Saudi Arabia Emergency and Disaster Response

SELP 695 – SE Integrative Project

Dec 11, 2013

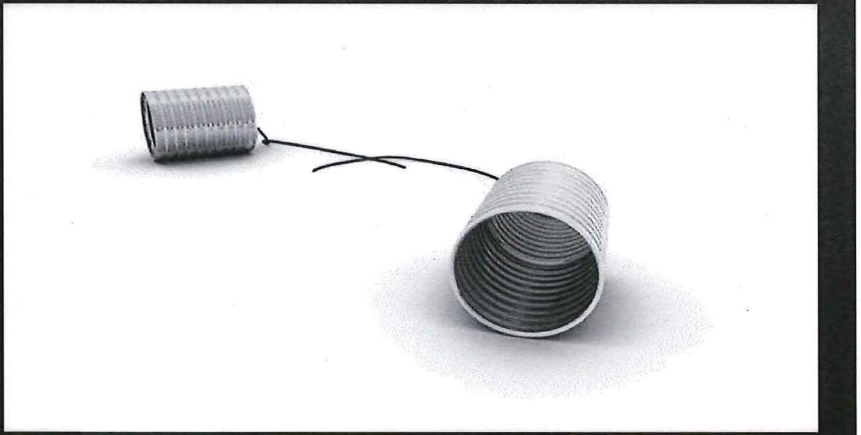
Almuhannad Alyousef

Agenda

- Problem Statement
- Project Objective
- Description of Stakeholders
- System Requirement
- Proposed Alternative Approach
- Analysis of the Proposed Alternatives
- User-Oriented Operational Description
- Operational Environment
- Operational Needs
- Flow Streamlining
- Pull
- Perfection
- Respect for people
- Implementation Methods
- Improvement Summary
- Support Environment
- Problems Which will exist in the future state
- Operational Impact
- Risk Management
- Opportunity Management
- Verification & Validation Methods
- Conclusion

Problem Statement

- This project addresses the negative effects of the poor response to disasters by the Saudi government agencies. These effects imitate the concerns of the government towards climate change, which triggers natural disasters. In addition, to human related risks and technological hazards in Saudi Arabia. Each of these has a huge impact on the life and property of both citizens and residents of Saudi Arabia.



Background Information

- **Natural Disasters:**

Although Saudi Arabia has recently become known for media-attracting incidents such as terrorist attacks and Hajj incidents, less attention has been given to the increasing frequency of natural disasters.

		# of Events	Killed	Total Affected	Damage ($1000)
Epidemic	**Bacterial Infectious Diseases**	2	92	242	-
	Avg per event		46	121	-
	Viral Infectious Diseases	1	76	329	-
	Avg per event		76	329	-
Flood	**Unspecified**	1	32	5,000	450,000
	Avg per event		32	5,000	450,000
	Flash flood	3	83	1,067	-
	Avg per event		27	355	-
	General flood	10	271	23,565	1,200,000
	Avg per event		27	2,356	120,000

Background Information

- ***Human-Related Risks***

Human-related risks are disasters caused by humans, and unlike natural disasters, this branch of disaster is well-managed by the government agencies, such as:

- Terrorism attacks
- Ramadan and Hajj seasons.

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Background Information

Technological Hazards:

Saudi Arabia has recently faced a variety of technological disasters that have resulted in the massive loss of life and property.

These include:

- Industrial accident
- miscellaneous accidents
- transportation accidents

		# of Events	Killed	Total Affected	Damage (1000 US$)
Industrial Accident	**Fire**	1	40	10	-
	Avgper event		40	10	-
Miscellaneous accident	**Collapse**	3	139	175	-
	Avgper event		46	58	-
	Fire	10	690	2,113	220
	Avgper event		69	211	22
	Other	7	2,371	690	-
	Avgper event		338	98	-
Transport Accident	**Air**	5	739	8	-
	Avgper event		147	2	-
	Road	14	293	505	-
	Avgper event		21	36	-

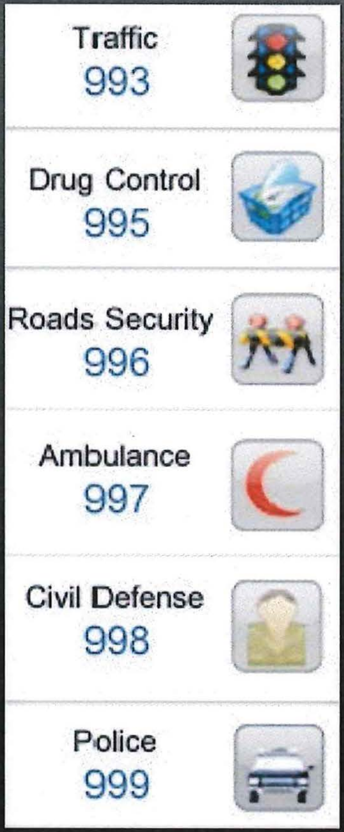
Project Objective

The primary objective of this project is to minimize the impacts of disasters on Saudi Arabia. This includes minimizing human and property losses in the natural disasters, human related risks, and technological hazards in Saudi Arabia and offer alternative solutions to reduce human and economic losses. While, the minor objectives are:

- To raise attention towards natural, human related, and technological disasters in Saudi Arabia.
- To provide alternative approaches to handle several types of disasters.
- To analyze each alternative approach in order to clarify its reliability and validity.
- To design a practical and well-defined system to prevent disasters that may occur in the future.

Description of Stakeholders

- Ministry of Health
- Ministry of Defense
- Region and Province
- Civil Defense
- General Directorate Of Security Forces GDSF
- Saudi Red Crescent Authority
- General Presidency of Meteorology
- Saudi Geological Survey
- Ministry of Municipal and Rural Infrastructure
- Minister of Culture and Information



Traffic	993
Drug Control	995
Roads Security	996
Ambulance	997
Civil Defense	998
Police	999

System Requirement

- ***Top-level requirement:***
- The main requirement of the system recommended is to minimize the impact of disasters in KSA.

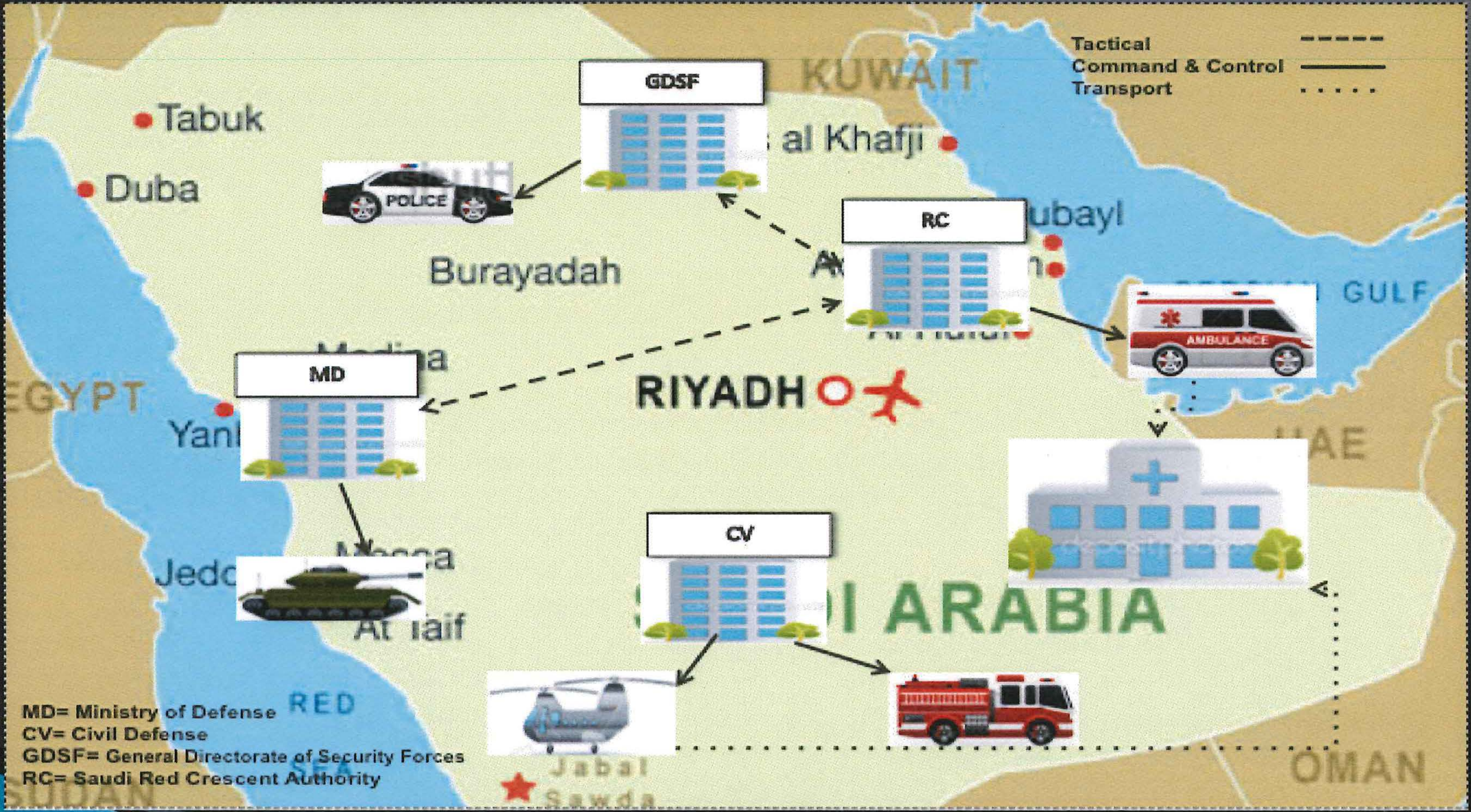
System Requirement

- ***Second-level requirements:***
  - The system shall be responsible for training all government agencies in various types of crises.
  - The system shall be responsible for keeping all sectors of the concerned government agencies on alert to work together as a specialized team.
  - The system shall reduce damages in terms of lives and properties.
  - The system shall have several plans in place to minimize losses.
  - The system shall forecast events such as a weather-related incident.
  - The system shall provide an infrastructure that integrates emergency plans at all levels of government and non-government involvement by utilizing the management of all related resources (including human and other resources).

System Requirement

- ***Additional important requirement:***
  - The system shall help those who have been affected by the disaster.
  - The system shall be prepared to communicate as soon as an event occurs, including what entities need to respond, when and in what manner.
  - The system shall simplify communication methods between the afflicted people and the responsible government agency to rescue them from their specific disaster or emergency.
  - The system shall consider and take into account all hazards, phases, stakeholders and impacts relevant to the disasters.
  - The system shall ensure the unity of efforts among all levels of government and all elements of the community.
  - The system shall synchronize the activities of all relevant stakeholders to achieve a common purpose.

The status quo system

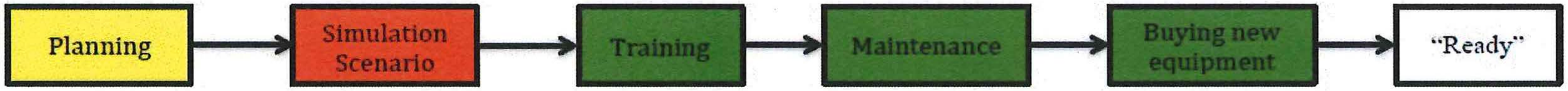

Tactical -----
Command & Control ——
Transport . . . . .
GDSF
RC
MD
CV
POLICE
AMBULANCE
KUWAIT
Tabuk
al Khafji
Duba
ubayl
Burayadah
GULF
EGYPT
Yanb
RIYADH
UAE
Jedd
Mecca
At Taif
ARABIA
RED SEA
OMAN
SUDAN
Jabal Sawda

MD= Ministry of Defense
CV= Civil Defense
GDSF= General Directorate of Security Forces
RC= Saudi Red Crescent Authority

Value Stream Map

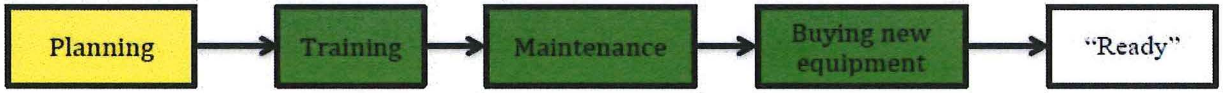
- Current State:
  - **Preparedness:**

1. *Civil Defense:*



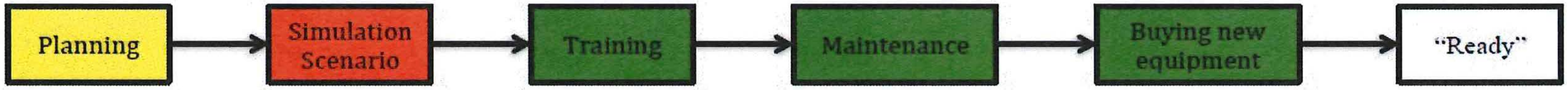
Planning → Simulation Scenario → Training → Maintenance → Buying new equipment → "Ready"

2. *Saudi Red Crescent Authority:*



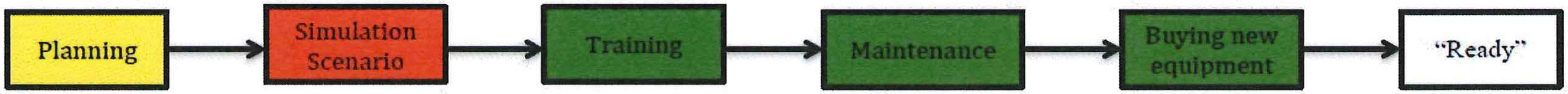
Planning → Training → Maintenance → Buying new equipment → "Ready"

3. *General Directorate Of Security Forces GDSF:*



Planning → Simulation Scenario → Training → Maintenance → Buying new equipment → "Ready"

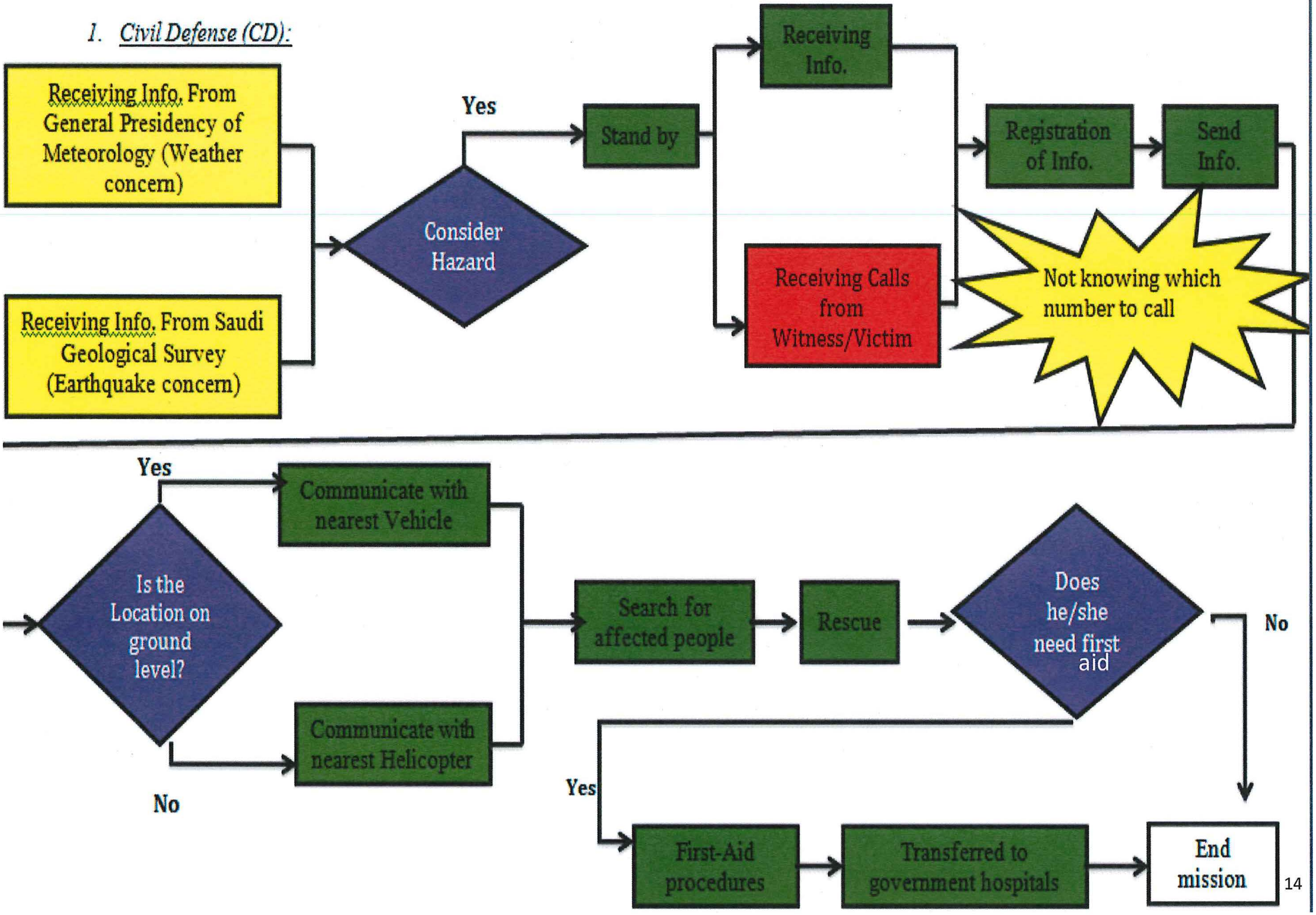
4. *Ministry of Defense:*



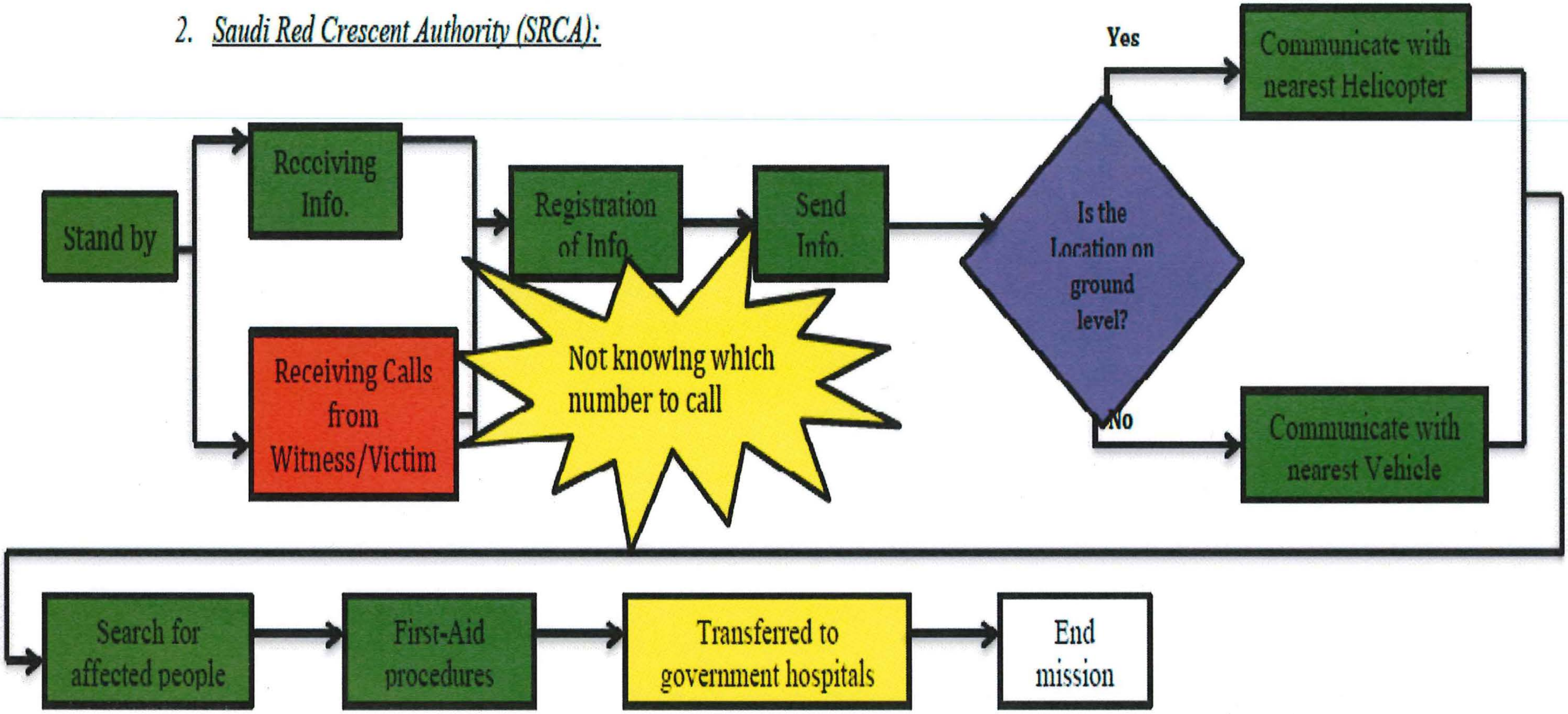
Planning → Simulation Scenario → Training → Maintenance → Buying new equipment → "Ready"

➢ Response:

1. *Civil Defense (CD):*


Receiving Info. From General Presidency of Meteorology (Weather concern)
Receiving Info. From Saudi Geological Survey (Earthquake concern)
Consider Hazard
Yes
Stand by
Receiving Info.
Receiving Calls from Witness/Victim
Registration of Info.
Send Info.
Not knowing which number to call
Is the Location on ground level?
Yes
Communicate with nearest Vehicle
No
Communicate with nearest Helicopter
Search for affected people
Rescue
Does he/she need first aid
No
Yes
First-Aid procedures
Transferred to government hospitals
End mission

2. *Saudi Red Crescent Authority (SRCA):*



Stand by

Receiving Info.

Receiving Calls from Witness/Victim

Registration of Info.

Send Info.

Not knowing which number to call

Is the Location on ground level?

Yes

Communicate with nearest Helicopter

No

Communicate with nearest Vehicle

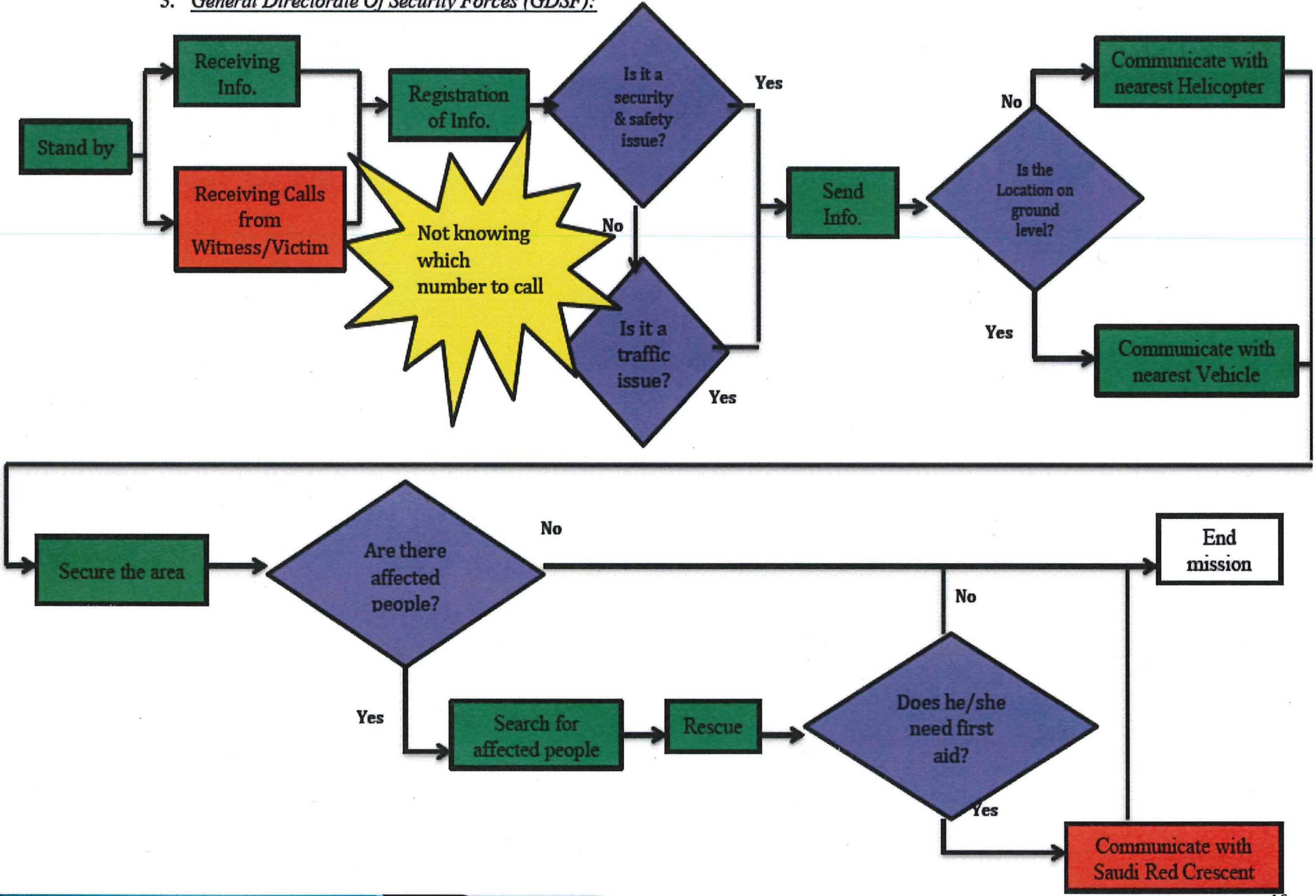
Search for affected people

First-Aid procedures

Transferred to government hospitals

End mission

3. *General Directorate Of Security Forces (GDSF):*



Stand by

Receiving Info.

Receiving Calls from Witness/Victim

Registration of Info.

Not knowing which number to call

Is it a security & safety issue?

Yes

No

Is it a traffic issue?

Yes

Send Info.

Is the Location on ground level?

No

Communicate with nearest Helicopter

Yes

Communicate with nearest Vehicle

Secure the area

Are there affected people?

No

End mission

Yes

Search for affected people

Rescue

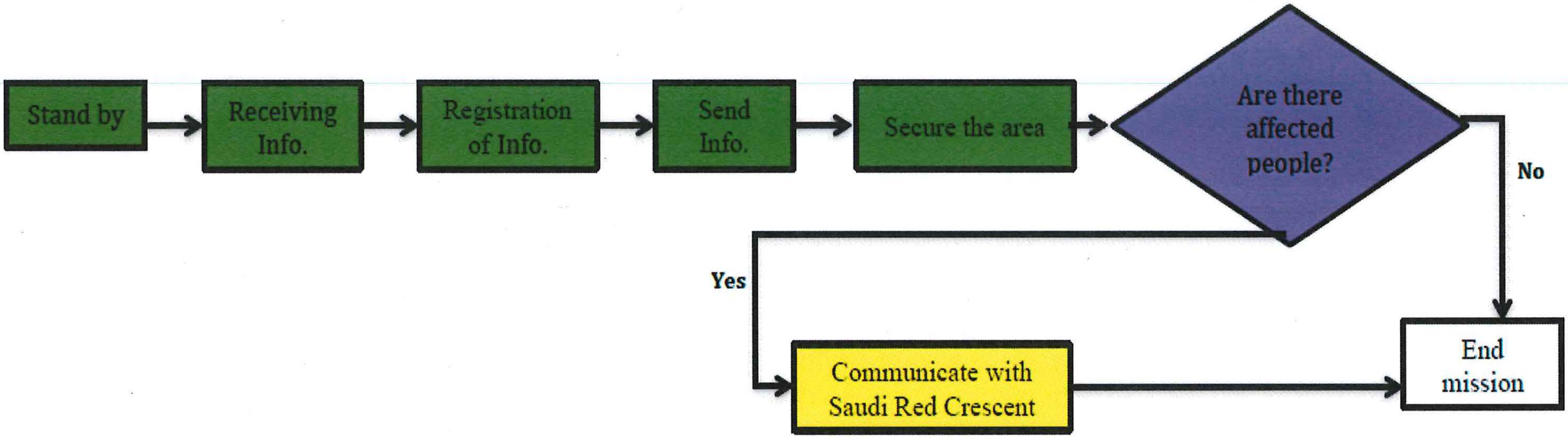
Does he/she need first aid?

No

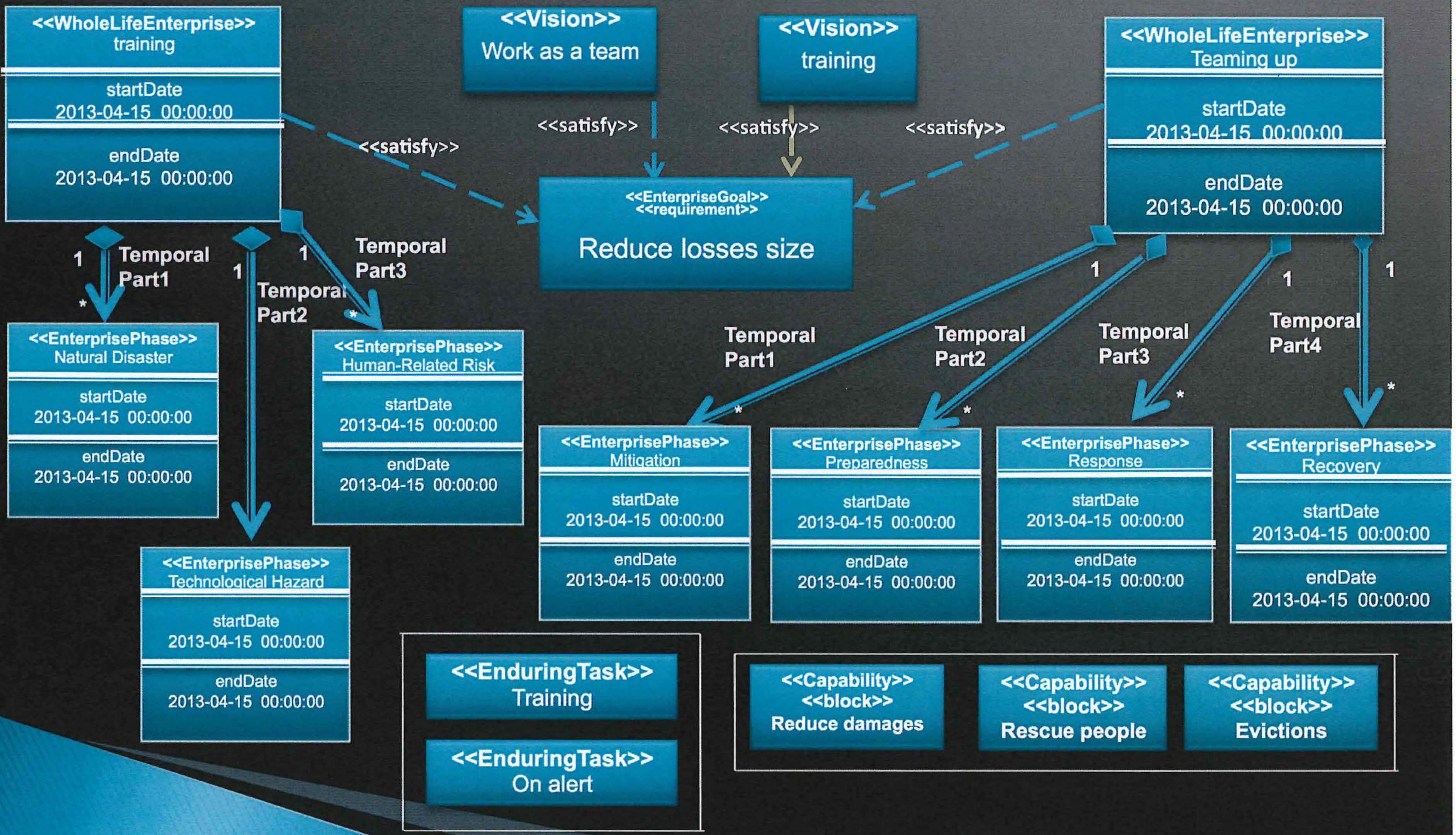
Yes

Communicate with Saudi Red Crescent

4. *Ministry of Defense (MD):*


Stand by
Receiving Info.
Registration of Info.
Send Info.
Secure the area
Are there affected people?
No
Yes
Communicate with Saudi Red Crescent
End mission

User-Oriented Operational Description



<<WholeLifeEnterprise>>
training
startDate
2013-04-15 00:00:00
endDate
2013-04-15 00:00:00

<<Vision>>
Work as a team

<<Vision>>
training

<<WholeLifeEnterprise>>
Teaming up
startDate
2013-04-15 00:00:00
endDate
2013-04-15 00:00:00

<<satisfy>>

<<satisfy>>

<<satisfy>>

<<satisfy>>

<<EnterpriseGoal>>
<<requirement>>
Reduce losses size

1 **Temporal Part1** *

1 **Temporal Part2**

1 **Temporal Part3** *

<<EnterprisePhase>>
Natural Disaster
startDate
2013-04-15 00:00:00
endDate
2013-04-15 00:00:00

<<EnterprisePhase>>
Human-Related Risk
startDate
2013-04-15 00:00:00
endDate
2013-04-15 00:00:00

<<EnterprisePhase>>
Technological Hazard
startDate
2013-04-15 00:00:00
endDate
2013-04-15 00:00:00

1 **Temporal Part1** *

1 **Temporal Part2** *

1 **Temporal Part3** *

1 **Temporal Part4** *

<<EnterprisePhase>>
Mitigation
startDate
2013-04-15 00:00:00
endDate
2013-04-15 00:00:00

<<EnterprisePhase>>
Preparedness
startDate
2013-04-15 00:00:00
endDate
2013-04-15 00:00:00

<<EnterprisePhase>>
Response
startDate
2013-04-15 00:00:00
endDate
2013-04-15 00:00:00

<<EnterprisePhase>>
Recovery
startDate
2013-04-15 00:00:00
endDate
2013-04-15 00:00:00

<<EnduringTask>>
Training

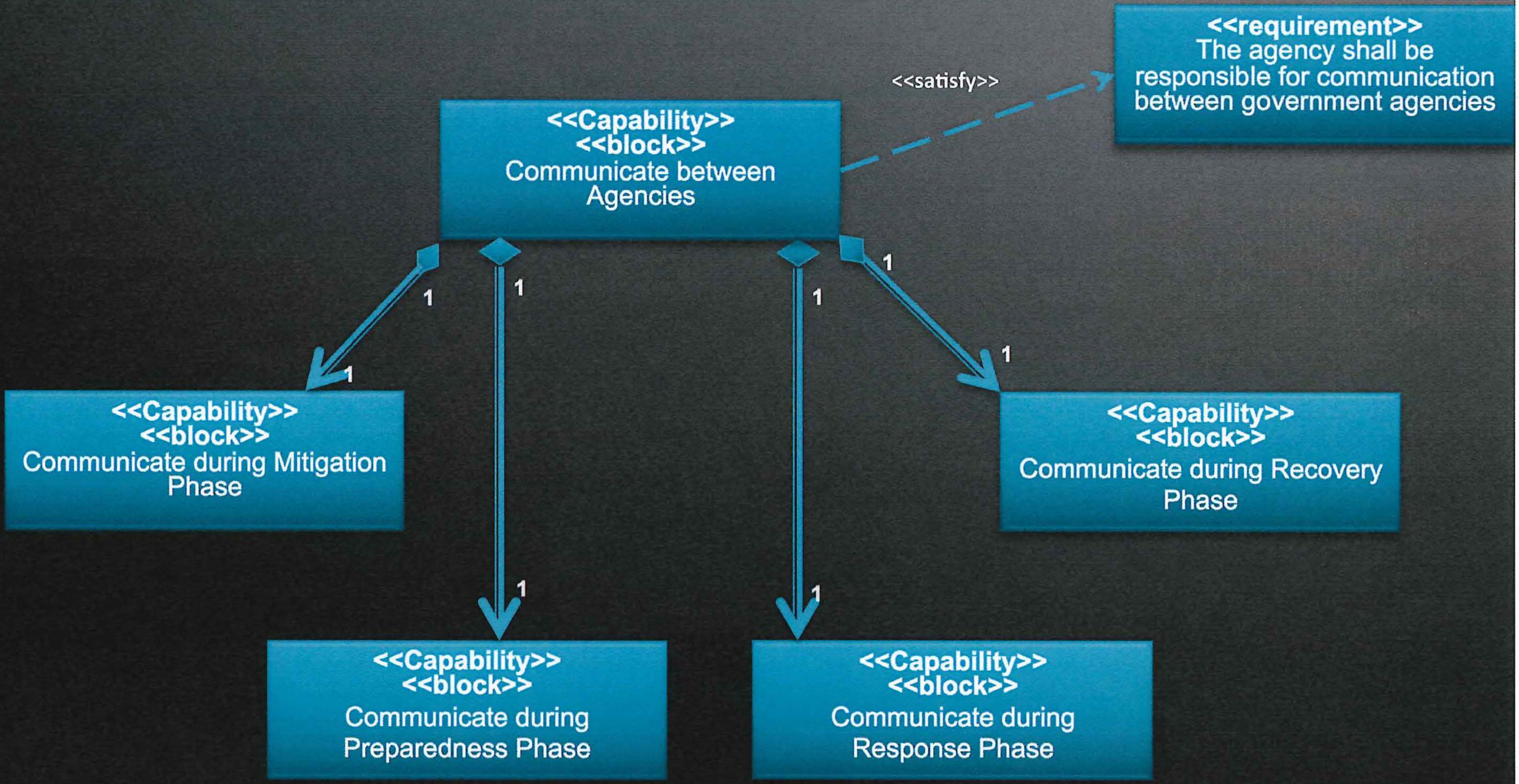
<<EnduringTask>>
On alert

<<Capability>>
<<block>>
Reduce damages

<<Capability>>
<<block>>
Rescue people

<<Capability>>
<<block>>
Evictions

Operational Environment



<<requirement>>
The agency shall be responsible for communication between government agencies

<<satisfy>>

<<Capability>>
<<block>>
Communicate between Agencies

<<Capability>>
<<block>>
Communicate during Mitigation Phase

<<Capability>>
<<block>>
Communicate during Recovery Phase

<<Capability>>
<<block>>
Communicate during Preparedness Phase

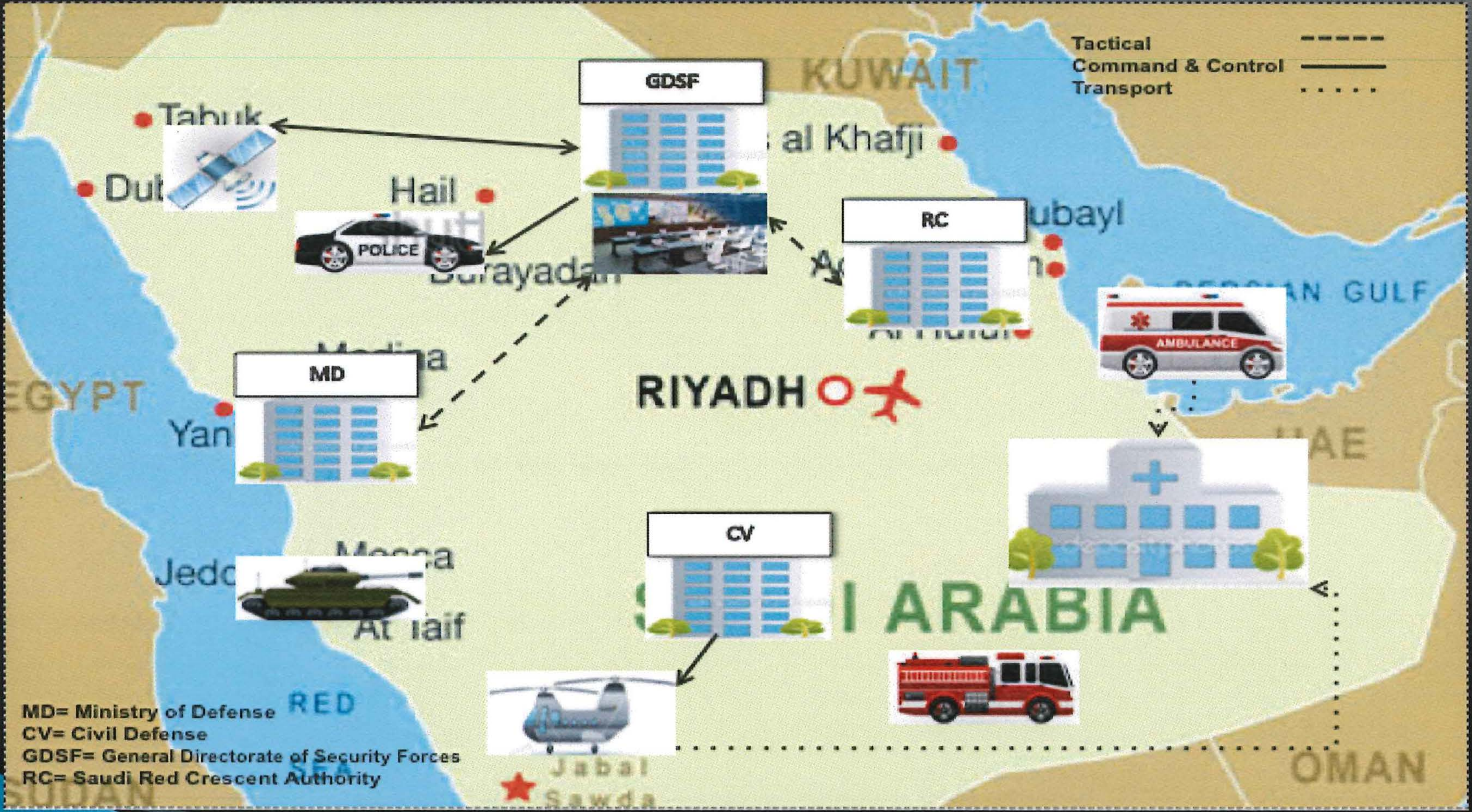
<<Capability>>
<<block>>
Communicate during Response Phase

Operational Needs

- Operational rooms that monitor and receive calls.
- The use of wireless electronics to ensure communication and cooperation between governmental agencies.
- Helipad should be available in different sites and buildings.
- Independent database maintained of all previous incidents that is kept on a special network to protect it from cyber-attacks.
- The agency should provide surveillance cameras connected to the operational room to monitor the situation closely.

UNITED NATIONS

Proposed Alternative Approach The enhancement to the Hajj season government response system


Tactical
Command & Control
Transport
GDSF
RC
MD
CV
POLICE
AMBULANCE
KUWAIT
al Khafji
Tabuk
Dub
Hail
ubayl
Burayadah
PERSIAN GULF
Medina
EGYPT
Yan
RIYADH
UAE
Jedd
Mecca
At Taif
SAUDI ARABIA
RED SEA
Jabal Sawda
SUDAN
OMAN

MD= Ministry of Defense
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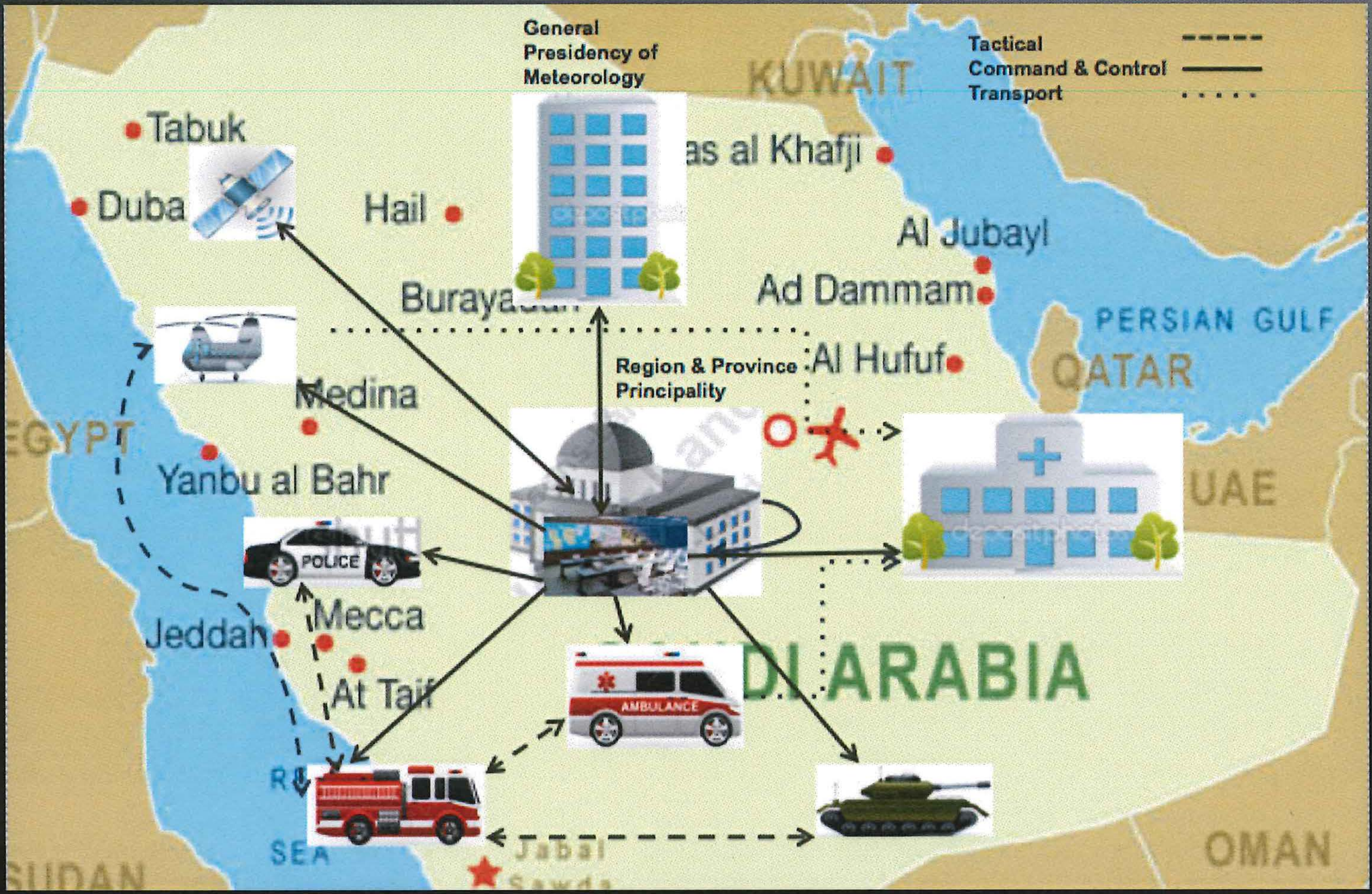
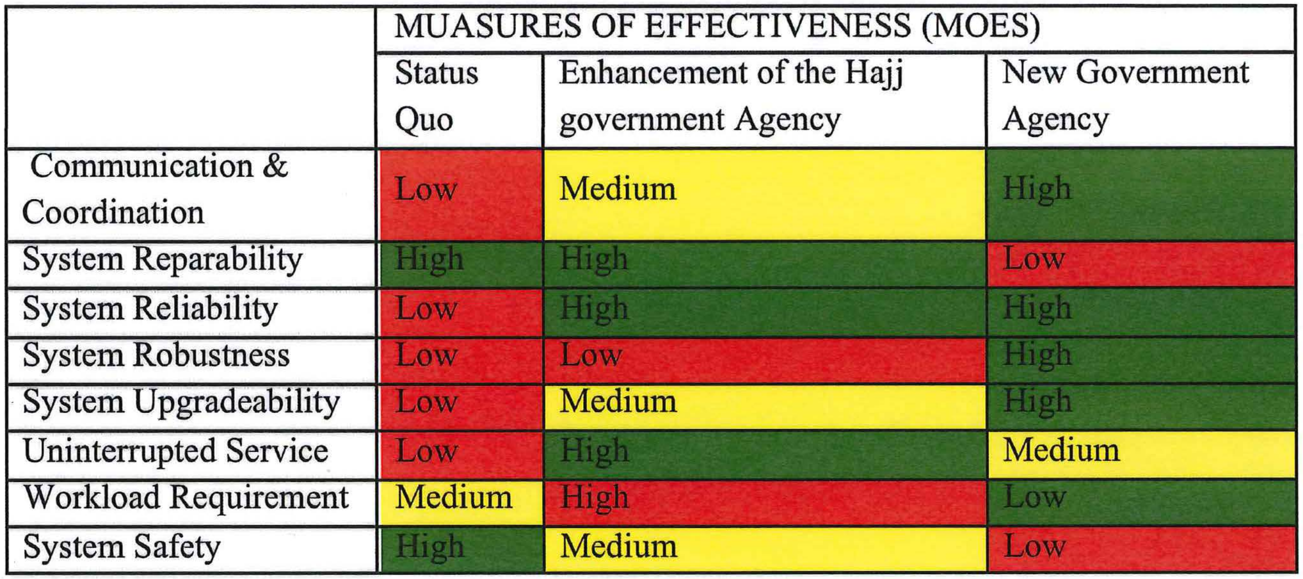
Proposed Alternative Approach
The new emergency response agency


General Presidency of Meteorology
Tactical -----
Command & Control ———
Transport . . . . .
Region & Province Principality
Tabuk
Duba
Hail
Buraydah
Medina
Yanbu al Bahr
Jeddah
Mecca
At Taif
Ras al Khafji
Al Jubayl
Ad Dammam
Al Hufuf
KUWAIT
PERSIAN GULF
QATAR
UAE
SAUDI ARABIA
OMAN
EGYPT
SUDAN
RED SEA
Jabal Sawda
POLICE
AMBULANCE

Analysis of the Proposed Alternative Approaches
Measures of Effectiveness



	MUASURES OF EFFECTIVENESS (MOES)		
	Status Quo	Enhancement of the Hajj government Agency	New Government Agency
Communication & Coordination	🟥 Low	🟨 Medium	🟩 High
System Reparability	🟩 High	🟩 High	🟥 Low
System Reliability	🟥 Low	🟩 High	🟩 High
System Robustness	🟥 Low	🟥 Low	🟩 High
System Upgradeability	🟥 Low	🟨 Medium	🟩 High
Uninterrupted Service	🟥 Low	🟩 High	🟨 Medium
Workload Requirement	🟨 Medium	🟥 High	🟩 Low
System Safety	🟩 High	🟨 Medium	🟥 Low

🟩 = Best Solution

🟨 = Regular Solution

🟥 = Worst Solution

SOLUTION
PROBLEM
TROUBLE
EPS10
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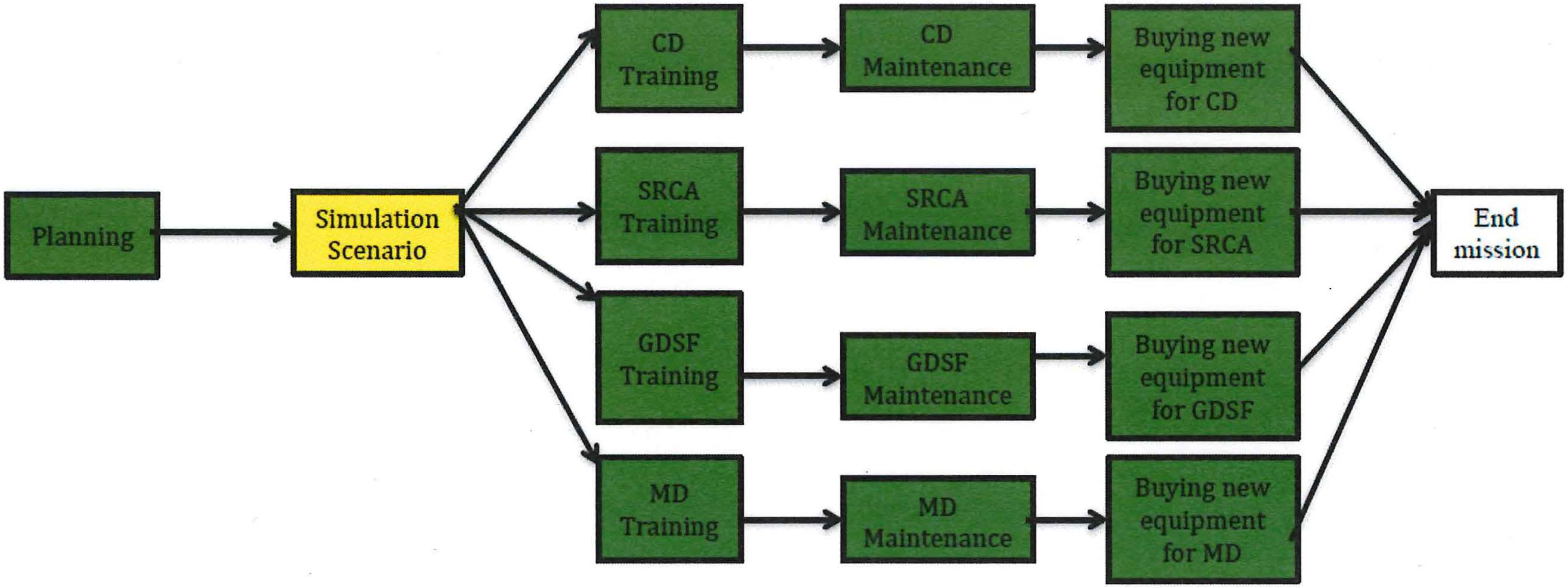
VSM: Future State

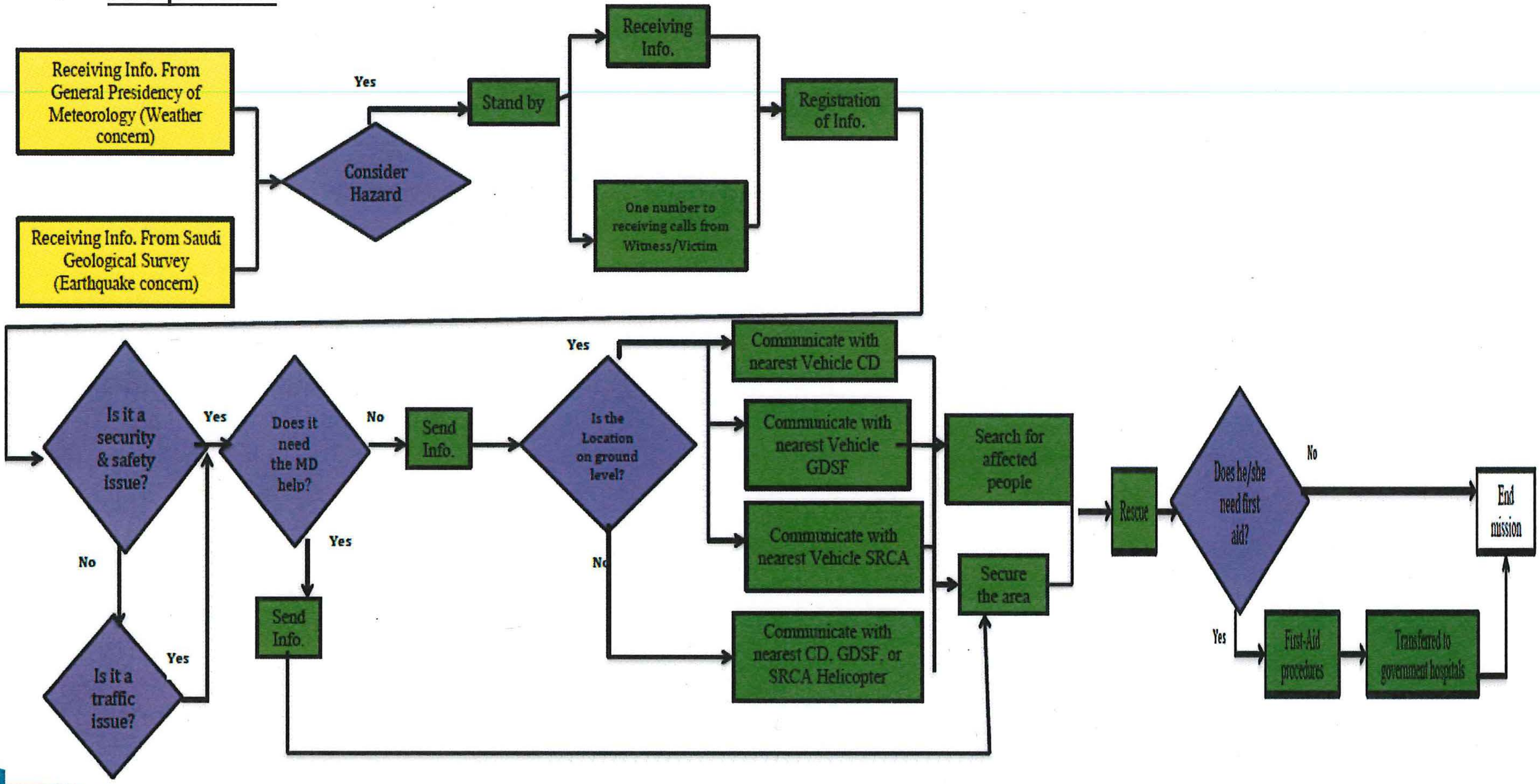
- **Preparedness:**



Planning
Simulation Scenario
CD Training
CD Maintenance
Buying new equipment for CD
SRCA Training
SRCA Maintenance
Buying new equipment for SRCA
GDSF Training
GDSF Maintenance
Buying new equipment for GDSF
MD Training
MD Maintenance
Buying new equipment for MD
End mission

VSM: Future State

- Response:



Receiving Info. From General Presidency of Meteorology (Weather concern)

Receiving Info. From Saudi Geological Survey (Earthquake concern)

Consider Hazard

Yes

Stand by

Receiving Info.

One number to receiving calls from Witness/Victim

Registration of Info.

Is it a security & safety issue?

Yes

No

Is it a traffic issue?

Yes

Does it need the MD help?

No

Yes

Send Info.

Send Info.

Is the Location on ground level?

Yes

No

Communicate with nearest Vehicle CD

Communicate with nearest Vehicle GDSF

Communicate with nearest Vehicle SRCA

Communicate with nearest CD, GDSF, or SRCA Helicopter

Search for affected people

Secure the area

Rescue

Does he/she need first aid?

No

Yes

First-Aid procedures

Transferred to government hospitals

End mission

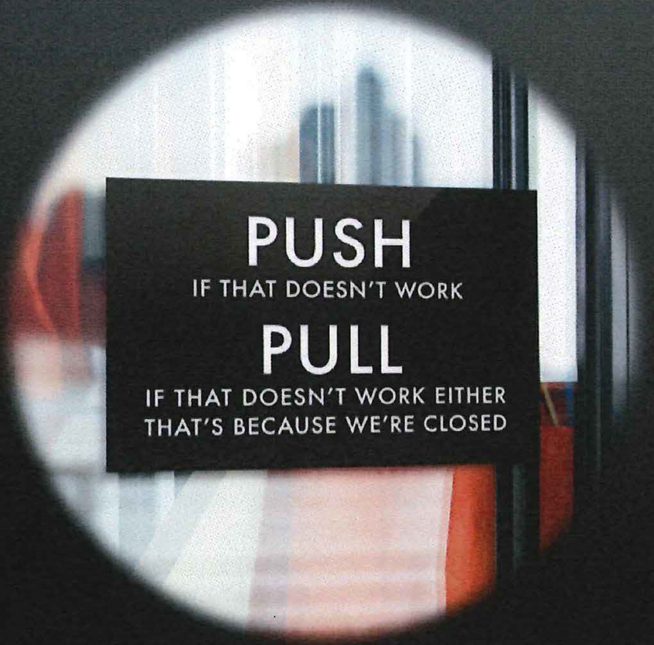
Flow streamlining

- In the current state:
  - Each governmental agency plans and simulates disasters independently.
  - Each governmental agency contains its own call center.
  - Each governmental agency has different procedures and methods.
  - There is no proper communication channels between governmental agencies .

- In the future state:
  - There will be a unified call center with a unique number to report incidents.
  - There will be one control room, which will assign tasks to each suitable agency.
  - There will be simulations performed by all of the governmental agencies.
  - There will be efficient communication and coordination between governmental agencies.

Pull Principle

- Pull principle is not applicable in this case.
- After receiving calls from victims/witnesses, the call center will push the information to the concerned agencies.

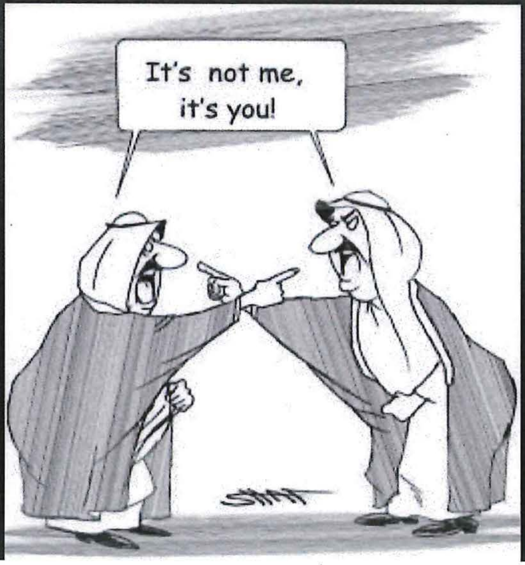

PUSH
IF THAT DOESN'T WORK
PULL
IF THAT DOESN'T WORK EITHER
THAT'S BECAUSE WE'RE CLOSED

Perfection

- Simulation must be performed together by all agencies as often as necessary. This will ensure that mistakes are visible and corrected before disasters strikes.
- Create a central database that includes all the lessons learned from the past experiences.
- The control room will ensure that information is distributed sufficiently and accurately.
- Performance evaluation will take place after each simulation/disaster and will be documented.

Respect for People

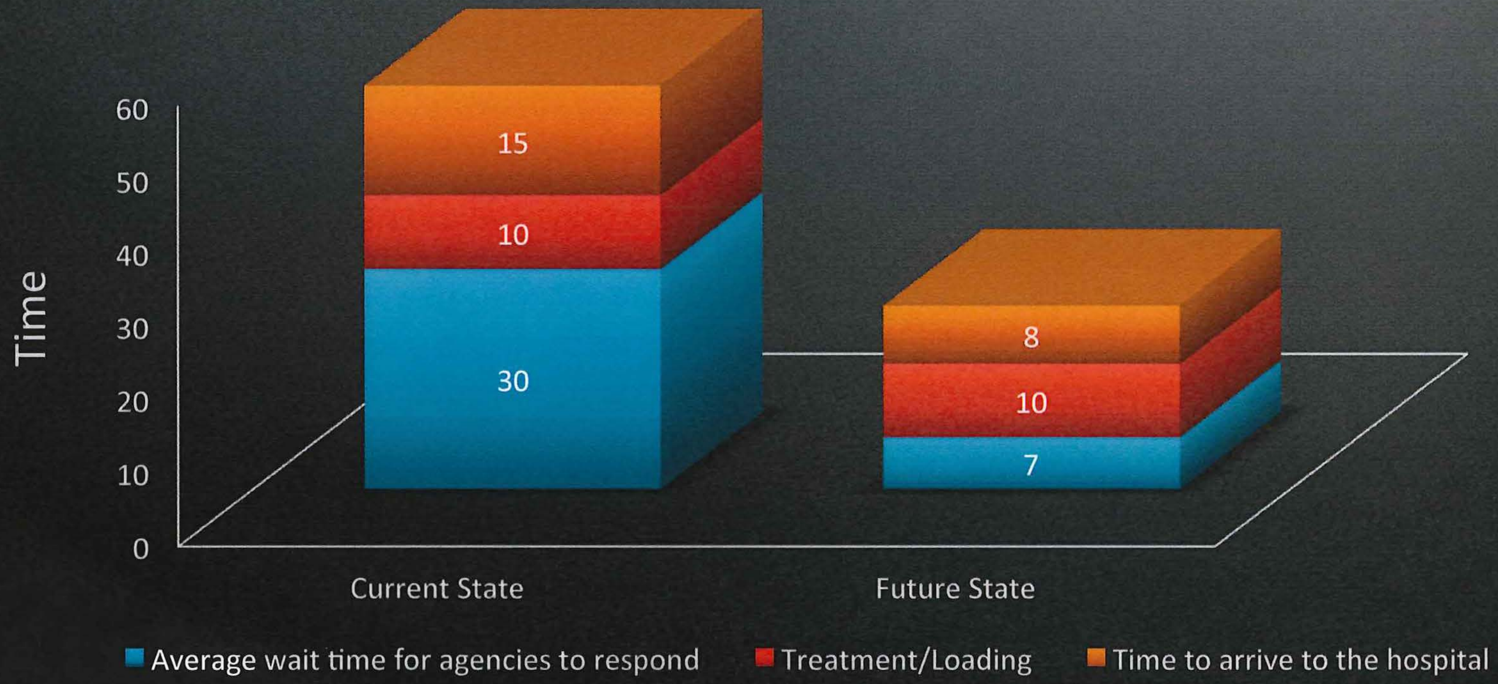
- People's safety should be the main concern of the agencies.
- Avoid finger pointing, blame and shame culture and encourage organizational learning culture in all the agencies.
- Teamwork, communication, coordination, and training are the keys to success!
- Enough stove piped bureaucracy!!


It's not me, it's you!

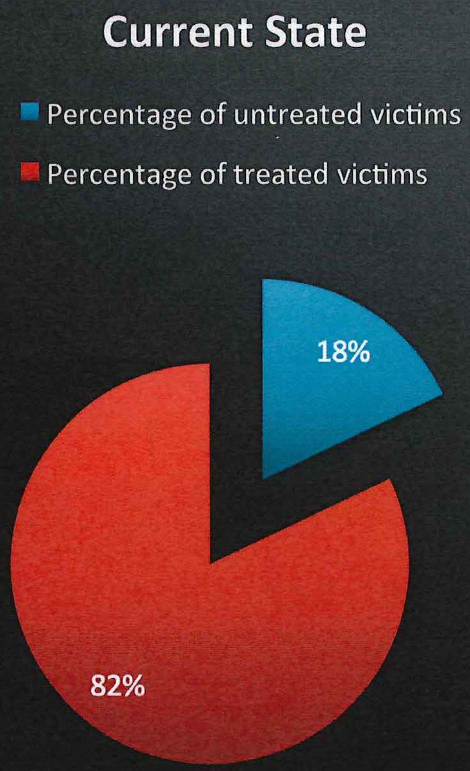
Implementation Methods

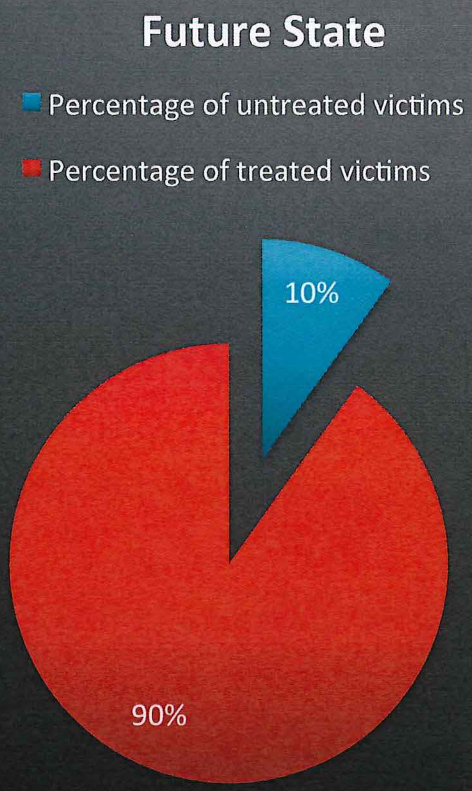
- Some Lean enablers that will help in improving project efficiency :
  - 2.2.1 Develop and execute clear communication plan that covers the entire value stream and stakeholders.
  - 2.2.5 Use formal value stream mapping methods to identify and eliminate SE and other PD waste and to tailor and scale tasks.
  - 2.210 For every action, define who is responsible, approving, supporting, and informing (RASI), using a standard and effective tool, paying attention to precedence of tasks.
  - 3.5.1 Capture and absorb lessons learned from almost all programs: “never enough coordination and communication.”
  - 5.2.4 Treat any imperfection as an opportunity for immediate improvement and lesson to be learned and practice frequent reviews of lessons learned.
  - 5.4.1 Develop a plan and train the entire program team in communication and coordination methods at the program beginning.

Improvement Summary
Response Time:

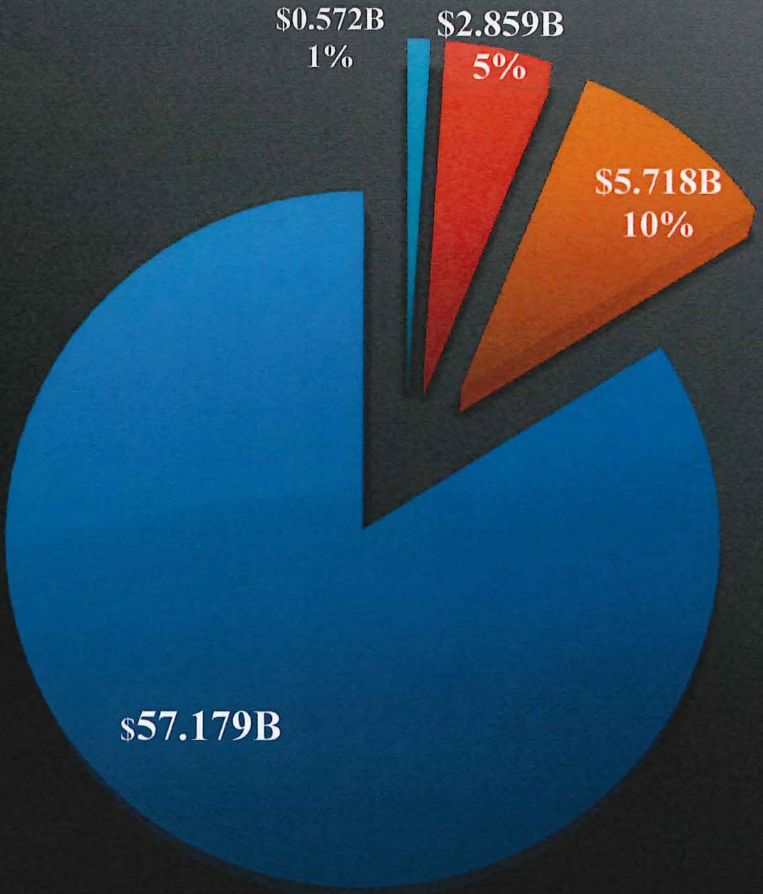


Improvement Summary percentage of victims untreated:

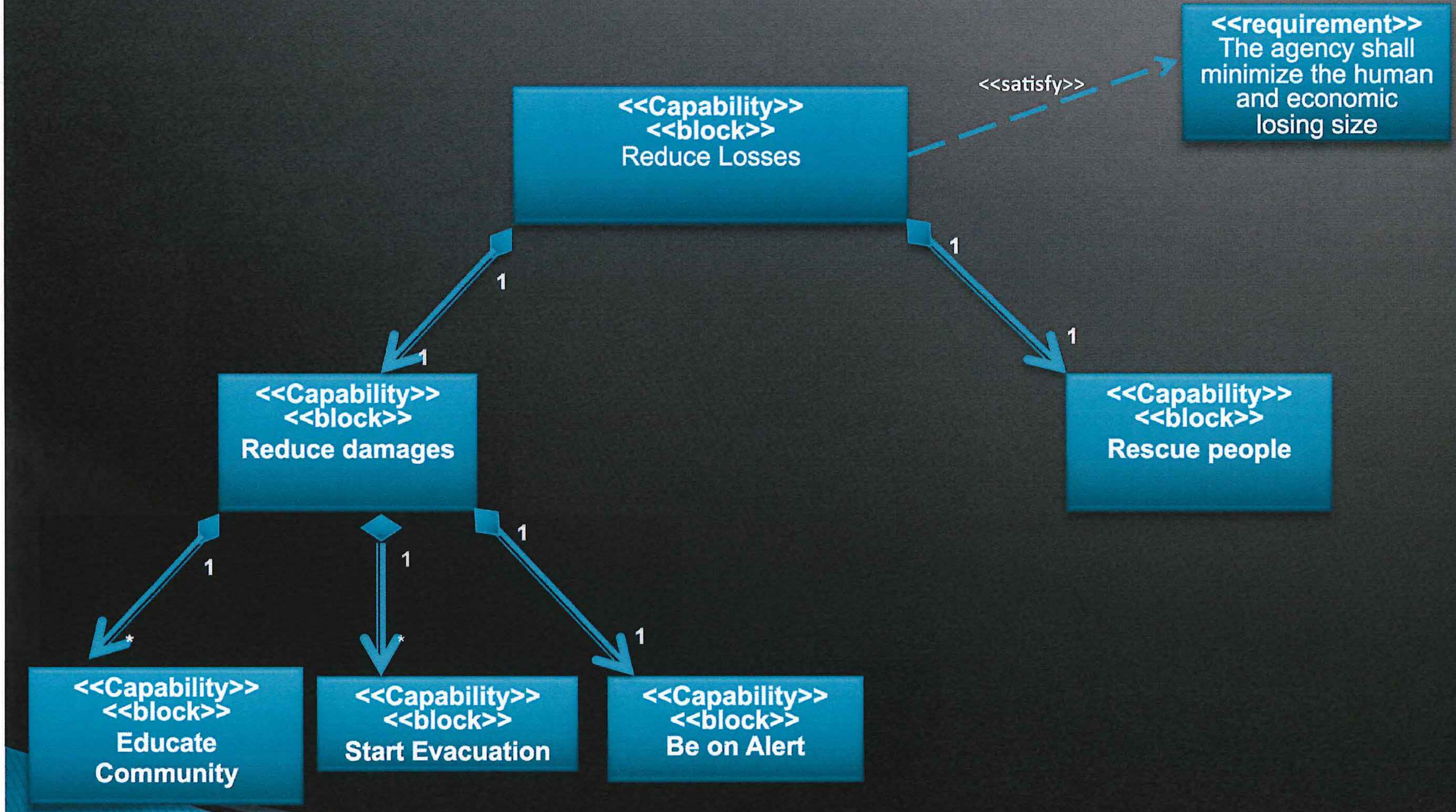




Improvement Summary
Budget Savings



Support Environment



<<requirement>>
The agency shall minimize the human and economic losing size

<<satisfy>>

<<Capability>>
<<block>>
Reduce Losses

<<Capability>>
<<block>>
Reduce damages

<<Capability>>
<<block>>
Rescue people

<<Capability>>
<<block>>
Educate Community

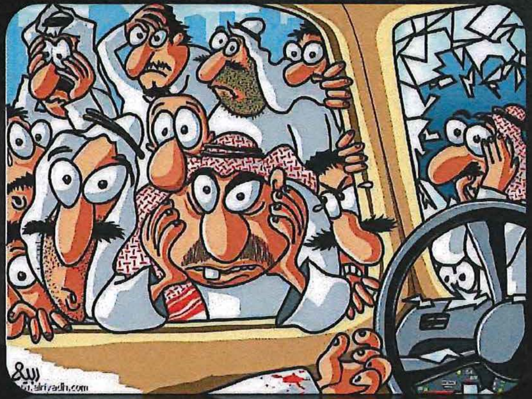
<<Capability>>
<<block>>
Start Evacuation

<<Capability>>
<<block>>
Be on Alert

Problems which will exist in the FS

Culture:

- Accident scenes are overcrowded with people who want to help or to just watch!
- People don't stop/yield for ambulances, police cars, or firefighters!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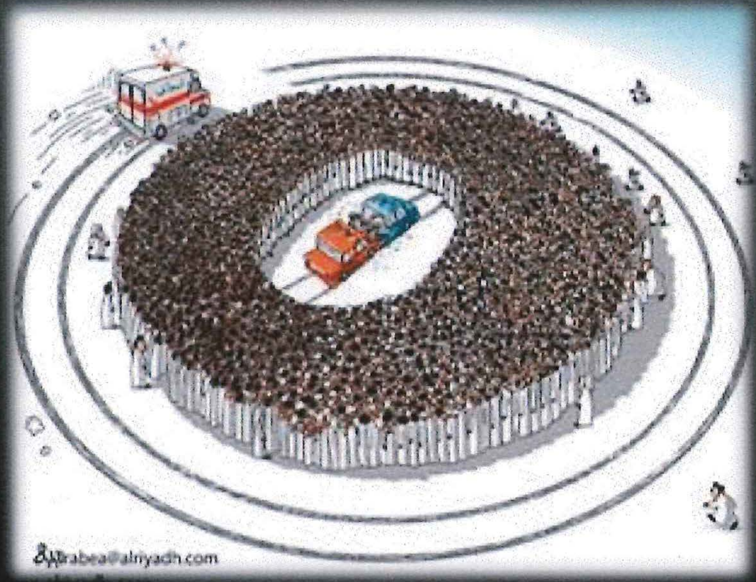
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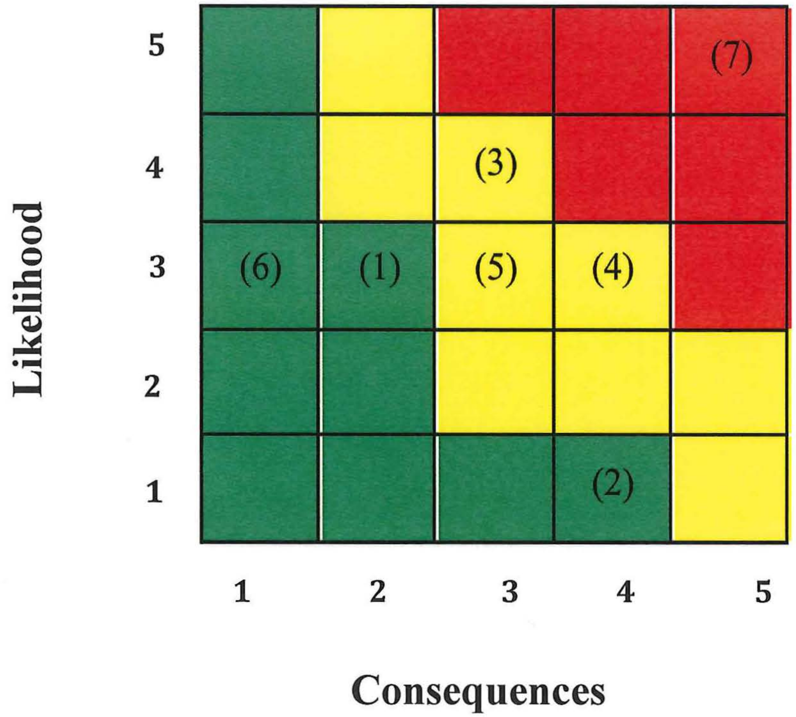
Risk Management

No.	Risk	Likelihood	Impact	Action
1.	System may not survive a disaster	Moderate	Low	Action not needed because data is saved automatically
2.	The system doesn't have a safe internal network	Low	High	Anti-Hacking firewall should be developed to protect information
3.	High level of bureaucracy is applied	Moderate	High	Develop a general policy of empowering and rewarding the bottom-up culture
4.	Lack of participation between governmental agencies when planning	Moderate	High	Develop a plan that implements the policy and ensures accountability within the entire program team in communications, coordination, and decision making methods at the program beginning
5.	Corruption	Moderate	Moderate	Rewards based upon team performance and include teaming ability among the criteria for hiring and promotion
6.	New technologies are being released	Moderate	Low	Only implement the new technology if necessary
7.	Unclear roles, responsibilities and accountability	High	High	Develop and execute a clear communications plan that covers the entire value stream and stakeholders

Risk Management

Risk Matrix



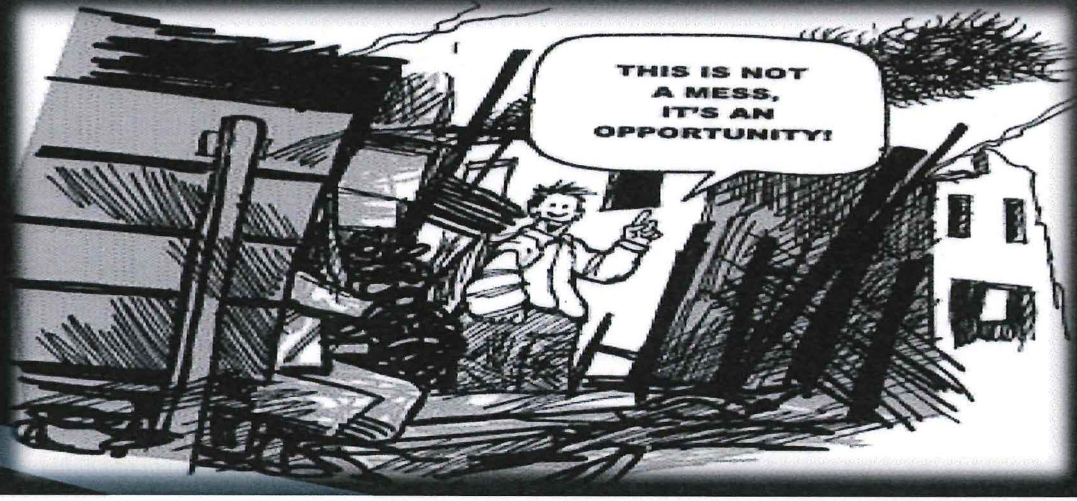
Likelihood

5	🟩	🟨	🟥	🟥	🟥 (7)
4	🟩	🟨	🟨 (3)	🟥	🟥
3	🟩 (6)	🟩 (1)	🟨 (5)	🟨 (4)	🟥
2	🟩	🟩	🟨	🟨	🟨
1	🟩	🟩	🟩	🟩 (2)	🟨
	1	2	3	4	5

Consequences

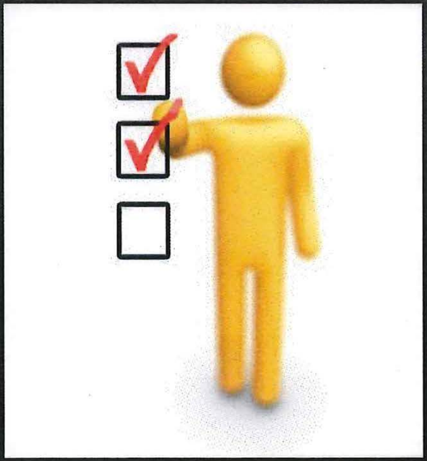
Opportunity Management

- The recovery effort primarily concerned with actions that involve rebuilding the property that was destroyed, re-work, and repair basic infrastructure.
- " Building back better " effort will be applied to reduce the risk of non- disaster inherent in society and infrastructure.
- Take advantage of the " window of opportunity" for the implementation of the mitigation measures that could be otherwise uncommon.


THIS IS NOT A MESS, IT'S AN OPPORTUNITY!

Verification & Validation Methods

- Test will be applied on network performance and capability including:
  - Verification tests for verifying that the system meets its requirement.
  - Validation testing to determine if the system performs according to the client's specifications.
  - Performance test to determine operation of the system under different test conditions.
  - Operational readiness test that assesses the cooperation of the interdependent system elements including resources, strategies, procedures.



Conclusion

- Disaster response is a matter of life and death. While response time is crucial, so is the quality of treatment!
- A new agency would act as a coordinator between various governmental agencies to carry out crisis and emergency management as well as disaster preparedness training services for all sectors.
- Saudi Arabian government and agencies need to openly share information with the public and listen to people's questions and criticisms.

More Pictures!

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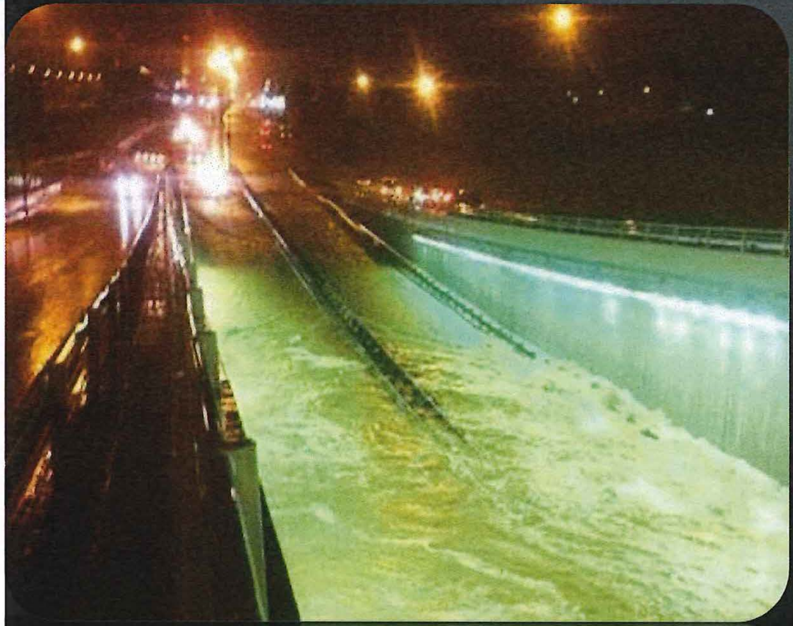
More Pictures!



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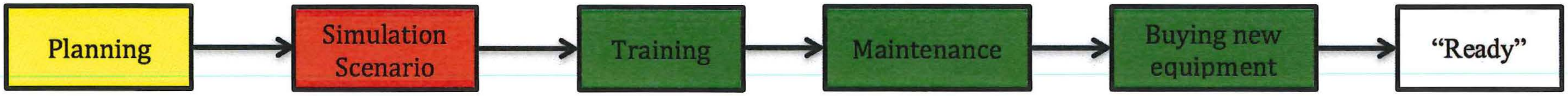
More Pictures!

Thank you!

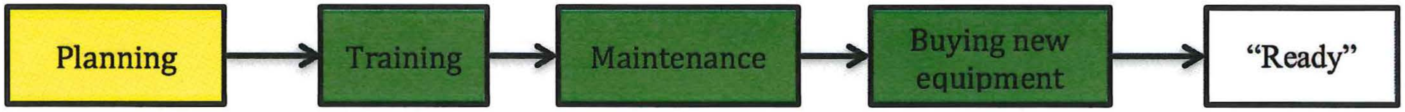
❖ Current VSM:

➢ Preparedness:

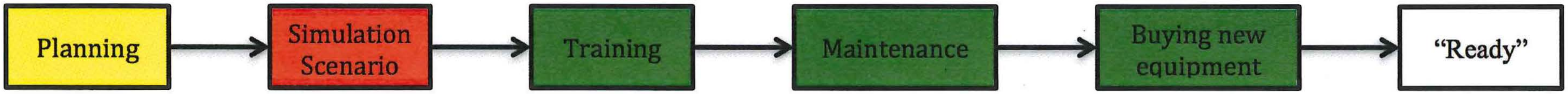
1. *Civil Defense:*


Planning
Simulation Scenario
Training
Maintenance
Buying new equipment
“Ready”

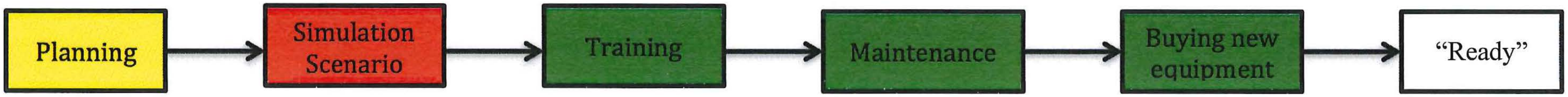
2. *Saudi Red Crescent Authority:*


Planning
Training
Maintenance
Buying new equipment
“Ready”

3. *General Directorate Of Security Forces GDSF:*

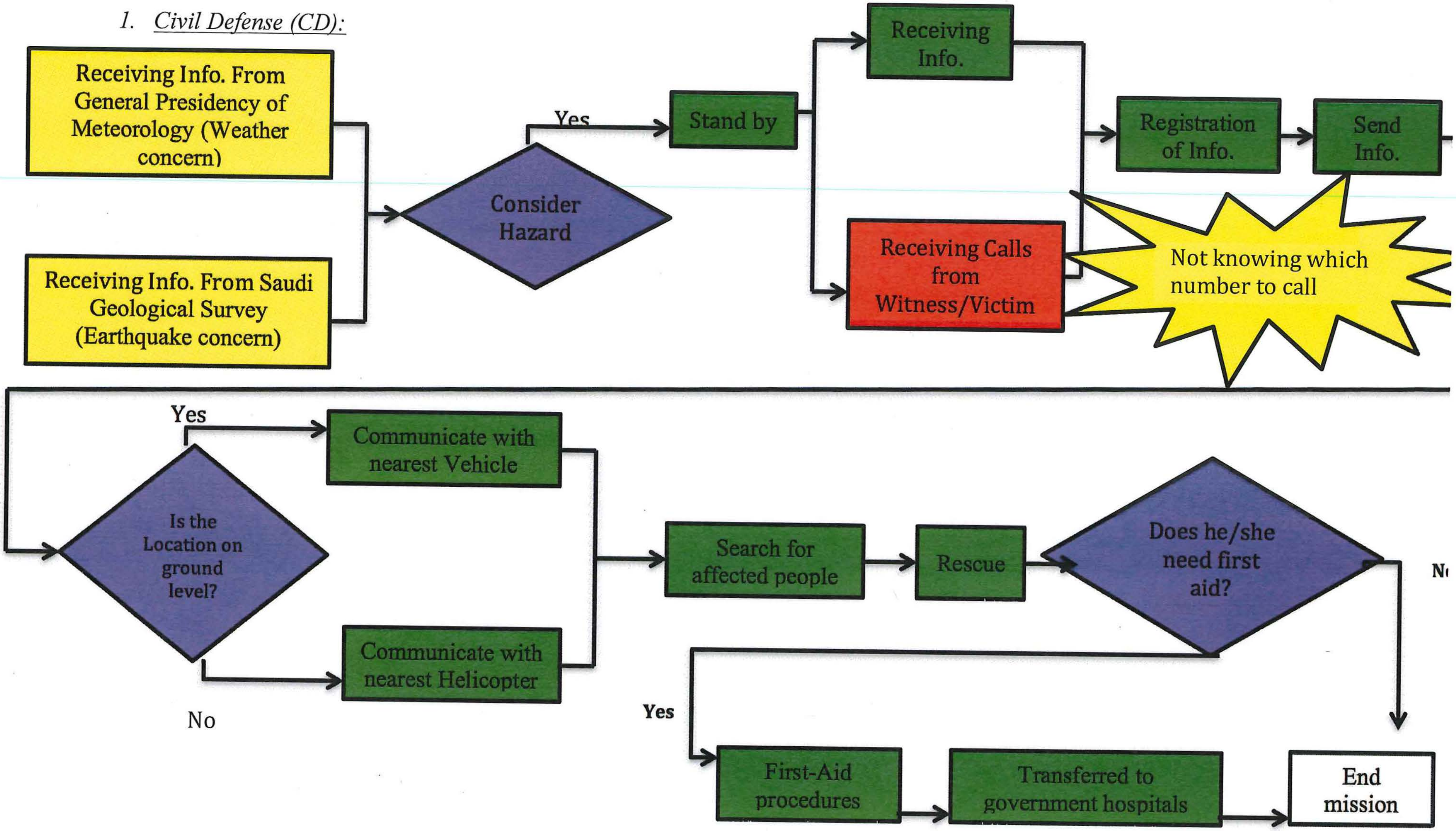

Planning
Simulation Scenario
Training
Maintenance
Buying new equipment
“Ready”

4. *Ministry of Defense:*

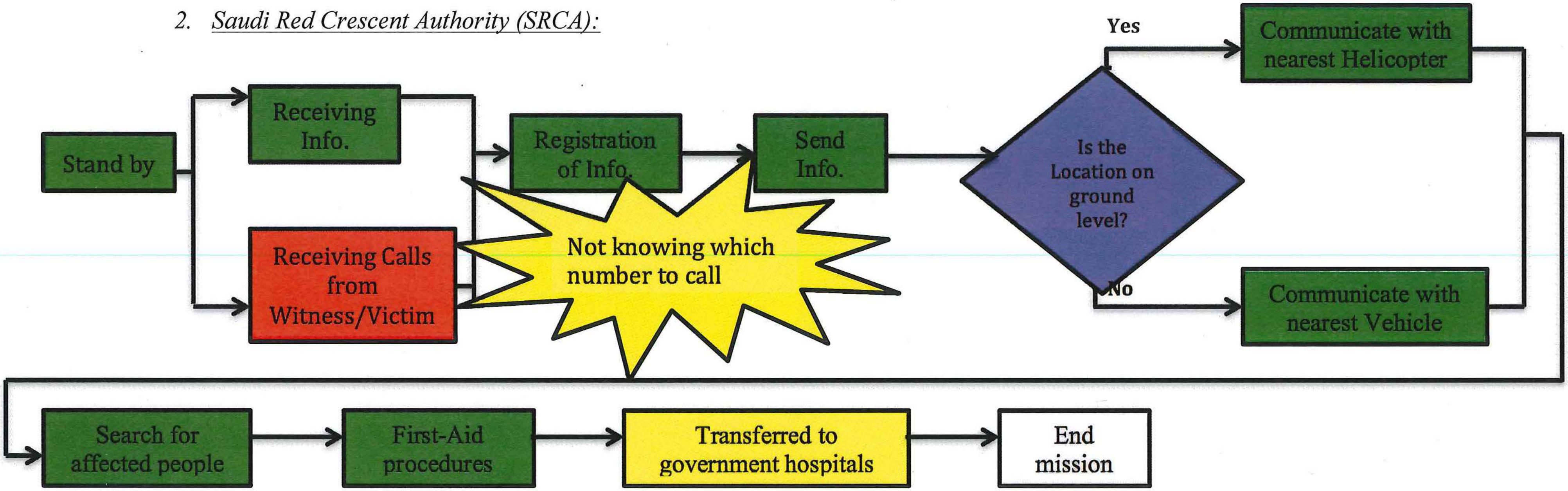

Planning
Simulation Scenario
Training
Maintenance
Buying new equipment
“Ready”

- **Response:**

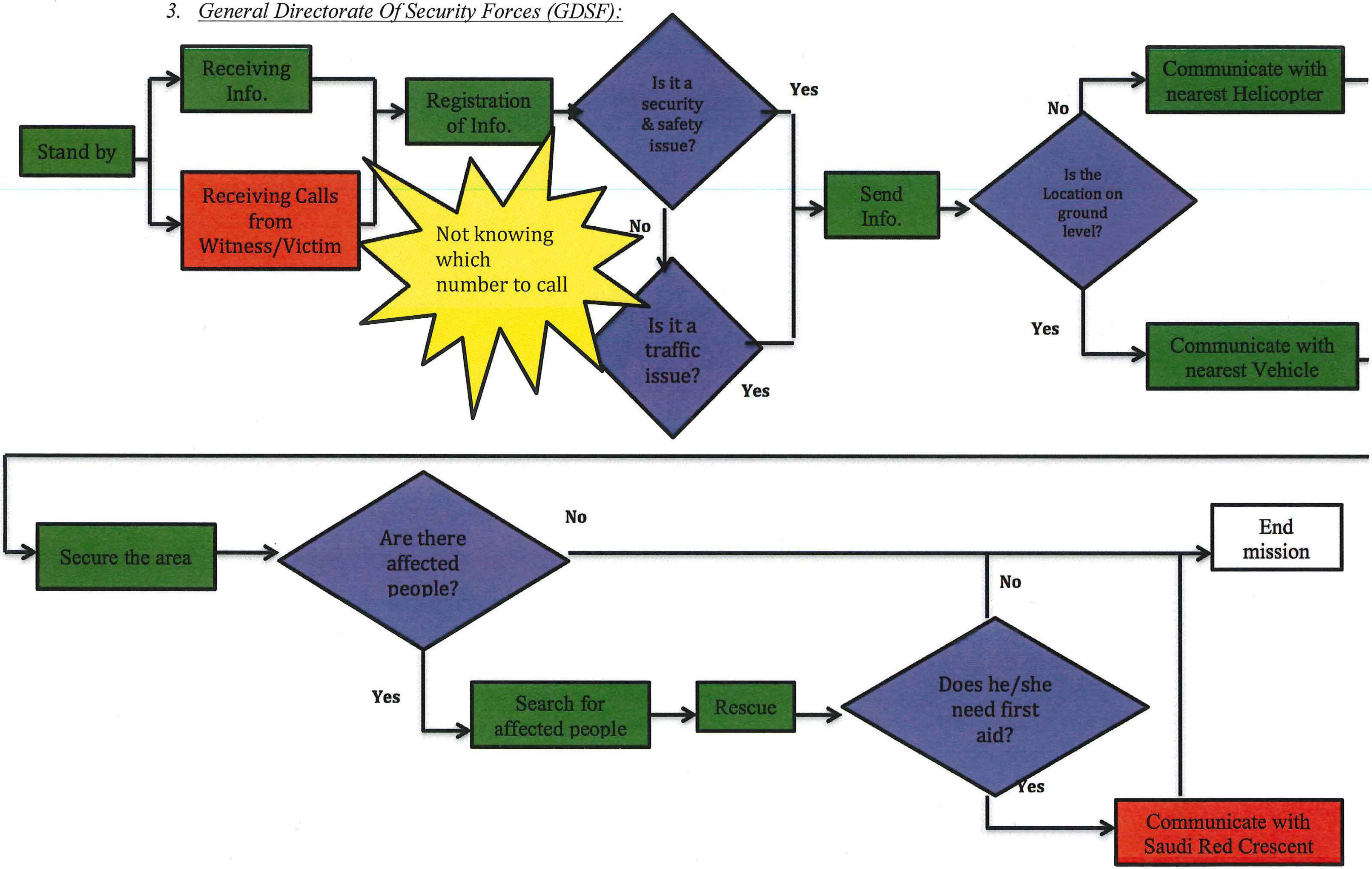
1. *Civil Defense (CD):*


Receiving Info. From General Presidency of Meteorology (Weather concern)
Receiving Info. From Saudi Geological Survey (Earthquake concern)
Consider Hazard
Yes
Stand by
Receiving Info.
Receiving Calls from Witness/Victim
Registration of Info.
Send Info.
Not knowing which number to call
Yes
Communicate with nearest Vehicle
Is the Location on ground level?
No
Communicate with nearest Helicopter
Search for affected people
Rescue
Does he/she need first aid?
N
Yes
First-Aid procedures
Transferred to government hospitals
End mission

2. *Saudi Red Crescent Authority (SRCA):*

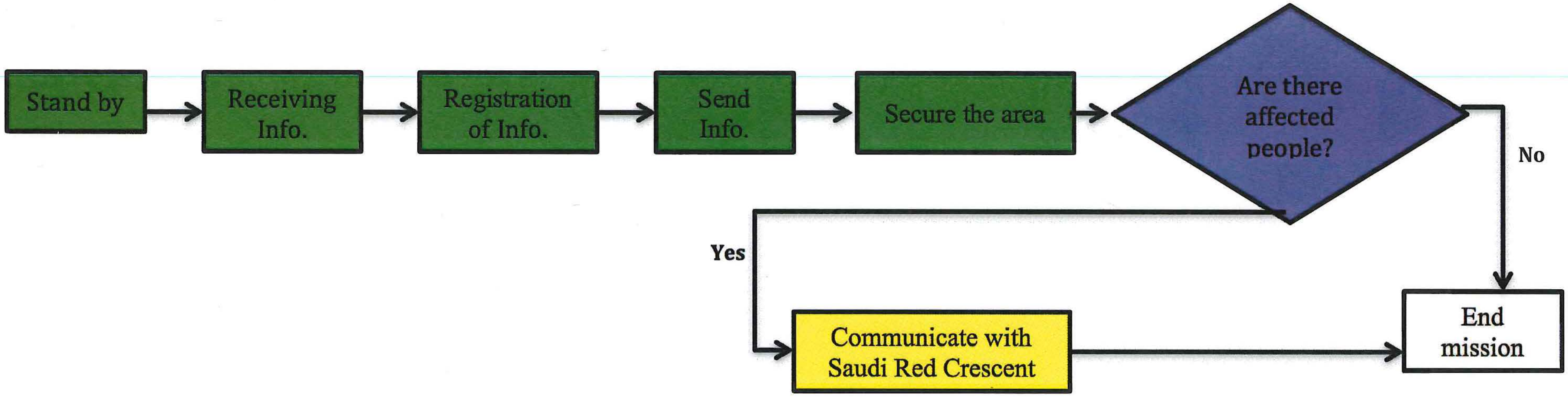

Stand by
Receiving Info.
Receiving Calls from Witness/Victim
Registration of Info.
Send Info.
Not knowing which number to call
Is the Location on ground level?
Yes
No
Communicate with nearest Helicopter
Communicate with nearest Vehicle
Search for affected people
First-Aid procedures
Transferred to government hospitals
End mission

3. *General Directorate Of Security Forces (GDSF):*

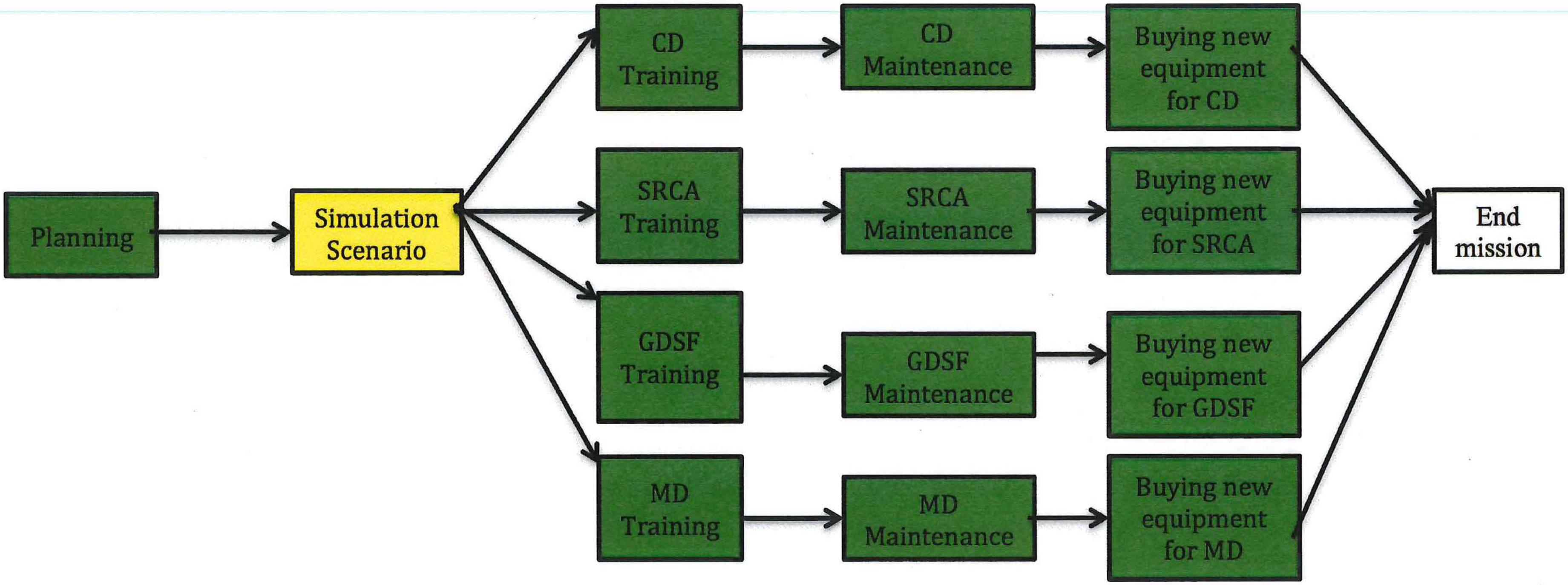


Stand by
Receiving Info.
Receiving Calls from Witness/Victim
Registration of Info.
Not knowing which number to call
Is it a security & safety issue?
Yes
No
Is it a traffic issue?
Yes
Send Info.
Is the Location on ground level?
No
Communicate with nearest Helicopter
Yes
Communicate with nearest Vehicle
Secure the area
Are there affected people?
No
Yes
Search for affected people
Rescue
Does he/she need first aid?
No
Yes
End mission
Communicate with Saudi Red Crescent

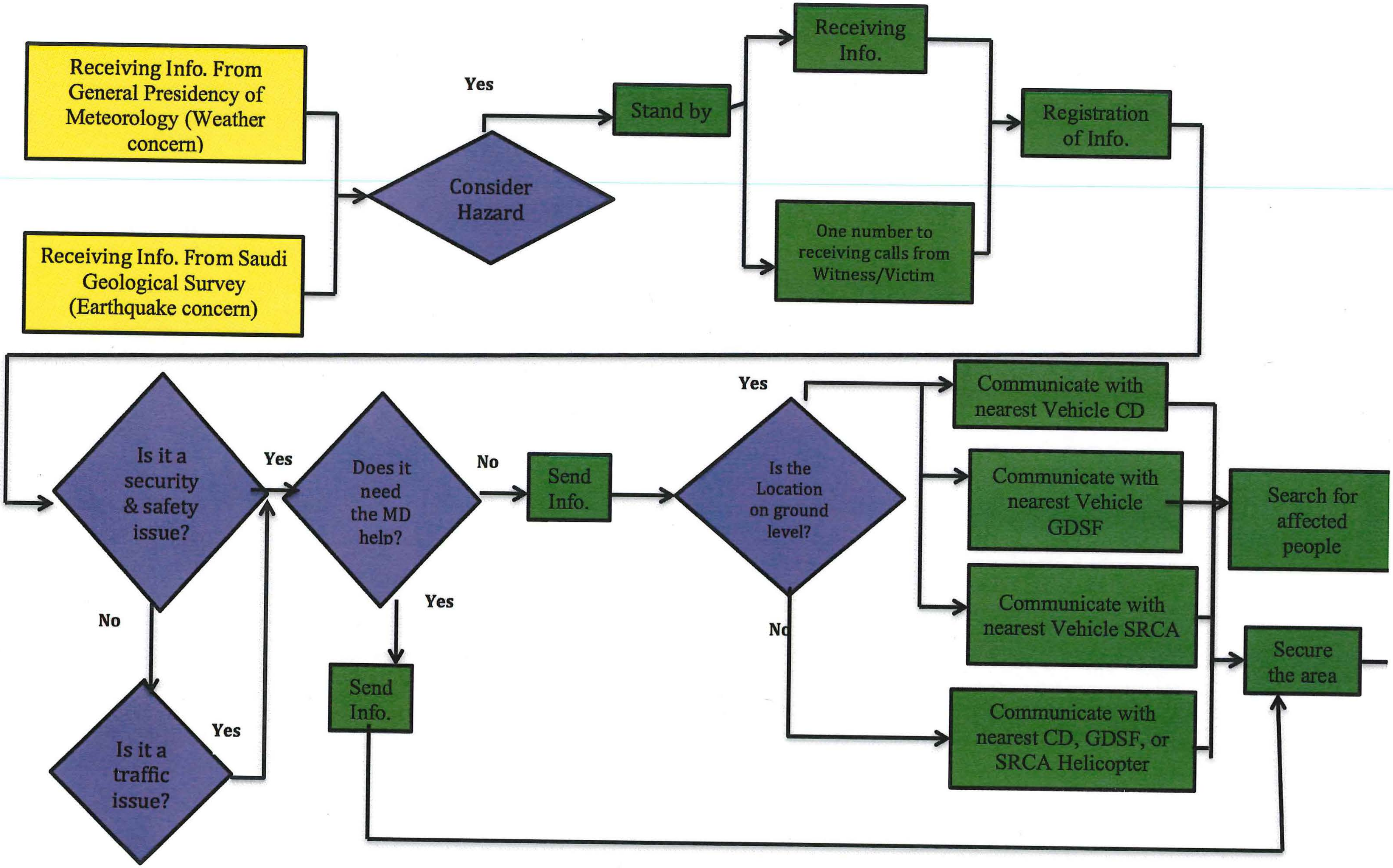
4. *Ministry of Defense (MD):*

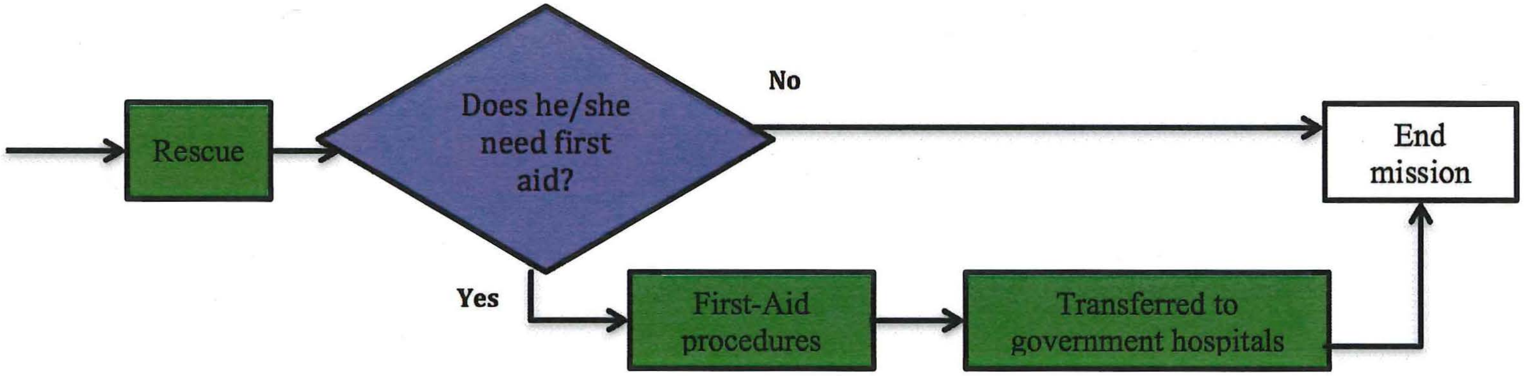

Stand by
Receiving Info.
Registration of Info.
Send Info.
Secure the area
Are there affected people?
No
Yes
Communicate with Saudi Red Crescent
End mission

- **Future VSM:**
  - **Preparedness:**


Planning
Simulation Scenario
CD Training
SRCA Training
GDSF Training
MD Training
CD Maintenance
SRCA Maintenance
GDSF Maintenance
MD Maintenance
Buying new equipment for CD
Buying new equipment for SRCA
Buying new equipment for GDSF
Buying new equipment for MD
End mission

- **Response:**


Receiving Info. From General Presidency of Meteorology (Weather concern)
Receiving Info. From Saudi Geological Survey (Earthquake concern)
Consider Hazard
Yes
Stand by
Receiving Info.
One number to receiving calls from Witness/Victim
Registration of Info.
Is it a security & safety issue?
Yes
No
Is it a traffic issue?
Yes
Does it need the MD help?
No
Yes
Send Info.
Send Info.
Is the Location on ground level?
Yes
No
Communicate with nearest Vehicle CD
Communicate with nearest Vehicle GDSF
Communicate with nearest Vehicle SRCA
Communicate with nearest CD, GDSF, or SRCA Helicopter
Search for affected people
Secure the area


Rescue
Does he/she need first aid?
No
End mission
Yes
First-Aid procedures
Transferred to government hospitals