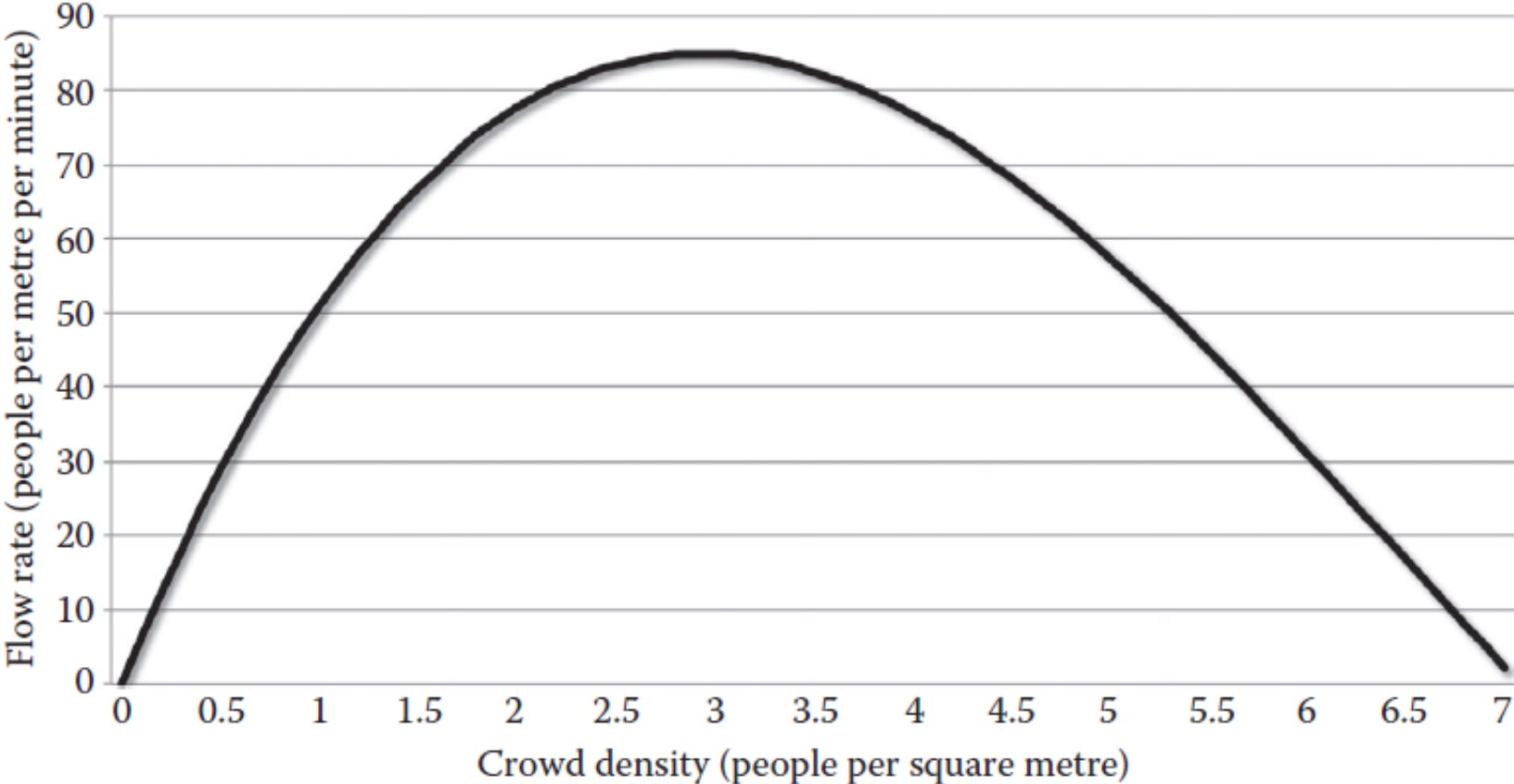
Crowd Movements



Dangerous Crowding



Crowd density versus flow rates



Problem Areas

- Inward Bus Stands
- Outward Bus Stands
- In Bus Stands
- Railway Stations
- Base Camps
- Enroutes
- Event Venues
- Ghats
- Pindapradanam Locations
- Temples
- Tourist Places



Risky



Before Stampede



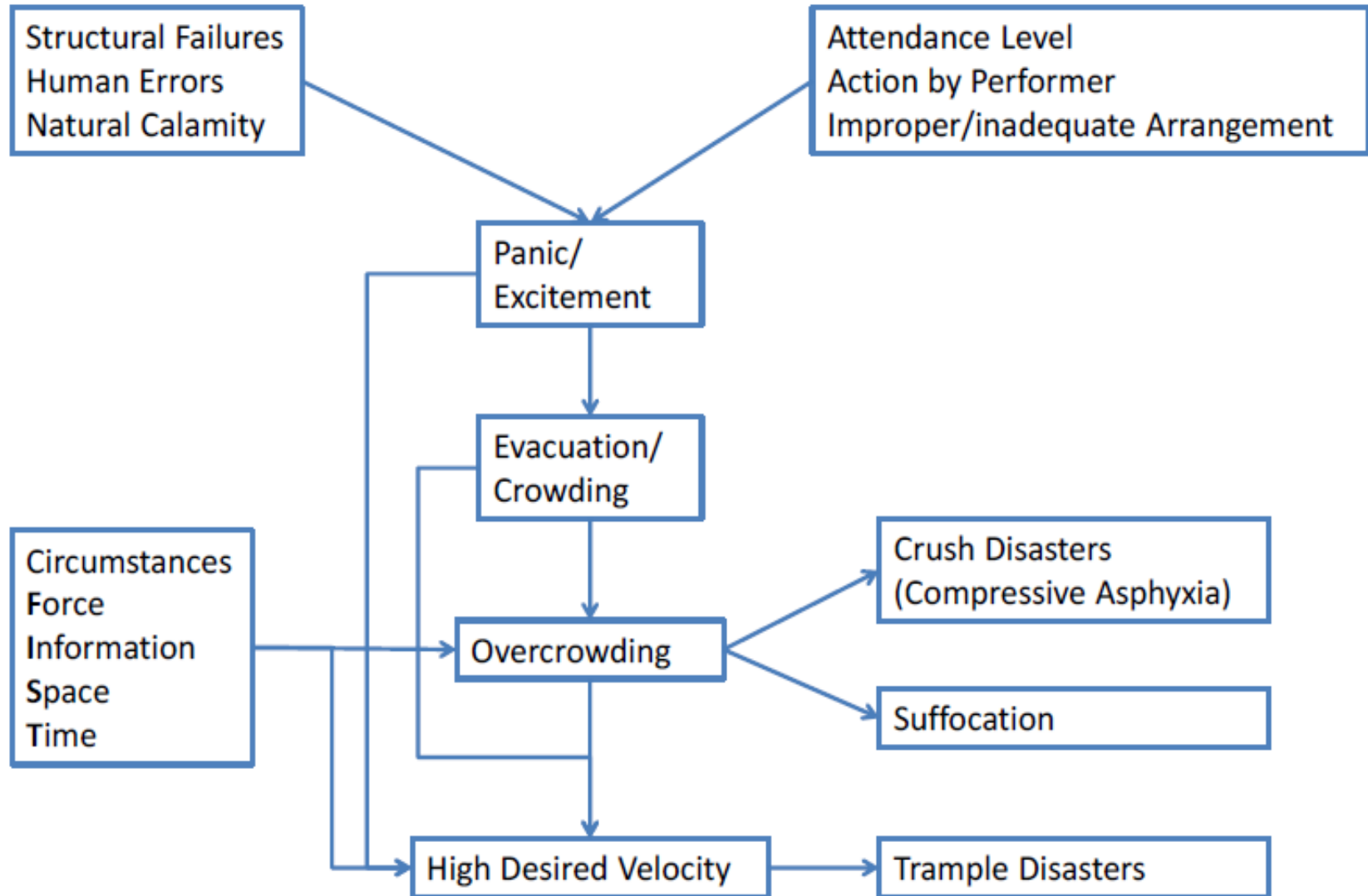
Before Stampede



Before Stampede



Crowd Disaster Process



Source and Destination



Inside Outside



After Stampede



After Stampede



After Stampede



After Stampede



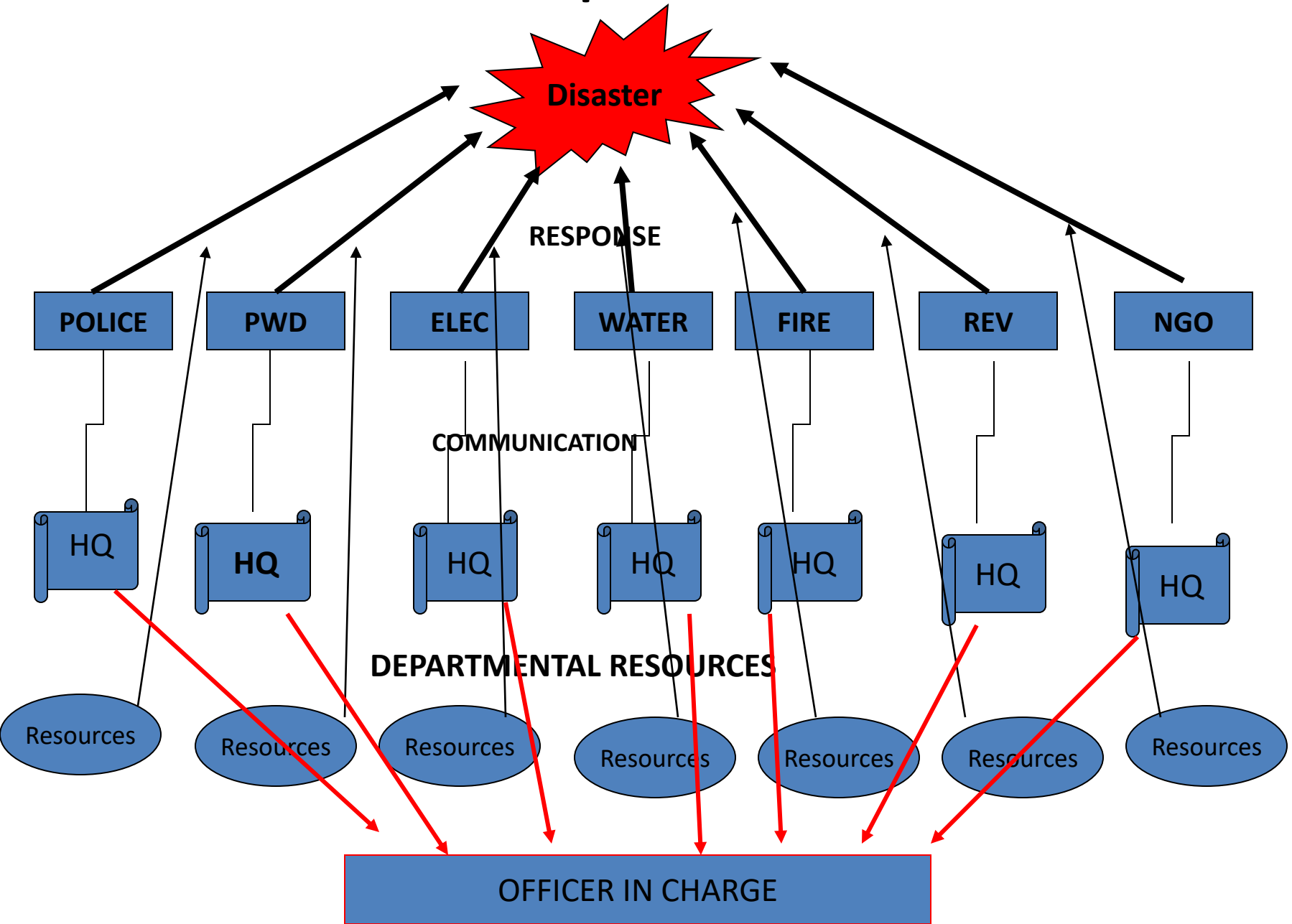
After Stampede



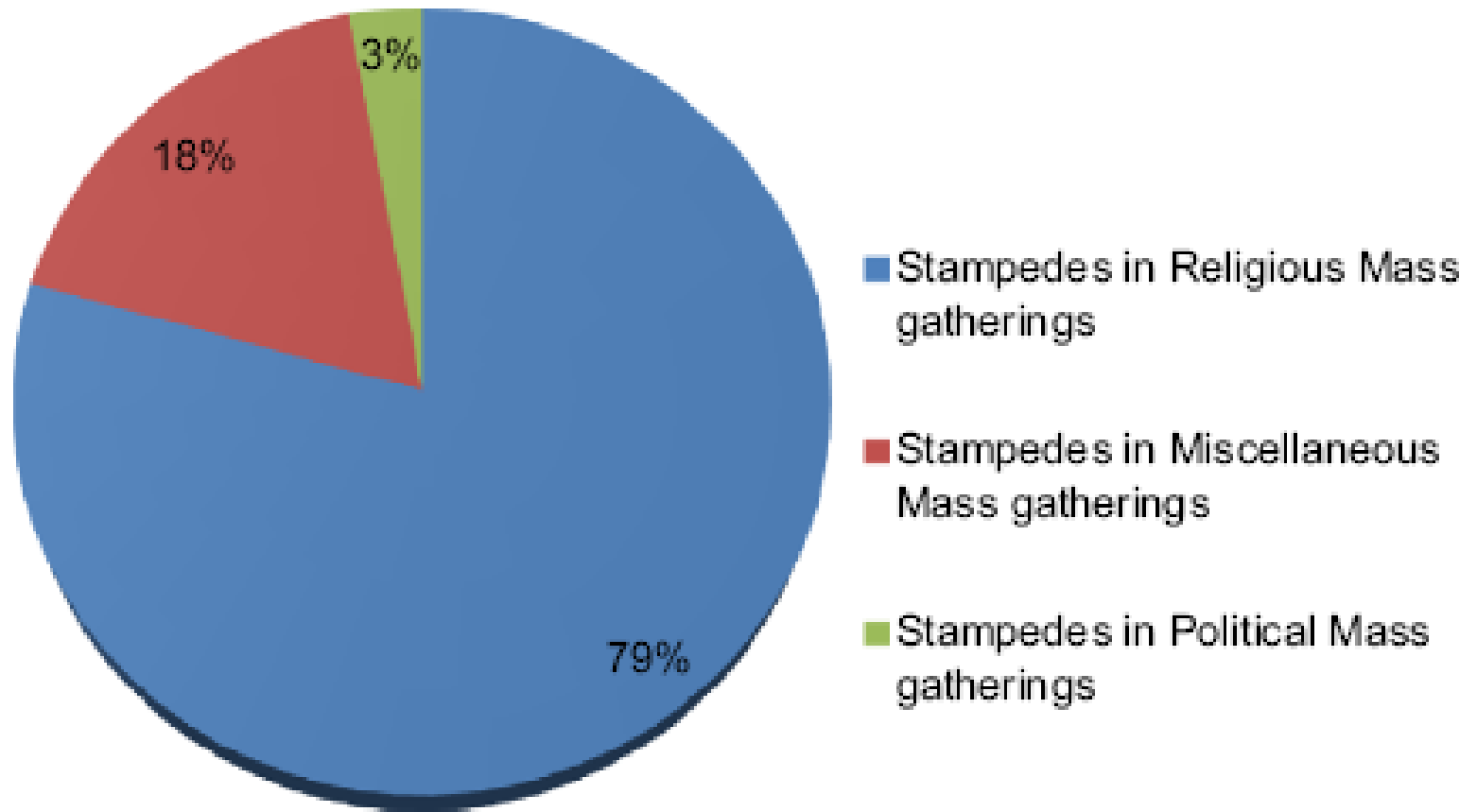
After Stampede



Present Response to Disasters



STAMPEDES AND DEATHS IN INDIA



Mass Gatherings

Organized at Same Location

Organized at Different Locations

Religious

Entertainment

Political

Miscellaneous

Annual festival

Special prayer days

Sport events

Celebrity shows

Rally/Procession

At Public Service points

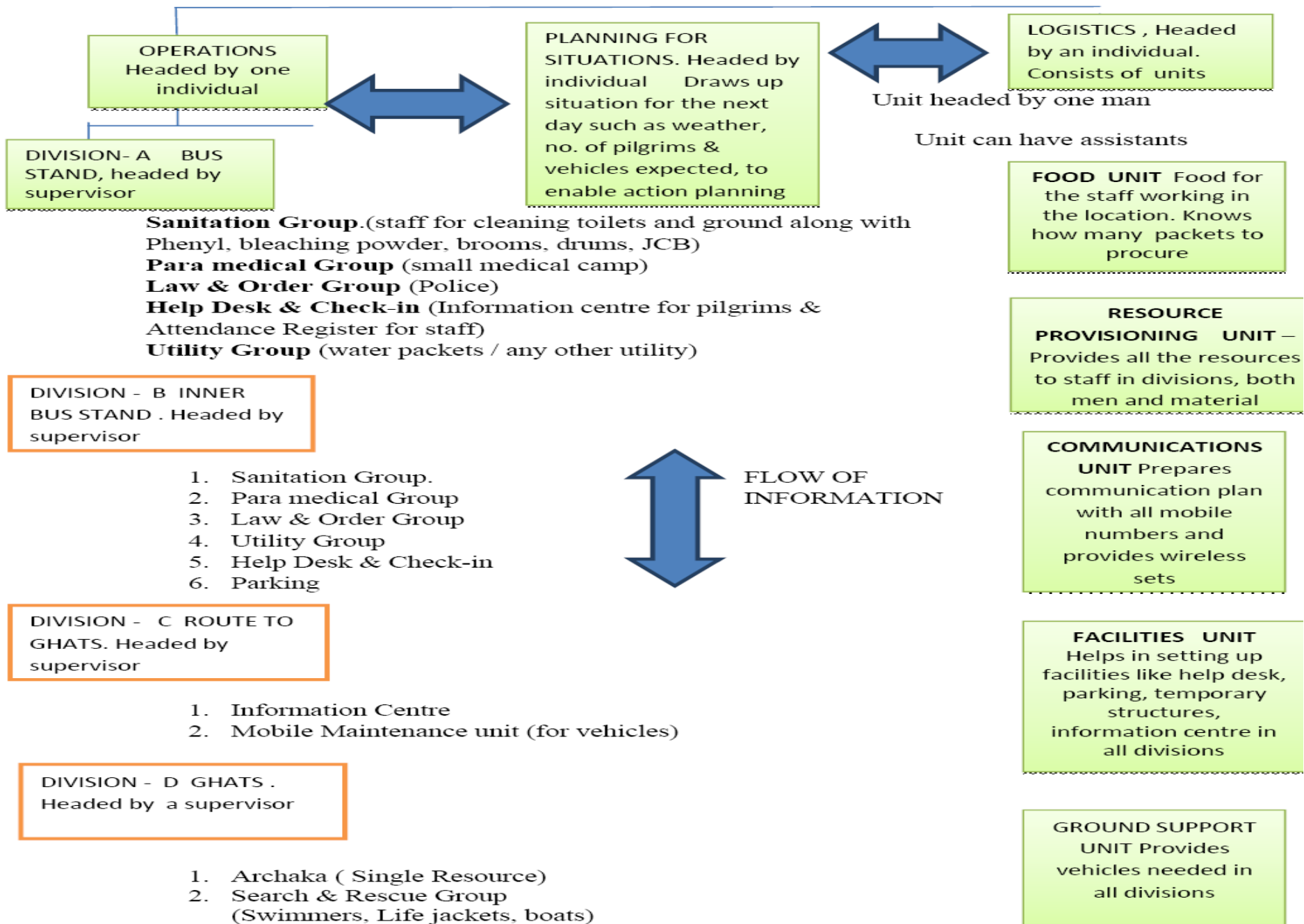
All other

Crowd Management

Short Comings in Crowd Management	Crowd Management Capacity Building
Inefficient deployment of staff and resources	Systematic and complete planning process
Unclear chain of command and supervision	Clear cut chain of command
Missing inter-agency coordination	Accountable incident response team members
Adhoc planning, no accountability and no training	Well thought out pre-designated roles for each member of the response team
Improper communication plan	Effective staff and resource management
Lack of orderly risk assessment, infringing into autonomy of systematic planning process, proper communication plan and inefficient use of available resources	System for effectively integrating independent agencies into the planning and command structure retaining concerned agency independence with coordinated communications
No integration of community resources, NGOs and professionals in response effort	Integration of local community resources and people in the response effort

INCIDENT RESPONSE SYSTEM FOR GODAVARI PUSHKARAM

Godavari Pushkaram: The Team at Each Location



IRS-INCIDENT RESPONSE SYSTEM

Standard Organization Structure

Incident Commander IC

DY IC

INFORMATION OFFICER

LIAISON OFFICER

SAFETY OFFICER

OPERATION SECTION

PLANNING SECTION

LOGISTICS SECTION

STAGING AREA

BRANCHES

AIR OPS BRANCH

DIVISIONS

GROUPS

STRIKE TEAM

TASK FORCE

SINGLE RESOURCE

RESOURCE UNIT

SITUATION UNIT

DEMOBILISATION UNIT

DOCUMENTATION UNIT

TECHNICAL SPECIALIST

SERVICE BRANCH

COMMUNICATION UNIT

MEDICAL UNIT

FOOD UNIT

SUPPORT BRANCH

SUPPLY UNIT

FACILITIES UNIT

GROUND SUPPORT UNIT

FINANCE & ADMIN SECTION

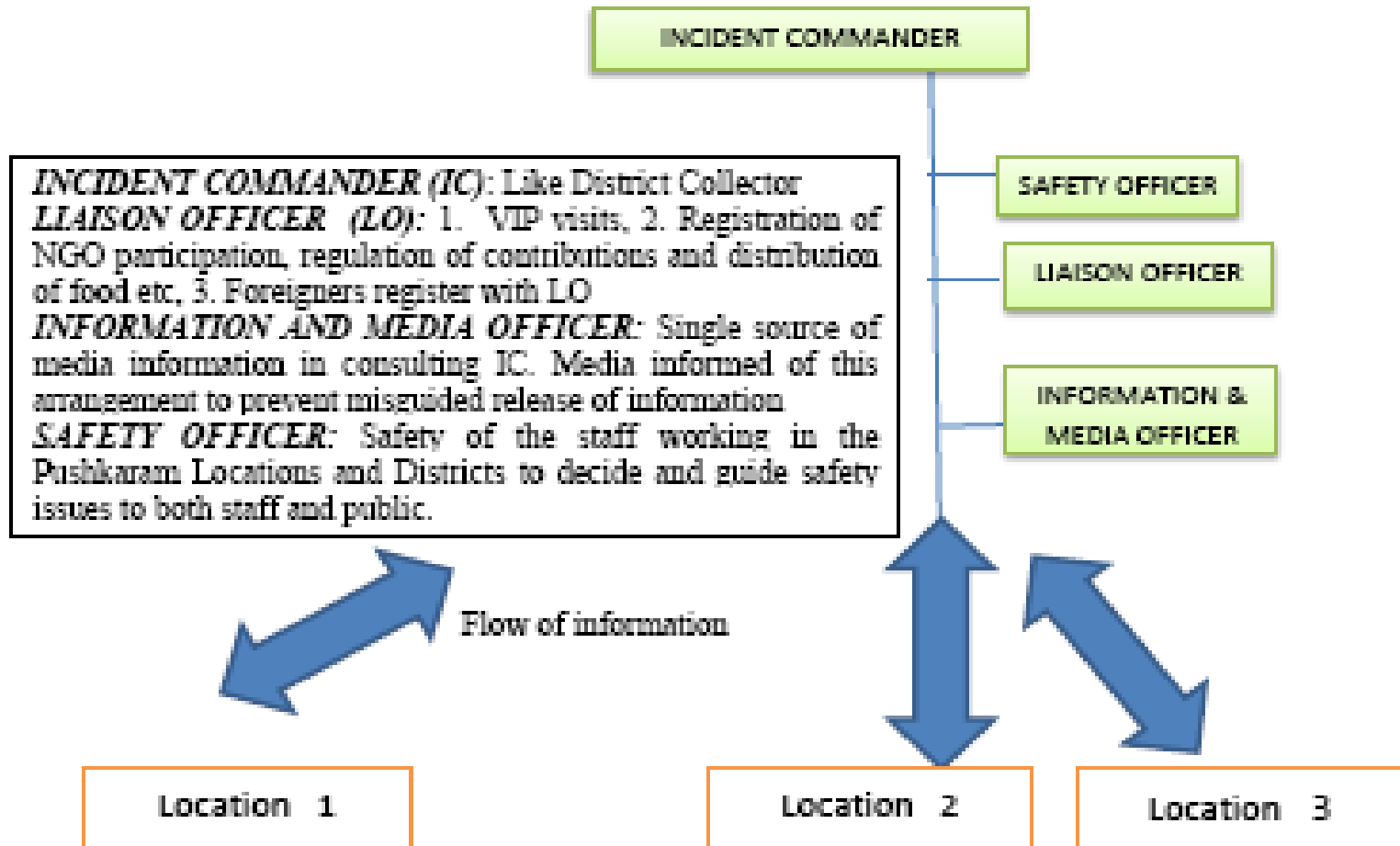
TIME UNIT

COST UNIT

PROCUREMENT UNIT

CLAIMS & COMPENSATION UNIT

Incident Response System At the District Level



Organisation of Pushkaram IRS

- Incident Commander (Collector/JC)
- Intelligence Officer (SP/ADDL SP/Police)
- Liaison Officer (DRO)
- Information and Media Officer(PRO)
- Safety Officer (Fire)
- Deputy Incident Commander (JC/RDO)
- Operation Section (SP)
- Planning Section (DIG/ Addl SP)
- Logistics Section (PD DRDA/Mpl Commr)
- Admin Section (DRO)



IRS Staffing

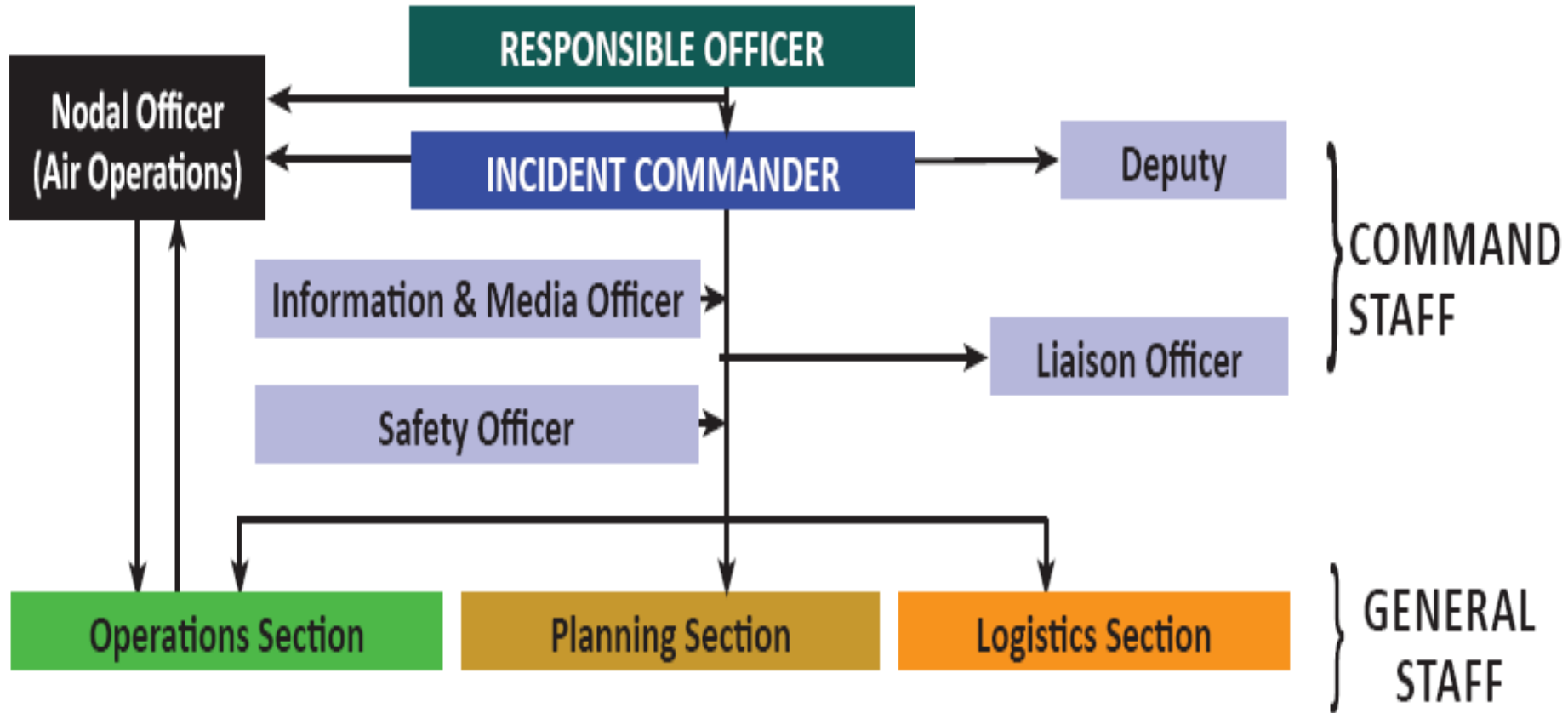
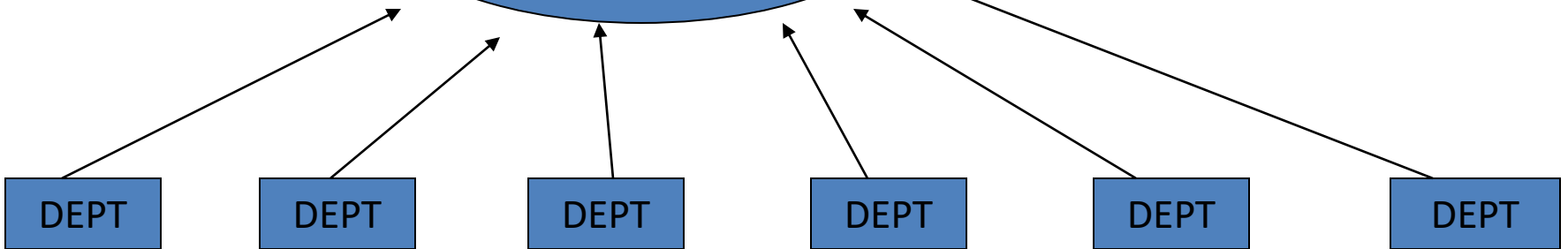
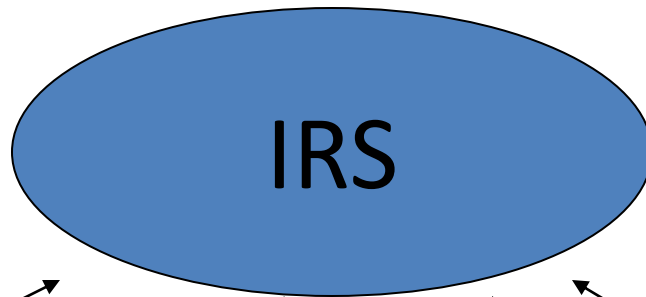
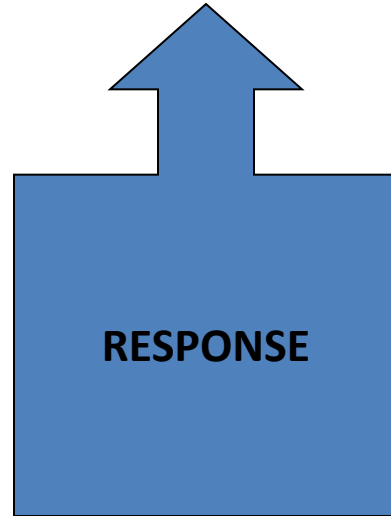


Fig. 1. IRS Organization

RESPONSE THROUGH IRS



IRS: Standard Organization Structure

Incident Commander

DY IC

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Human Stampede Risk Reduction Framework for Mass Gathering Occurrences

Decision to hold the Event

Event Approval

Risk Assessment

Integrated Planning

Risk Reduction Measures

Event -religious, entertainment, political

Event Duration

Indoor/outdoor

Location

Historical incidents/Facilities

Capacity of organizers

Expected Crowd size

Site visit

Safety measures

Licensing and permit

Crowd mood and age group

Spectators and their characteristics

Weather and natural hazards

Analysis of previous accidents

Accidents & intentional acts

Available resources-estimation

Crowd density monitoring

surge of people management

Competition control

Bottle necks release

Emergency Services

Evacuation Plans

Control room

Live Surveillance

Venue Layout and sign boards

Public addressing system

Safeguards & barriers

Medical Care Team

Exercise and review