

# MSc THESIS

*SENSE-MAKING OF THE NETHERLANDS RED CROSS PRIORITY INDEX MODEL*

*CASE: TYPHOON HAIYAN, PHILIPPINES*

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**30<sup>th</sup> of November 2016**



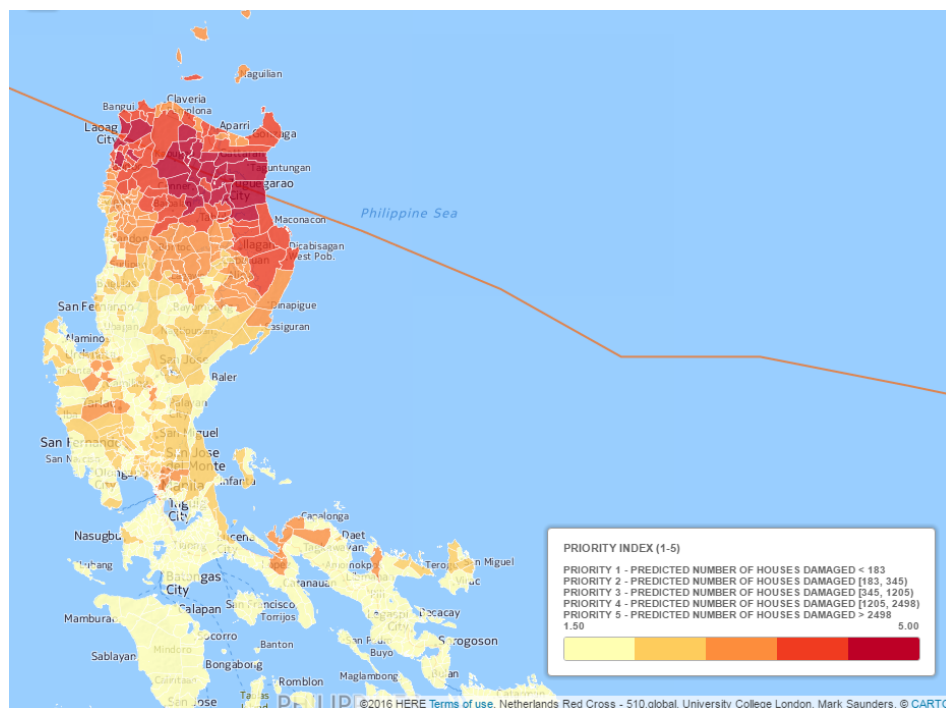


## Disaster and Conflict Studies

MSc Thesis

# Sense-making of the Netherlands Red Cross Priority Index Model

Case: Typhoon Haiyan, Philippines



November 2016

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## Abstract

In the aftermath of a typhoon, decision-makers struggle to find appropriate, reliable and timely information to decide upon the prioritisation of municipalities for assistance. The Netherlands Red Cross designed a model that aims to identify the high priority areas for humanitarian assistance on the basis of secondary data. This research identifies how decision-makers from humanitarian agencies and the Philippine Government 'make sense' of this model and its predictions in order to prioritise municipalities for humanitarian assistance. This research explores what the Priority Index Model is, what similar initiatives are, who the decision-makers are that have to prioritise and what their information needs are. To answer the main question of this research, interviews are conducted with decision-makers from humanitarian agencies and the Philippine government at local, regional and national levels. As identified, appropriate, reliable and timely information is necessary and remains unclear in the literature what these concepts mean for decision-makers. This research explores those concepts and defines whether the Priority Index Model contributes to a more cost-effective and efficient way of prioritising. This is seen in the light of a trend in the Philippines: the establishments of Common Operational and Fundamental Operational Datasets that contribute to the Common Operational Picture.

**Keywords:** *Typhoon Haiyan, Sense-making, Priority Index Model, Humanitarian agencies, Philippine Government.*

## Preface

Dear reader,

This research explores how decision-makers make sense of the Priority Index Model, as designed by the Netherlands Red Cross, in the initial emergency response phase. I appreciate it very much that there was an opportunity for me to write my thesis for the Netherlands Red Cross. By doing this research, I defined an understanding of the Red Cross Movement and other humanitarian agencies. In addition to the research itself, I did learn about the practicalities during the emergency response phase, the challenges that decision-makers encounter and opportunities that arise. In the following section, I would love to thank a few people for their contribution to this research.

First of all, I would like to thank my supervisors Annelies Heijmans (WUR) and Maarten van der Veen (Netherlands Red Cross) and examiner Gemma van der Haar (WUR) for their guidance and advice during my research. Thank you for encouraging me to think further and to strive for a better research. A few people from the Netherlands Red Cross 510.Global team have also contributed to the technical side of the Priority Index model, so Krystyna Millian, Gideon Bleumink, Marco Velliscig, Jannis Visser and Raymond Nijssen thank you for thinking along and for the improvements to this model. Professor Mark Saunders (University College London) has been very supportive of our study and provided the 510.Global team with up-to-date datasets of the typhoons. Marc van den Homberg has been very helpful throughout this study. He has connected me to some key contacts in the humanitarian community and in the Philippines. I want to express my gratitude to colleagues of the Netherlands Red Cross delegation in the Philippines. A special acknowledgement to the efforts of Mrs. Gen and Mr. Bryan to this research. Without your work and the warm welcome of the NLRC team in Manila, it would have been more difficult. I would like to thank the Philippine Red Cross for inviting me to do this research in the Philippines and for having the opportunity to work closely together with the Red Cross Movement. Moreover, I would like to thank all the interviewees for sharing their knowledge and experiences. I am grateful for the positivity towards my research. The gained knowledge is highly valuable for the outcome of this research. A special acknowledgement to Joseph Addawe and Steeve Ebener who contributed to new datasets, invited me to participate in the IM-TWG meetings, shared their contacts with me and kept in contact.

To conclude, I hope you enjoy reading this Master thesis!

Sandra van Lint

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## List of abbreviations

ACAPS	Assessment Capacity Project
AFP	Armed Forces Philippines (GovPH)
AmCross	American Red Cross
BRC	British Red Cross
COD	Common Operational Dataset
COFOD	Common Operational and Functional Operational Dataset
COP	Common Operational Picture
DCHI	Dutch Coalition for Humanitarian Innovation
DOST	Department of Sciences and Technology (GovPH)
DND	Department of National Defence (GovPH)
DReAMB	Disaster Response Assistance and Management Bureau (GovPH)
DRR	Disaster Risk Reduction
DSWD	Department of Social Welfare and Development (GovPH)
EC	European Commission
ECHO	EU Humanitarian Aid and Civil Protection department
EM-DAT	International Disasters Database
ER	Emergency Response
FAO	United Nations Food and Agriculture Organisation
FCA	Forgotten Crisis Assessment
FOD	Fundamental Operations Datasets
GDACS	Global Disaster Alert and Coordination System
GEO	Global Emergency Overview
GNA	Global Needs Assessment
GovPH	Government of the Philippines
HDX	Humanitarian Data Exchange
IASC	Inter Agency Standing Committee
IDP	Internal Displaced Person
IFRC	International Federation of Red Cross and Red Crescent Societies
IM-TWG	Information Management Technical Working Group
IM-WG	Information Management Working Group
IOM	International Organization for Migration
JRC	Joint Research Centre
LDRRM	Local Disaster Risk Reduction Management
LGU	Local Government Unit
MDM	Management of the Death and Missing (Cluster)
MGB	Mines and Geosciences Bureau (GovPH)
MIRA	Multi-cluster/sector Initial Rapid Assessment
NAMRIA	National Mapping and Resource Information Authority (GovPH)
NDRRMC	National Disaster and Risk Reduction Management Council (GovPH)
NGO	Non-governmental organisation
NHQ	National Headquarter
NOAA	National Oceanic and Atmospheric Administration (Government of USA)
NOAH	Nationwide Operational Assessment of Hazards; Project NOAH (GovPH)
NLRC	Netherlands Red Cross
OCHA	(United Nations) Office for the Coordination of Humanitarian Affairs
OCD	Office of Civil Defence (GovPH)
OSM	OpenStreetMap
PAGASA	Philippine Atmospheric, Geophysical and Astronomical Services Administration (GovPH)

PAR	Philippines Area of Responsibility
PHIVOLCS	Philippine Institute of Volcanology and Seismology (GovPH)
PRC	Philippine Red Cross
RSET	Rough Severity Estimation Tool
UN	United Nations
UNDP	United Nations Development Programme
UNDAC	United Nations Disaster Assessment and Coordination
UNHCR	United Nations High Commissioner for Refugees
UNICEF	United Nations International Children's Emergency Fund
UNISDR	United Nations Office for Disaster Risk Reduction
WASH	Water, Sanitation and Hygiene
WFP	United Nations World Food Programme
WHO	United Nations World Health Organisation
3W	Who does What Where
4W	Who does What Where and When

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## List of geographic classifications

As defined by Philippines Shelter cluster and WASH cluster (REACH, 2014a, 2014b, 2014c).

<b>Country</b>	National level; not classified as an Administrative Level
<b>Region</b>	Highest form of governance below the national level; Admin Level 1
<b>Province</b>	Second highest form of governance comprised of multiple municipalities; Admin Level 2
<b>Municipality</b>	A collection of barangays that comprise a broader 'city'; Admin Level 3; Local Government Unit (LGU)
<b>Barangay</b>	An area formed of 10,000 voters; Admin Level 4
<b>Sitio</b>	Neighbourhood or area that is informal and not classified for administrative purposes

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## 1. Introduction

Worldwide the number of disasters triggered by natural hazards has been increasing. Worldwide population growth, urbanisation, environmental degradation, climate change and increasing vulnerabilities are leading towards an increased number of natural hazards (Hilhorst, 2013). According to Hilhorst (2013) the number of affected people and the damage caused by these hazards is also increasing. Last year, the International Disaster Database EM-DAT reported 346 cases of natural disasters (EM-DAT, 2009). Frequently, social conflicts are proceeding in the same regions that are also prone to natural hazards. All social and natural factors combined, co-create a complex situation for emergency response. Humanitarian agencies and governments are continuously considering innovative methods to make emergency response faster, more efficient and to reach out to those who need urgent assistance the most. This research explores: 1) the information needs of decision-makers in the initial emergency response phase, 2) how decision-makers make sense of the situation, and 3) how decision-makers prioritise municipalities for humanitarian assistance in this phase. This research analyses how decision-makers make sense of the Netherlands Red Cross Priority Index Model.

The first chapter introduces the Netherlands Red Cross Priority Index Model, further referred to as Priority Index Model (PiM). The case of typhoon Haiyan in the Philippines and the initial emergency response phase will be further explored. Chapter 2 studies the research problem and clarifies the problem statement and research objective. The third chapter studies the theoretical framework which consists of the main concept of 'sense making' and concepts such as accuracy, appropriateness, validity and timeliness. Chapter four defines the research strategy of this research. Chapter 5 explores the Chapter 6 informs the reader about the information needs of decision-makers during the initial emergency response phase. In chapter 7 the way of (collective) sense-making will be analysed. Chapter 8 and 9 present the conclusions and discussion.

### 1.1 Data preparedness to enhance effective emergency response

Preparing for natural hazards and thereby reducing the risks, total damage and people affected, has been incorporated into international and national agenda's. As an example, the United Nation's frameworks for Disaster Risk Reduction (DRR) advocate that countries report their progress on DRR annually (Tozier de la Poterie & Baudoin, 2015). The United Nations Office for the Coordination of Humanitarian Affairs (OCHA) has also incorporated the different phases of a disaster or crisis within their policies and stimulates international humanitarian agencies and governments to prepare for each of the different phases. OCHA distinguishes 6 different phases: prevention, mitigation, preparedness, response, recovery and reconstruction (n.d.). The disaster phases are linked to and influence each other. Actors who are responding to a disaster, such as humanitarian agencies, governments, companies and civil society, need certain information in order to determine their strategy and planning during the different phases of a disaster. Without access to information on infrastructure, where people live, the location of health facilities, etc. it is difficult to extend strategies. In addition, detailed maps can give actors the information to support them in preparing for a disaster and planning the emergency response and recovery activities (Sumadiwiria, 2015). The humanitarian community creates detailed maps, dashboards and infographics to support their sense making process in the initial emergency response phase.

Obtaining reliable information for decision-making is one of the main challenges of the humanitarian agencies and governments during the initial emergency response phase (Vitoriano, Montero, & Ruan, 2013). Agencies have to plan their disaster response based on the little amount of information that is available and are thus waiting for reliable and validated data from the field. Preparedness of data is crucial in order to receive detailed information on time to extend the following actions. The Priority Index Model is based on (open) secondary data and specific disaster data; the first category can be

prepared before a disaster strikes and the latter may be incorporated after the disaster. It is important that these pre-crisis secondary datasets are available and up-to-date (ACAPS & CDAC-Network, 2014; Inter\_Agency\_Standing\_Committee, 2010). ACAPS (2016) identified that after sudden-onset disasters, *'assessments benefiting from pre-crisis assessment preparedness, measures were published on average 17 days faster – 25 days after the event, compared to 42 days for those without preparedness'*. A lack of pre-existing datasets and predictable processes to manage the datasets leads to *'wasted resources, duplicated efforts and missed opportunities'* (Inter\_Agency\_Standing\_Committee, 2010).

## 1.2 The initial emergency response phase

Emergency response occurs on three levels: local, national and international (Vitoriano et al., 2013) (Figure 1). Local people are the first to respond to a disaster, although they are often also victims of the disaster themselves (INFORM, 2016). When a disaster of Level 3 strikes, as declared by the Inter Agency Standing Committee (IASC) Principles, and the affected country agrees to receive international assistance different international humanitarian teams will be directly deployed to support the national and local teams (Inter\_Agency\_Standing\_Committee, 2015). The first issue faced by the humanitarian community is access to information regarding the disaster. When agencies are present in the area, they may receive information from the field within minutes to hours. Vitoriano et al. (2013) argue that otherwise agencies must rely on forecasts, previous experience, the media and other organisations until *'their own disaster response teams are able to reach the affected area and send information back to the headquarters'*.



Figure 1 Different operational levels of disaster response (Vitoriano et al., 2013).

When the international community is requested to support the National government with the disaster response, the humanitarian cluster system is activated. The eleven clusters, as presented in Figure 2, create partnerships between humanitarian agencies, national and local authorities, civil society and the private sector. Via the clusters, numerous teams communicate and cooperate with each other (Chandran & Thow, 2013; OCHA, n.d.). Each cluster provides a clear point of contact and is therefore led by one or two agencies; e.g. the International Federation of Red Cross and Red Crescent Societies (IFRC) and the United Nations High Commissioner for Refugees (UNHCR) are responsible for the Shelter Cluster. Clusters can be held *'accountable for adequate and appropriate humanitarian assistance'* and thus have a responsibility to respond to these hazards (OCHA, n.d.).

The first step in any emergency response is to access the extent and impact of the damage caused by the disaster (damage and needs assessment) and the capacity of the affected population to meet its immediate survival needs (coping capacity) (IFRC, n.d.). The impact of a disaster may vary considerably, depending on a number of factors. An assessment to identify the needs, that require external intervention, is an important part of the planning process of humanitarian agencies. Anderson and Woodrow (1999) define needs in a disaster context as *'immediate requirements for*

*survival or recovery from a calamity, on a relatively short term'*. These needs assessments provide information that is the basis for key decisions that will be affecting the lives of disaster victims (IFRC, n.d.). The analysis of the needs assessment will be used to determine the priority areas for humanitarian assistance. Unfortunately, executing these field assessments and constructing an overview of the priority areas is time consuming. Usually the execution of these field assessments takes around 3-5 weeks, due to logistics, safety constraints, or workload. The indistinctness of the priority areas during the early emergency response phase may result in that humanitarian agencies and the government are not able to reach people in the hardest hit areas. For humanitarian agencies it is a challenge to decide upon a timely and effective response in the first few weeks, while the disaster's impact and the needs of the affected population are still unclear.



Figure 2 UN OCHA Humanitarian Cluster system (OCHA, n.d.).

### 1.3 Data trends

The trend is that the availability of (open source) data is increasing at a high rate. It is essential that humanitarian organisations and agencies also integrate the use of data and new technologies into their work (Chandran & Thow, 2013; Whipkey & Verity, 2015). Many humanitarian agencies and governments are focusing on the use of data, we can recognise this trend in sessions at the World Humanitarian Summit (n.d.), the establishment of platforms that support innovation such as HumanityX (n.d.) and the launch of the Dutch Coalition for Humanitarian Innovation (DCHI). The Netherlands Red Cross launched 510.Global; a data team which explores the potential of the use of data and aims to find ways to make humanitarian assistance faster and more cost effective by smart use of data (NetherlandsRedCross, 2016a). The NLRC is contributing to a larger humanitarian data perspective by offering services and products that are designed to make the process of 'sense-making' easier, faster and more corresponding between the different stakeholders.

### 1.4 Case: typhoon Haiyan, Philippines

The Philippines is one of the most disaster-prone countries (Quismundo, 2012, October 16). A total of 25 typhoons entered the Philippines Area of Responsibility (PAR) in 2013 (Quismundo, 2012, October 16). On Friday November 8, 2013, typhoon Haiyan reached central Philippines. Typhoon Haiyan, locally known as Yolanda, turned out to be the Philippines most 'devastating catastrophe' in 20 years (Barmania, 2014; Takagi et al., 2015). The typhoon made landfall in Eastern Samar with a wind speed of 235 km/h. A storm surge of 6 meters high followed this typhoon and hit various areas in the provinces of Leyte, Cebu and Samar very strongly (Ahmed, Luneta, & Krishnamurthy, 2015).



The Philippines government placed seven regions (Admin Level 1) under a state of national calamity: Aklan, Capiz, Cebu, Iloilo, Leyte, Palawan, and Samar (MIRA, 2013). According to Barmania (2014) more than 6200 people died, many more people were/are missing, 4 million people were displaced and in total the lives of 14 million Filipinos were affected by destruction. The official numbers, of the NDRRMC Department of the Philippines Government, for typhoon Haiyan/Yolanda are 6069 casualties, 179 persons missing, 27.468 persons injured and a total of 35,5 billion Philippine Pesos were the costs of the damages.

Generally, due to the high turnover rate within humanitarian agencies, chances are decreasing that humanitarian workers are still reachable three years after a hazard hit. In the case of the Philippines, three years after typhoon Haiyan made landfall, there are still humanitarian projects on-going in the country. This provides an opportunity to interview more humanitarian workers face-to-face in the Philippines. Typhoon Haiyan is one of the first hazards where both pre-disaster and post-disaster data are widely available. A wide range of agencies has collected data; some key players in the data collection are departments of the Philippines government, humanitarian agencies and universities. In addition, a range of agencies has conducted impact studies and needs assessments in the months following typhoon Haiyan. These impact studies show which communities were affected most by the storm and can be used to compare with the outcome given by the Priority Index Model. Typhoon Haiyan is an exceptional case to research new ways of using data that can help humanitarian decision making in the future.

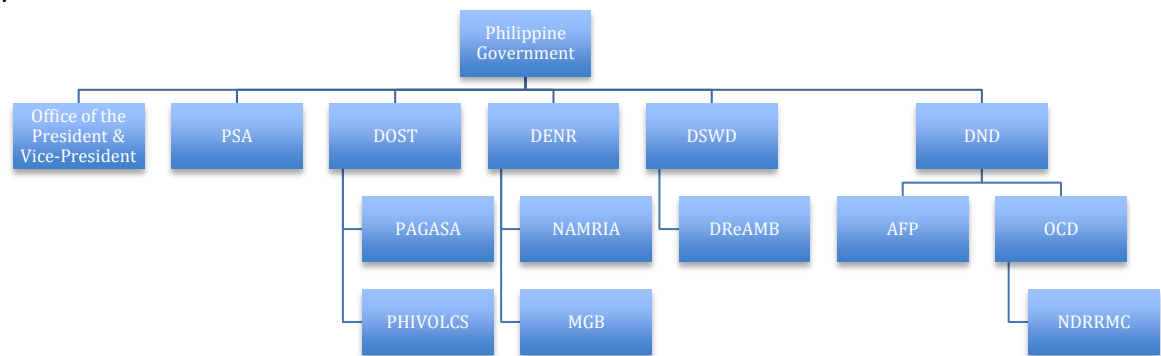
## 1.5 Existing disaster response structures in the Philippines

At the moment of writing, a structure of government agencies responding to disasters is intertwined within the existing Philippines governmental structure. At the time that typhoon Haiyan made landfall, this structure was still in the development phase. During typhoon Haiyan, the UN Clusters established 11 clusters in the Philippines (see Figure 2) and the Philippines Government only incorporated 5 clusters in their disaster response (Tollenaar, 2016). According to one of the respondents, coordination between the different agencies has seen a '*360 degrees turn since Yolanda*'. This paragraph describes the structure of the Philippines Government with its various departments and the (international) humanitarian agencies as these structures were presented during the time of this research fieldwork (August, 2016). The UN cluster system, as advocated for by UN OCHA, still differs from the cluster system that is incorporated within the Philippines government, but nowadays these actors are trying to minimize the differences between the clusters. The challenges in coordination, partly due to the mismatch in clustering, during the time of Haiyan, are influencing the way decision-makers from various agencies make sense of the information in order to prioritise.

### 1.5.1 Structure of the Philippines Government

The Philippines Government (GovPH) is composed of 21 different executive departments and each of the departments is responsible for different sectors. The four important departments for this research are: the Department of National Defence (DND), the Department of Science and Technology (DOST), the Department of Social Welfare and Development (DSWD) and Department of Environment and Natural Resources (DENR). In addition, the National Disaster Risk Reduction and Management Council (NDRRMC) is a key actor for this research. The NDRRMC consists of members from all Government Departments and sub-departments that are involved in disaster risk reduction and management and is led by the Office of Civil Defence (OCD). The Philippine Statistics Authority (PSA) is responsible for planning and implementing policies regarding the production of official statistics. It is responsible for national censuses, surveys, and other administrative recording systems and is thus one of the key sources for agencies in the response to a disaster. The OCD, NDRRMC,

DSWD, DOST and PSA are key actors during the emergency preparedness and response phases (Figure 3).



**Figure 3 Philippines government structures**

The **Philippines Department of Science and Technology (DOST)** is responsible for the coordination of science and technology-related projects in the Philippines and is responsible for policies and laws regarding these fields. DOST supervises a number of collegial and scientific bodies, research and development institutes and scientific and technological services. Two DOST services are relevant sources of data for this research: the Philippine Atmospheric, Geophysical and Astronomical Services Administration (PAGASA) and the Philippine Institute of Volcanology and Seismology (PHIVOLCS).

The **Department of Environment and Natural Resources (DENR)** is responsible for governing and supervising the exploration, development, utilization, and conservation of the natural resources of the Philippines Area of Responsibility (PAR). Within the DENR there are two offices that fulfil a role within emergency preparedness and response: the National Mapping and Resource Information Authority (NAMRIA) and the Mines and Geosciences Bureau (MGB).

The **Department of Social Welfare and Development (DSWD)** is responsible for the protection of the social welfare rights of Filipinos and to promote social development. The Disaster Response Assistance and Management Bureau (DReAMB), which is a sub-department of DSWD, is one of the relevant agencies for this research.

The **Department of National Defence (DND)** is responsible for guarding against external and internal threats to peace and security in the country. The DND and its sub-departments are also responsible for disaster preparation and management within the country. The DND supervises multiple offices; the following two are relevant for this research, the Armed Forces of the Philippines (AFP) and the Office of Civil Defence (OCD).

### 1.5.2 Structure of humanitarian agencies

During the emergency response phase there are many different humanitarian agencies cooperating. OCHA presented the humanitarian decision-makers taxonomy as a contribution to the Decision Makers Need Community to show the structure between and within these humanitarian agencies. Figure 4 is the part of the taxonomy that includes international agencies such as the United Nations/Interagency Standing Committee and the Red Cross Movement. The taxonomy is based on national and sub-national levels of decision making. Regional or local levels of decision-making are not included in this figure. The Government of the Philippines has to declare the emergency as an L3 to request assistance of the international community. Subsequently the United Nations Office for the Coordination of Humanitarian Affairs and the clusters will be activated, as well as the country teams of the humanitarian agencies.

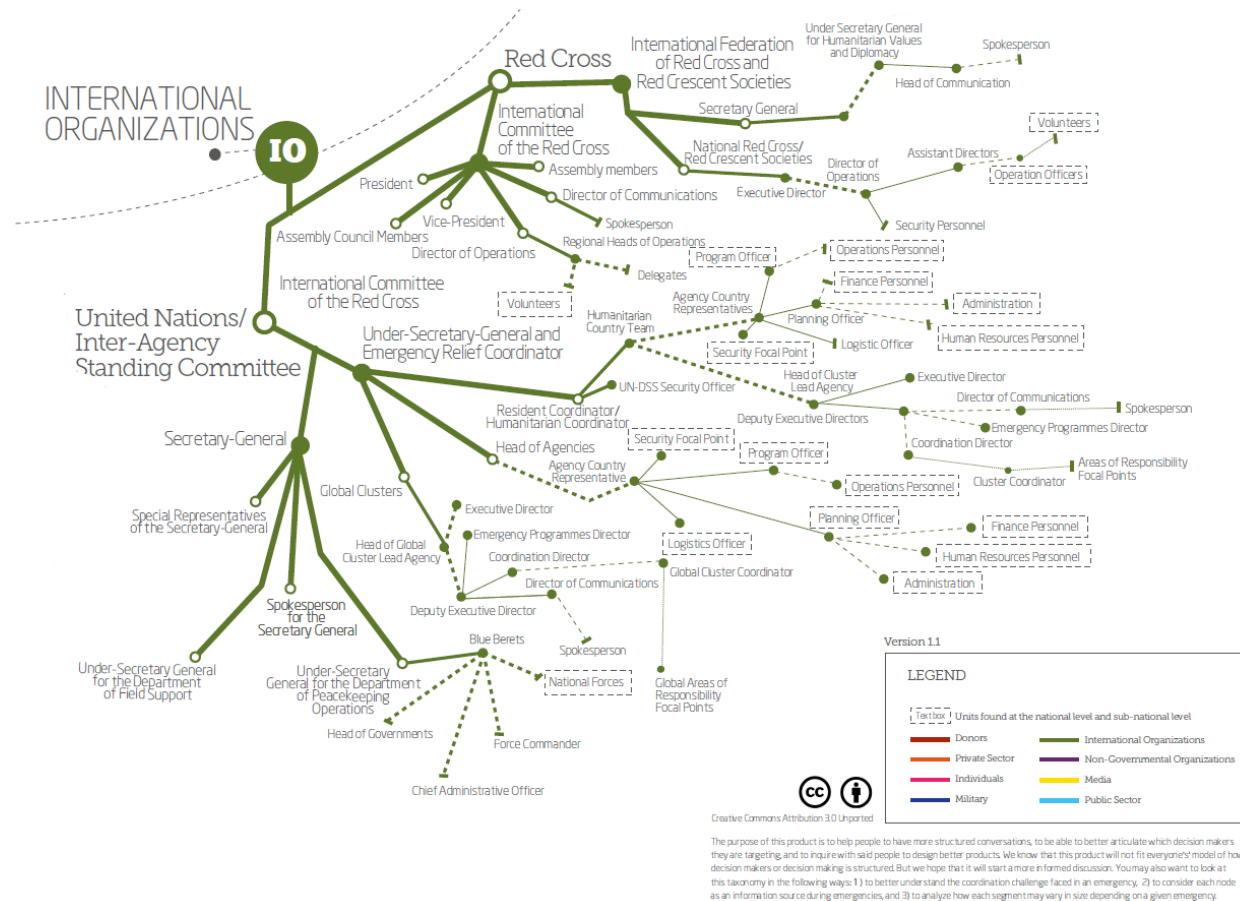


Figure 4 Humanitarian Decision Makers Taxonomy presented by OCHA and published Decision Makers Needs Community (DigitalHumanitarianNetwork, 2012).

## 2. Research Problem

### 2.1 Problem statement

Needs assessments inform decision-makers in relation to four main questions: 1) whether to intervene, 2) the nature and scale of an intervention, 3) prioritisation and allocation of resources, and 4) programme design and planning (Darcy & Hofmann, 2003). With a natural disaster, reliable baseline data is more likely to be available than in the case of conflict or displacement, still data need to be prepared. As identified in section 1.1 the execution of needs assessments usually takes around 3-5 weeks. The timeframe for the needs assessments and the delay in initial information from the local government units (LGU's) and local departments of (i)NGO's contribute to the information gap that decision-makers face in the initial emergency response phase. Besides, it is a challenge for agencies to reach the people who are living in the hardest hit areas or who need assistance the most. The needs assessments are a human driven process, while the Priority Index Model is a data-driven process. The Priority Index Model is designed to make sense of the available data so that decision-makers have a more timely understanding of the initial situation and can act upon it (section 1.3). Potential disadvantage for this model are errors in its prediction, when the incorporated data-sets are outdated or not accurate. Potential advantages of using a model are that it is acquiring information faster and that it is more cost-effective. The advantages and disadvantages are considered in this study to the usefulness of the Priority Index Model for decision-makers.

In order to make a decision on the prioritisation of humanitarian assistance, it is important that decision-makers make sense of the information that has been provided to them. Preece, Shaw, and Hayashi (2013) cited by Homberg, Monné, and Spruit (2015) argue that *'high levels of uncertainty, extreme stress, compressed timelines, a significant lack of information available'* in the early response phase are factors that responders have to face. Van den Homberg et al. add that information overload, such as in the case of typhoon Haiyan, also influences the decision-making process (Homberg et al., 2015). The question that is concerning this research is how decision-makers make sense of the information that is presented to them in order to make a decision. How do decision-makers deal with high levels of uncertainty, a lack of information or an overload of information? Which sources are reliable to base important decisions upon?

Some research has been done to the information that is needed in the emergency response phase (Comes, Vybornova, & Van de Walle, 2015; Gralla, Goentzel, & Van de Walle, 2013; Verity, 2013); but very little is known about how decisions are made and what kind of role evidence plays in the decision-making (Nissen, 2015). Gralla et al. identified that it is unclear what information field managers need in order to make the best possible decisions (2013). Therefore they claim that it is also *'difficult to develop decision support systems or collect and analyse data that results in information that is accessible and actionable for decision makers'* (Gralla, Goentzel, & Van de Walle, 2015). To overcome this gap the authors, in cooperation with OCHA and ACAPS, organised a workshop with 18 field-based decision-makers focussing on their information needs in the initial response phase of a disaster. The result of this workshop is a list of general questions that arise in the initial phase (Gralla et al., 2013). This report has not defined yet which information is *'most important'* to prioritise in the early response phase. Various authors specify that the information need to be accurate, appropriate, reliable, timely and valid (ACAPS, 2016; Comes et al., 2015; Gralla et al., 2015; Homberg et al., 2015; Van de Walle & Turoff, 2008). Decision-makers must feel that they have all the relevant information that is available to make a decision that *'reflects the reality of a given situation'* (Van de Walle & Turoff, 2008). Ebener, Castro and Dimailig identify that the *'need for accurate and up-to-date data to support disaster risk reduction and emergency management has long been recognized'* (2014). The authors argue that despite this recognition, data sets are still not

*'available, of sufficient quality, and easily accessible to all stakeholders at the time of a crisis'* (Ebener et al., 2014). Yet it remains unclear what those concepts mean for decision-makers.

The priority index model is presented as a tool to make the process of 'sense-making' easier, faster and more corresponding between different stakeholders. The concept of 'sense-making' provides the research with a lens to view and understand how decision-makers use information. A sense-making perspective on information sharing is crucial to understand the *'ambiguity of information, the presence of multiple perspectives and the role of representations'*, in order to understand how humanitarian workers interpret the information needs of their own and other agencies for coordination (Wolbers & Boersma, 2013). When information is provided; how do decision-makers 'make sense' of that information? What is the information that is needed in order to prioritise municipalities for most urgent assistance during the initial emergency response phase?

Chapter 0 will explore the theoretical framework that is being used in this research. The concept of 'sense-making' is used as the main concept for this research (Dervin, 1998; Muhren, Van den Eede, & Van de Walle, 2008; Weick, 1988, 1995; Weick, Sutcliffe, & Obstfeld, 2005). Two tools for collective, or collaborative, sense-making will be discussed: the Common Operational Picture (COP) tool (Wolbers & Boersma, 2013) and the Common Operational Datasets/Fundamental Operational Datasets (COD/FOD) (Inter\_Agency\_Standing\_Committee, 2010). The COP tool is used to *'overcome coordination and information management issues during emergency response'*, while the COD's and FOD's are used as a baseline for collective datasets. Choo (1996) highlights the importance of integrating sense making, knowledge creation and decision making effectively for organisations. This research explores the sense-making process of information that is needed during the emergency response in order to prioritise municipalities for assistance. This research examines whether the Priority Index Model is seen as a useful sense-making tool for humanitarian agencies and the government during the initial emergency response phase.

## 2.2 Research objective

This research examines the way that decision-makers make sense of the Netherlands Red Cross Priority Index Model in the case of typhoon Haiyan that made landfall in the Philippines in November 2013. Section 1.4 elaborates on the specific case of this research. The research proposes the following questions:

### Research question:

How do decision-makers from humanitarian agencies and the Philippines government make sense of the Priority Index Model in order to prioritise assistance in the early emergency response phase?

To answer the research question, several sub-questions are formulated.

### Sub-questions set A: Priority Index Model

1. What is the priority index model?
2. Does the prioritisation of the priority index model coincide with the identified priority areas?
3. Which similar priority indices are available?

### Sub-questions set B: Decision makers and their information needs

4. What are the decision-makers that had to prioritise?
  - a. Within agencies and authorities?
  - b. At a global, national or local level?
  - c. Which roles: operational, tactical or strategic?
5. What are the decision-makers information needs in order to prioritise assistance?

6. When is the priority index model 'appropriate, reliable and timely' use during emergency response?

The sub-questions have been divided in two sets: sub-set A explores the priority index model itself and sub-set B answers the sense-making and decision-making processes. Sub-set B explores what the Priority Index Model is, what the possibilities of this model are and whether it coincides with the priority areas that were identified during the Haiyan response. Within the second sub-set, this research defines what kind of decision-makers need to prioritise, what their information needs are in order to do so and how the process of sense-making happens during the emergency response phase.



### 3. Theoretical framework

#### 3.1 (Collective) Sense-making

The sense-making concept has been widely discussed in literature (Muhren et al., 2008; Weick et al., 2005; Wolbers & Boersma, 2013). Emergency responders have to constantly make sense of the situation, because of the rapid changes. Challenges for agencies are information sharing, a similar interpretation of the information, communication and coordination during the emergency response (Bharosa, Lee, & Janssen, 2010; Janssen, Lee, Bharosa, & Cresswell, 2010; Quarantelli, 1997; Wolbers & Boersma, 2013). Additionally, decisions are influenced by the political context (Homberg et al., 2015; Nissen, 2015) and humanitarian/organisational agenda's. Wolbers and Boersma (2013) present the Common Operational Picture (COP) as a tool to *'overcome coordination and information management problems during the emergency response'*. Making information widely available is not enough; a shared understanding of the situation is necessary to create a COP for coordination between multiple agencies (Comfort, 2007; Endsley, 1995; Wolbers & Boersma, 2013). A COP is relevant in order to achieve a more efficient level of coordination between the agencies. The Interagency Standing Committee (IASC) introduces two concepts in favour of better data preparedness: Common Operational Datasets (CODs) and Fundamental Operational Datasets (FODs) (Inter\_Agency\_Standing\_Committee, 2010). These COD's and FOD's could contribute to the establishment of a Common Operational Picture. If all the agencies are talking about the same data sets, there would be fewer misunderstandings. A common understanding of the data sets, that are currently available or could be issued in the future, is something the IASC, UN OCHA and other agencies are striving for. The target audience for these datasets are Cluster/Sector leads, the Humanitarian Coordinator, UN Agencies, NGO's and other humanitarian actors. Ebener et al. (2014) promote the integration of these datasets in the government and humanitarian agencies in the Philippines by the establishment of the Information Management Technical Working Group (IM-TWG). The IASC defines the CODs as: *'predictable, core sets of data needed to support operations and decision-making and are made available within 48 hours of a given humanitarian emergency'*. These datasets are often dynamic in the initial phase and are also pro-actively prepared prior to the emergency. The list of CODs includes: humanitarian profiles, population statistics, administrative boundaries, populated places, transportation networks, hydrology and hypsography. The recommended source for CODs is in most cases the Government. The FODs are defined as: *'datasets required to support multiple cluster/sector operations and complement the common operational datasets. These datasets are characterized by thematic areas and are made available as soon as possible after the onset of an emergency given availability'* (Inter\_Agency\_Standing\_Committee, 2010).

Sense-making itself refers to the *'making and unmaking of sense and has defined information/knowledge as product of and fodder for sense-making and sense-unmaking'* (Dervin, 1998). Sense-making addresses the following questions: *'What is going on here?'*, *'What do I do next?'* (Weick et al., 2005), *'Why is it taking place?'* and *'What does it mean?'* (Muhren et al., 2008). Weick (1995) distinguishes seven properties of sense making: identity constructing, retrospection, enactment, social context,

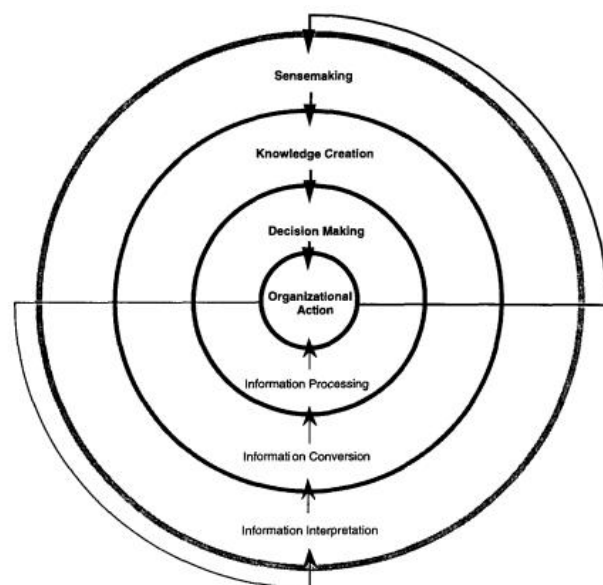


Figure 5 The knowing organisation (Choo, 1996).

ongoing understanding, cue extraction, and plausibility. Through sense-making, people in an organisation '*give meaning to the events and actions of the organisation*'; through knowledge creation, the insights of individuals are translated to knowledge; and in decision making, understanding and knowledge of the situation are focused on the 'selection of and commitment to an appropriate course of action' (Choo, 1996). Choo (1996) argues that an organisation that integrates sense making, knowledge creation and decision-making effectively will be called the '*knowing organisation*' (Figure 5).

Homberg et al. (2015) argue that the '*degree collective sense making that is reached among responders is another important factor in decision making between and within organisations*'. Responders will have different degrees of data literacy, cognitive abilities, and organizational agenda to make sense of the information and data that are available. The authors advocate for improvement of the CODs and FODs in the Philippines. Furthermore, as mentioned in section 2.1, having reliable, accurate and timely data is important in sense making. The availability of these data-sets is challenging given the '*by definition chaotic and disrupted situation*' (Homberg et al., 2015). In the literature, it is not clear yet how these concepts are defined. This research will question what these concepts mean for the different respondents. The design of the Priority Index Model remains a challenge and the following questions arise: which indicators should be used, which weightings should be given to the different indicators, which sources and data sets could be used to make it reliable and appropriate and within which time scale should the model be delivered to decision-makers to make it timely? In chapter 5 the Netherlands Red Cross Priority Index Model and similar models are presented.

## 3.2 Concepts

In this section, the different concepts that are relevant for this research are described. Yet, within the literature not one fixed definition has been given for the different concepts. The concepts will be defined throughout this research based on the interviews that are held with decision-makers and are thus findings of this research. For decision-makers it is important that the Priority Index Model is reliable, appropriate and timely (paragraph 3.2.1). Two concepts that are defined as important information needs are defined in paragraph 3.2.2 and 3.2.3: vulnerability and affected population. A challenge in the humanitarian community is the use of concepts that are defined differently, actors often approach the sense-making of the situation differently and decisions will be made differently. During the research phase, it is important for the researcher to keep the agendas of the respondents in mind. This might influence their sense- and decision-making.

### 3.2.1 Reliable, appropriate and timely

As mentioned earlier in section 0, various authors specify that the information that is presented to decision-makers in the wake of a disaster need to be accurate, appropriate, reliable, timely and/or valid (ACAPS, 2016; Comes et al., 2015; Gralla et al., 2015; Homberg et al., 2015; Van de Walle & Turoff, 2008). Decision-makers must feel that they have all the relevant and trusted information before deciding upon the given issue. To support this need for information, Ebener et al. argue that datasets should be up-to-date and accurate (2014). The meaning of these concepts is also not a fixed one within the humanitarian sector. Darcy and Hofmann (2003) argue that the following general criteria are important:

- **Timeliness** providing information and analysis in time to inform key decisions about response
- **Relevance** providing the information and analysis most relevant to those decisions
- **Coverage** adequate to the scale of the problem
- **Continuity** providing relevant information throughout the course of a crisis
- **Validity** using methods that can be expected to lead to sound conclusions



- **Transparency** being explicit about the assumptions made, methods used and information relied on to reach conclusions, and about the limits of accuracy of the data relied on

Clarke and Darcy define reliability as: *'reliability relates to the consistency of the results of the same experiment when repeated: it is a measure of the degree to which the same experiment will produce the same result under the same conditions on different occasions'* (Clarke & Darcy, 2014). The quality of the index depends on *'having enough information of the right sort to work on'* (Darcy & Hofmann, 2003). The priority index is based on secondary data and aims to give an initial assessment of the situation, based on the available information, *'which includes an overview of the scale and impact of the crisis, the likely priority needs of the affected population, their locations, and the short term sectoral risks the affected population is exposed to'* (ACAPS, 2014). ACAPS notes several challenges for the reliability of the models and the used data: a) numbers that are provided without a specific methodology; b) the age of data; c) sources of data that are difficult to trace down, and d) accuracy within the secondary data. In the literature, it is unclear when a data set or model is viewed as *'reliable'*. Some literature refers to the *'good enough principle'*. Judgement of the validity of the index depends on the reliability of the information, on the credibility of the publisher and the case itself (ACAPS, 2014). OCHA (2015) argues that the data reliability for their Humanitarian Needs Comparison Tool relies on the 1) data source, 2) age, and 3) collection methodology.

Darcy and Hofmann (2003) assume in their report that the international humanitarian response to a given situation should be *'proportionate in scale'* and *'appropriate in nature'* to people's real needs in that disaster. The information or models that are used to make sense of the situation and that are the baseline for decision-making should be *'appropriate'* and present the needs within that given situation.

*'Timely information can save lives. Aid organisations must recognize that accurate, timely information is a form of disaster response in its own right'* (M. Niskala, Secretary – General of the IFRC (2005)). Each set of information is needed within a different timeframe; some sets within 24, 48 or 72 hours, others within 1, 2 or 3 weeks. Important is that the information is most accurate and complete within the timeframe that it is needed, in order to make sense of it for decision-making. So far, the literature describes some of the information needs that are needed within a certain timeframe (Gralla et al., 2013, 2015). However it is unclear which data- or information sets are used to prioritise municipalities after a typhoon made landfall. How and when do decision-makers make sense of the information? Homberg et al. (2015) recommend that further research to the relation between available data and information needs focuses on the time dependency of information needs into more detail.

### 3.2.2 Vulnerability

Humanitarian agencies and the government strive to assist most vulnerable people first. Vulnerability includes two elements: a) exposure – *'people's dwelling and work places in relation to the hazard'* and b) susceptibility – *'the social, economic, political, psychological and environmental variables that work together in producing susceptible impacts amongst people within the same exposure'* (Islam, Swapan, & Haque, 2013). The literature and international community have not yet agreed upon the definition of vulnerable people. The REACH Assessment identifies two categories of vulnerable households: 1) single headed households, and in particular women-headed households; and 2) households including member(s) with specific needs: pregnant and/or lactating women; persons living with a physical disability; seriously ill, or members with special needs; members living with a chronic illness; and separated children (REACH, 2014a). The Multi-Cluster/Sector Initial Rapid Assessment (MIRA) (2013) argues that we need to *'recognize the diversity of affected people and their special needs and vulnerabilities'* if we want to reach the hardest-hit population with our

humanitarian response. MIRA identified three categories of vulnerable or hardest-hit population instead of two: 1) people with specific needs such as unaccompanied teenagers and children, the elderly, people with disabilities, and single-headed households with children, which may not have the capacity to self-recover at the same rate as others; 2) people living under the absolute poverty line likely the lack of self-recovery resources; and 3) those remaining in evacuation centres who often have no other options and appear to be from among the poorest segments of the population. A major challenge is to understand that barangays are not homogenous so sub-units within these communities, such as households and businesses vary in their vulnerability to disaster impacts.

The OCHA Protection Cluster post-Haiyan needs assessment identified the following groups as most vulnerable:

- |                           |     |
|---------------------------|-----|
| 1. Women                  | 24% |
| 2. Elderly                | 23% |
| 3. Children               | 17% |
| 4. Person with disability | 15% |

Other vulnerable groups identified are: pregnant and lactating women, single-headed households and female-headed households. Women and elderly were mainly seen as vulnerable, because there is no targeted assistance for these groups, their conditions make it difficult to access services and they often still experience traumatic experiences (ProtectionClusterPhilippines & UNHCR, 2014). Darcy and Hofmann (2003) note that the *'notion of the 'vulnerable group' – typically based on assumptions about socio-economic status – can introduce artificial distinctions which do not necessarily reflect the real needs of a population'*. Several factors are influential in determining the vulnerable people: the country and its context, the mandate and objectives of the organisations concerned (Darcy & Hofmann, 2003) and the way of addressing vulnerability (economic, biological, political, sociological or a combination of the sectors).

### 3.2.3 Affected population

Humanitarian agencies tend to reach out to the affected population and try to select the people that are most in need. ACAPS (2014) presents a general overview of the various categories that are included in the term 'affected population' (Figure 6). Within this overview we can find that the definition of the term 'affected' is still very broad: it includes all the casualties, non-displaced and displaced people. There is still not one fixed definition of affected population. Figure 7 presents the official Government numbers of affected people by typhoon Haiyan. It is a coordination challenge if agencies are not talking about the same group of affected people.

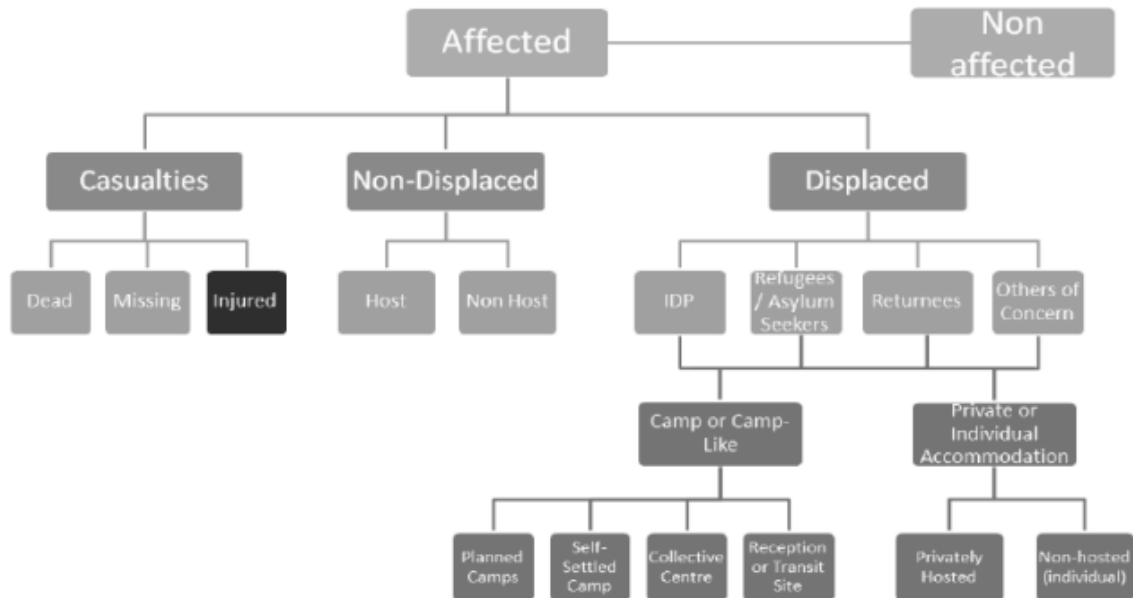


Figure 6 General overview of the affected population (retrieved from ACAPS (2014)).

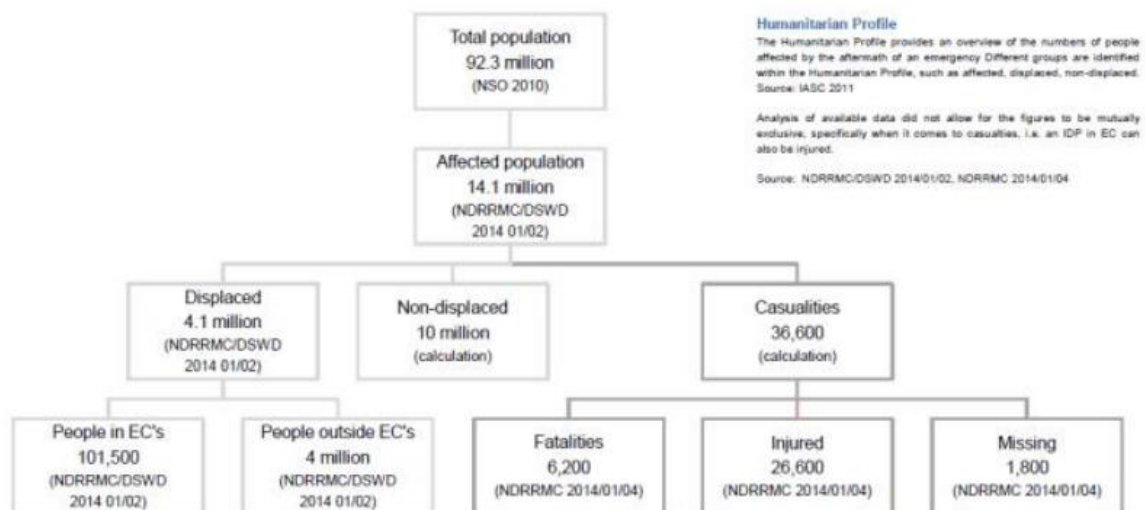


Figure 7 Overview of the affected population by typhoon Haiyan/Yolanda (retrieved from ACAPS (2014)).

## 4. Research strategy

This research includes four components of data collection and analysis: a) a review of the existing models and comparison of these models with the Priority Index Model; b) semi-structured interviews with decision-makers within the Philippines government and humanitarian agencies; c) attending two relevant meetings: INFORM Severity Index Meeting and IM-WG meeting, and d) secondary data collection. The first section highlights the different methods that will be used to answer the research question and the sub-questions as has been pointed out in section 2.2. In section 4.2, the analysis of the collected interviews will be explained. Section 4.3, 4.4 and 4.5 will respectively discuss and/or reflect on the ethics of this research, the role of the researcher and the methodology.

### 4.1 Data collection

#### 4.1.1 Review of Priority Index Model and existing models

Firstly, this review explores the Priority Index Model itself. Secondly, in this review the similar existing models that are designed for humanitarian use will be explored. There are a few similar initiatives, which slightly have a different methodology, target audience, indicators or sources. A comparison of these initiatives with the model of the Netherlands Red Cross will identify the added value and challenges of each of the models. Chapter 5 elaborates on the findings of this review.

#### 4.1.2 Interviews

Interviews are conducted with decision-makers from humanitarian agencies and the Philippines authorities. The following topics are addressed in these interviews: sense-making of the information needs; the concepts reliable, appropriate and timely for decision-making; and the potential use of the Priority Index Model for prioritising municipalities for humanitarian assistance. The researcher has conducted 30 official interviews and has organized 2 short informal meetings where the interview topics were also discussed; so 32 'interviews' have been coded and processed to answer the questions. This research aimed to conduct interviews 1) with decision-makers from both humanitarian agencies and the Philippines government and 2) with decision-makers that were positioned on different levels: global or national, regional and local. Table 1 shows the number of decision-makers that are interviewed regarding the different roles. These numbers are not as black and white as they are noted down here; most respondents have fulfilled positions at different levels and at different agencies in the past four years.

	Global/National	Regional	Local	Total aim 1
<b>Humanitarian agencies</b>	20	3	4	27
<b>Philippines government</b>	2	1	2	5
<b>Total aim 2</b>	22	4	6	32

Table 1 Interviews conducted

Respondents belong to the following humanitarian agencies: Philippine Red Cross (PRC), the Red Cross Movement, UN OCHA, UNICEF, UNHCR, IOM, Oxfam, Cordaid, Samaritan's Purse, Relief International, World Vision, Habitat for Humanity, Save the Children and ACTED. Various departments from the Philippines Government were also interviewed: DreAMB, as a sub-department of DSWD, two LGU's and the OCD at a regional and national level. Appendix B presents a full list of the agencies and position that belong to the respondents. In addition, respondents were selected at different levels: global, national, regional and local. Different roles are covered at the different levels: strategic, tactic and operational.

The selection of interviewees was done via chain referral. Employees of the NLRC and PRC, who were working during the emergency response of typhoon Haiyan, referred the author to a number of

respondents. The still operational networks for the Haiyan Programmes of the NLRC and PRC were utilized, to provide the researcher access to the right people. More respondents were selected via respondent-driven sampling. A few respondents were selected to act as 'seeds': after interviewing these key informants the researcher asked them for names of other potential respondents (Bernard, 2011). Often humanitarian workers and agencies work closely together in the emergency response phase; therefore I believed that they would have more knowledge about potential respondents. By taking the knowledge of previous respondents into account, the author did expand her network of respondent's via-via. Seven interviews were recorded with a voice-recorder; the other transcriptions were based on extensive notes. All of the respondents agreed beforehand that the researcher could record their interview or take notes. The reordered interviews were transcribed verbatim afterwards, so that key insights could be taken into account.

#### *4.1.3 INFORM Severity Index meeting, IM-TWG Meeting and IM-WG Meeting*

INFORM is a global, open source risk assessment for humanitarian crises and disasters. The INFORM Partner group invited the Netherlands Red Cross to take part in the discussions about the establishment of a new Global Severity Index. One of the agenda points was the discussion and comparison of existing models; some of the discussed models are described in chapter 5.

The Information Management – Technical Working Group (IM-TWG) is a group of Information Managers from various departments within the Philippines Government and humanitarian organisations. The working group aims to work closely together and share information and data that is relevant in disaster preparedness, response and recovery phases. Joseph Addawe (IM; UN OCHA) and Steeve Ebener (GIS consultant) have established the IM-TWG; and nowadays the GovPH is responsible for its meetings. Around 80 organisations and departments that are working within disaster response are invited for these meetings. The IM-TWG meeting is organised every 6-8 weeks in Manila. Attending this meeting has the benefit of expanding my respondent network and receiving updates on the relevant Information Management topics and similar initiatives. Unfortunately, the IM-TWG meeting has been rescheduled a few times when I was in Manila, and lastly cancelled. Alternately, Joseph Addawe organized the Information Management – Working Group (IM-WG) meeting at the UN OCHA Country office to bring the humanitarian agencies together. This meeting addresses issues that are relevant for the Philippines government and it offers an opportunity for the agencies to meet in between the IM-TWG meetings.

#### *4.1.4 Data-set collection and analysis*

To compute the most accurate version of the Priority Index Model; accurate and up-to-date datasets are needed. In the initial phase research was done to find additional sources, which might have more accurate or up-to-date datasets. The various datasets were computed and analysed by colleagues of the Netherlands Red Cross who have specific technical knowledge. The datasets were analysed and computed into the current model by data-analysts, who are part of the Netherlands Red Cross 510.global Data Team. This model and its corresponding map were presented during the interviews with decision-makers to identify how they make sense of this model. During this research, the author also requested the humanitarian and governmental agencies for other or more up-to-date data sets, which can lead to an improvement of the current model.

## **4.2 Data analysis**

The notes of all the interviews were collected within one project in the qualitative data analysis software ATLAS.ti 7. Seven interviews were recorded and could therefore be transcribed using the software ExpressScribe. The transcriptions were combined with the notes of the researcher. The remaining twenty-three interviews could not be recorded, for example because there was too much background noise or the interview was conducted via Skype. Two short meetings were added in the ATLAS.ti project because of their relevance and remarks.

To start analysing the interviews, the interviews were coded via the various steps of 'open coding' and 'axial coding' as described by Boeije (2010). Printed versions of the interviews were used for a first round of the steps of open coding: 1) read the whole document, 2) create fragments, 3) determine the meaningful fragments, 4) judge whether these fragments are relevant for this research, 5) make up an appropriate code for the fragment, 6) assign this code to the text fragment and 7) read the document and code all the relevant fragments (Boeije, 2010). The same steps of open coding were repeated using ATLAS.ti7, to double-check the relevant fragments and assigned codes. The focus of this research lies on a code-based analysis instead of a case-based analysis; with *'an orientation towards the themes or categories present in the data, rather than a focus on the cases, such as organisations, activities or events'* (Lee & Fielding, 2004). By focusing on codes, the researcher intended to gather the quotes together that contain relevant information about the same 'code'. One risk of a code-based analysis is to forget the cases or interviews where these quotations originate. To overcome this challenge, the researcher constantly checked the original interviews and cases of the used quotations. Next, the researcher applied the various steps of axial coding; *'determining whether the codes developed thus far cover the data sufficiently and create new ones when the data provide incentives to do so'*, decide which code is most suitable if similar codes have been used, consider the similarities and differences between the used codes and subdivide categories (Boeije, 2010).

### 4.3 Ethics

The goal and objectives of this research have been explained clearly to the respondents; first with an official letter to invite them for the interview and second in the beginning of the interview. All the respondents were enthusiastic and willing to answer all the questions during the interviews. However, some of the agencies for which respondents were working for, were hesitating to give an interview or following bureaucratic rules; this will be considered in the discussion of the methodology. Although the interviews were arranged officially with approval of various levels within the agencies, the results of the interviews will be discussed anonymous within the published report. The transcribed interviews won't be published as an appendix of this research, thus they will be shared with my supervisors. The respondents all agreed that I, or one of my follow colleagues of the Red Cross, could contact them again. Within most interviews the respondents 'interviewed' the researcher as well about her role in this research, her studies and private life. These questions were also answered and left room for open discussions, therefore none of the respondents objected to one of the questions or decided to stop the interview.

### 4.4 Reflexivity

Within this section I would like to reflect on the role of the researcher in this research. When the researcher is aware of her subjectivity and background and when she accounts for it, the research itself will be less subjective. Born and raised in the Netherlands, with an education at Western universities influenced my way of thinking. I am aware that I have a hands-on mentality, that I enjoy efficiency when it comes to processes, and that I am quite direct in my conversations. Although with travelling I gained insights in different cultures, I am still aware that being direct, but honest, friendly and professional is my way of working. I do observe cultural differences and try to adjust myself to them so that I won't offend people and that I will act professionally. To give an example, I noticed that Filipinos are very polite and address their superiors or senior colleagues with Mr., Mrs. or Miss. I started using the polite greetings as well for my colleagues and respondents; the Filipinos were quite amused by that because most expats are also 'senior or expert' in their eyes. Prior to my departure to Manila, I met with the Netherlands Red Cross Country Representative for the Philippines in The Hague for a security and cultural briefing. Therefore I was aware of the dress code and decided to wear long skirts or dresses, trousers and shirts or blouses with sleeves during my time in the



Philippines. By adjusting myself to the Filipino culture, I believe that I was being perceived as more professionally.

Contrary to the adjustments that I could make, some of the characteristics are fixed. By acquiring my education at Western university and travelling 'all the way' to the Philippines to conduct my master research there, was quite impressive for most of the people that I spoke with. Being a young white female who is still studying also allowed me to talk to more people; Western people could have interesting and fruitful discussions and Filipinos were also asking me a lot to find out more about this Priority Index Model and about cultural differences between the Netherlands and the Philippines. Being invited by the Netherlands Red Cross and Philippine Red Cross opened quite some doors for my research. Mr. Bryan, delegate of the NLRC in Manila, assisted me in arranging a number of the appointments. Prior to arrange the appointments with all of the Government departments and with some of the humanitarian agencies, you have to send official invitations signed by the office of the Secretary General of the PRC. I felt honoured that I could do this research in the Philippines and that people reacted so positively when I explained my research to them.

One weakness was my lack of knowledge of the local languages and the Philippines national language Tagalog. Luckily, most people in the Philippines do speak English, certainly in Metro Manila. During my interviews with the Mayors and with some other local representatives, Mr. Bryan was present to translate some of the sentences. As mentioned before, Mr. Bryan is also working for the Red Cross Movement and is familiar with emergency response and typhoon Haiyan. Only during one interview that I conducted by myself, I had the idea that the respondent did not understand my questions completely. By framing the questions differently, this problem was solved. Working with a translator has a limitation, because you are unsure if your question and the answer are interpreted and translated correctly. By making little use of a translator and having a translator that understands my research, decreased the influence of language on this research.

#### 4.5 Discussion of the methodology

Normally agencies finish the emergency response activities within 2 months and start with the long-term development projects. Considering that typhoon Haiyan made landfall in the Philippines in 2013, the author assumed that all humanitarian agencies finished their emergency response activities. Some of the agencies are still active in the Philippines with the post-Haiyan development projects and/or other projects. A limitation for this research is the high turnover rate of employees within humanitarian projects and agencies. Projects are planned for a 'relatively' short time, so humanitarian workers often move around globally. As noticed earlier, the turnover rate within the humanitarian sector itself is quite high, and thus people switch between agencies. If the research was done earlier after the typhoon, more respondents would have been available. A few respondents had moved to another country but were willing to do an interview via Skype. A limitation is that these interviews are not recorded, and could therefore not be transcribed verbatim. The author did write down extensive notes of these interviews, with quotes, to assure the usefulness of these interviews. A final list of respondents can be found in appendix B.

Another limitation that the author assumed is a certain level of bureaucracy within some humanitarian agencies and departments of the Philippines Government. Beforehand, the author assumed that this level of bureaucracy might have a negative effect on the number of respondents that could plan an interview with the researcher. During the research phase, the author noticed that it was fine to get into contact with humanitarian agencies. Other respondents referred to the author, the PRC and NLRC delegates could introduce her as well and with an official letter most of the contacted interviewees were able to meet. One agency did not reply, and when visiting their office in Cebu City they apparently moved back to Manila without publishing that on their website. Another

contact person was not able to meet during the research phase due to an reluctant response from their side. It was more difficult to get into contact with the right contact persons from the various departments of the Philippines Government. The author was able to meet with the Mayor and Councillors of the two LGU's in Leyte, because Mr. Bryan is part-time stationed in those LGU's for post-Haiyan development projects and is therefore acquainted to them. The heading positions within all Government Departments and LGU's were 'replaced' at the 1<sup>st</sup> of July 2016, due to the Philippines elections earlier this year. Quite a lot of the leading contacts were not reachable or not in position anymore. This change in contacts and the ongoing bureaucracy, official letters and permission from the head of the departments are needed, made it difficult to obtain contacts for interviews at the Philippines Government. Despite the difficulties while arranging the interviews, the Government officials that were interviewed for this research were honoured to be included within the research. An equal amount of respondents from humanitarian agencies and the Philippines Government would improve this research, however this was not possible during the time that the research was conducted.

A limitation regarding the analysis is the fact that only one person was responsible for the coding of all the interviews and the analysis itself. In this research the author also discussed some of the earlier comments with other respondents without mentioning with whom it was previously discussed. In addition, the author validated the information discussed in the interviews with colleagues of the NLRC delegation in Manila and in The Hague.



## 5. Priority Index Model

### 5.1 Netherlands Red Cross Priority Index Model

#### 5.1.1 Typhoon Haiyan

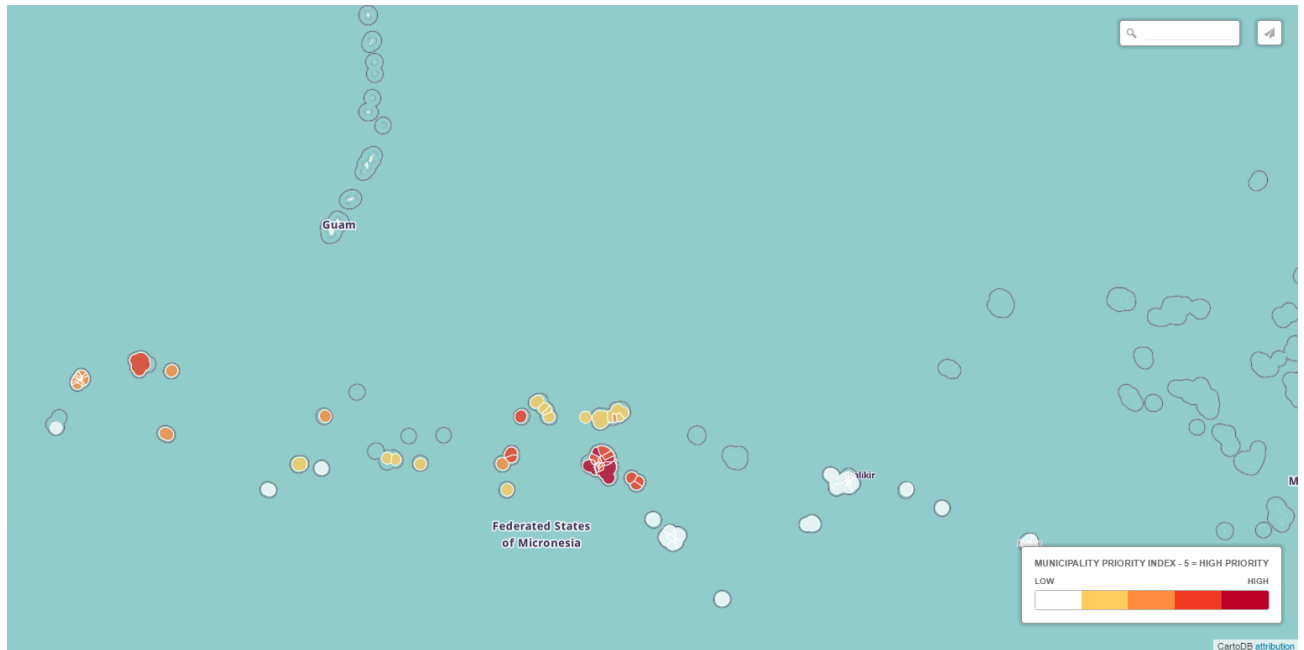
The Red Cross Priority Index Model (PiM) is assessing the priority areas based on (open) secondary data and disaster specific data. The model is designed to use during the emergency response in the initial phase. In the response to typhoon Haiyan, Andrej Verity (IM Officer for UN OCHA) received an email with a composite index created by Miguel Antonio Garcia (University of Zurich; Barcelona Graduate School of Economics) and Giedrius Kaveckis (University of Hamburg; UN OCHA). This composite index was compiled using pre- and post-crisis data (e.g. poverty incidence, population density, house size, storm surge height, etc.). Kaveckis and Verity developed this further into the Onset Disaster Severity and Impact Estimate Index (see 5.2) (OCHA, 2014c). Verity (2014, December 11) wrote a blogpost to suggest the mixture of pre- and post- disaster data in a model to show the impact of the disaster and to prioritise municipalities or areas for most urgent assistance. His blogpost triggered Simon Johnson (British Red Cross) to create a pilot version of the Priority Index Model (Johnson, 2015, April 10). This model has been calculated and distributed to a few actors in the wake of cyclone Pam and typhoon Maysak (both 2015). The aim was to develop a new methodology to identify high priority areas for humanitarian response, based on (open) secondary data of affected areas, combined with disaster impact data. The priority index is an expert model, which is using a combination of data and in which the weights of these features are determined by experts, and is thus subjective. The result of this priority index model is a set of priority areas for humanitarian assistance and/or further needs assessments; this can be visualised on a priority index map to present a clear overview to humanitarian decision makers and emergency responders. The aim of the Netherlands Red Cross is to calculate the priority index model and create the corresponding map within a few hours after a disaster happened, ideally so that decision-makers can make sense of the situation within a couple of hours. If humanitarian agencies and the government receive the priority index model and its complementing map a couple of hours after the disaster stroke, they could design their response plans to the calculated priority areas. To build evidence for the correctness and effectiveness of this model for decision-makers this research focuses on the case of typhoon Haiyan/Yolanda (2013).

The Priority Index Model is an expert model, which is using a combination of data and in which the weights of these features are determined by experts. The pilot of the Priority Index Model, by the British Red Cross for Cyclone Pam and Typhoon Maysak, consisted of the indicators that are shown in Table 2 (Johnson, 2015, 2015, April 8, 2015, April 10). The data are aggregated to a municipality level (Admin level 3, see geographic classifications) and the weighting of the three indicators is equal. The municipalities of Micronesia have been prioritised in the index with a scale from 1-5, with 5 as the highest priority.

Typhoon Maysak Priority Index Model		
Population data	Census 2010 projected	
Poverty data	Census 2000 – earning less than \$2500 a year	
Wind speed	Professor Mark Saunders and Dr Adam Lea, Tropical Storm Risk, University College London, UK	Real-time track, intensity and quadrant wind-radii data for Maysak combined with a simple analytical model for peak 3-sec gust (Joint Typhoon Warning Centre (JWTC)).

**Table 2 Data sources for the Cyclone Maysak Priority Index Model (derived from HDX, 2016).**

The map below is a visualisation of the Priority Index Model for Typhoon Maysak (Figure 8). The map visualises the priority given to the different municipalities based on pre- and post-disaster data-sets. On the one hand the colour red visualises the municipalities that are given the highest priority based on this model, on the other hand municipalities that receive a low priority have been visualised as white.



**Figure 8 Priority Index Map for typhoon Maysak, Micronesia. Output of the Priority Index Model as piloted by the Simon Johnson of the British Red Cross, April 2015 (Johnson, 2015, April 8).**

In the months following typhoon Haiyan, a data-set has been published that incorporates the following indicators (Johnson, 2015, April 10):

- Geographical data, such as land area (sq. km)
- Demographical data, such as population, number of households, family size, population density and poverty incidence
- Event specific data, such as storm surge height and distance to typhoon

With estimated numbers of population affected and households affected, the scores are calculated for five categories aggregated to an municipality level: the severity, the density-poverty, typhoon, storm surge and the typhoon-storm.

The NLRC 510.Global team revised this data-set and used a learning algorithm. The following model (version of June 2016) was brought to the Philippines by the researcher to discuss with decision-makers. The model highlights differences with an aim of distributing aid efforts in the initial emergency response phase more efficiently. The following indicators are used in the Priority Index Model (with the percentage importance) when it was trained over the percentage of houses destroyed:

- |                                     |     |
|-------------------------------------|-----|
| • Distance from typhoon path (km)   | 50% |
| • Average wind speed (km/h)         | 25% |
| • Poverty fraction                  | 6%  |
| • Surge height (int. m)             | 5%  |
| • Distance from the coast (m, mean) | 3%  |
| • Rugged index (mean)               | 3%  |
| • Rainfall (mm)                     | 3%  |

- Population density (2010 p km<sup>2</sup>) 3%
- Population (Census 2010) 2%

To come to the final Priority Index supervised machine learning algorithm (random forest regressor) has been used to predict the number of houses that were damaged by typhoon Haiyan/Yolanda. The Philippines Government Departments (NDRRMC and OCD) have provided the total number of houses that were damaged during the typhoon. The geographical and demographical indicators can be collected beforehand and can thus be prepared. These data sets are combined with typhoon specific information, which should be released as soon as possible after the event. In the ideal situation the model will be released within 24-48 hours after landfall of the typhoon. The final results show that this model is able to predict the number of houses damaged with a median error of 400 houses, with respect to the houses damaged as reported by the REACH assessment. The priority given to municipalities is 0-5, with 5 as the highest priority. The Priority Index Model of June 2016 has been visualised (see Figure 9); in this version 0 may mean zero priority or data unknown. Within appendix D the error maps of the Priority Index Model can be found. For the success of the algorithm it's of primary importance that the data from which we are learning from is an accurate estimation of the damage in the region. The algorithm cannot be better than the actual data that it is learning from. The NLRC is looking forward to receive more up-to-date and accurate data-sets, as well as recommendations about the included indicators.

**Text box 1: Random Forest Regressor (NetherlandsRedCross, 2016b)**

*'Its power comes from an interesting strategy of building multiple predictors (decision trees) and averaging their outputs. Each tree is built in a slightly different way, using different subsets of historical data, and randomly selecting different variables during the process of building the trees. This strategy allows to build a model that can handle multidimensional data well and can estimate importance of each input variable. It is a highly configurable method so several experiments were held to select parameters that produce the best results on training data.'*



The Netherlands  
Red Cross

# Typhoon Haiyan (Yolanda)

## Priority Index per Municipality

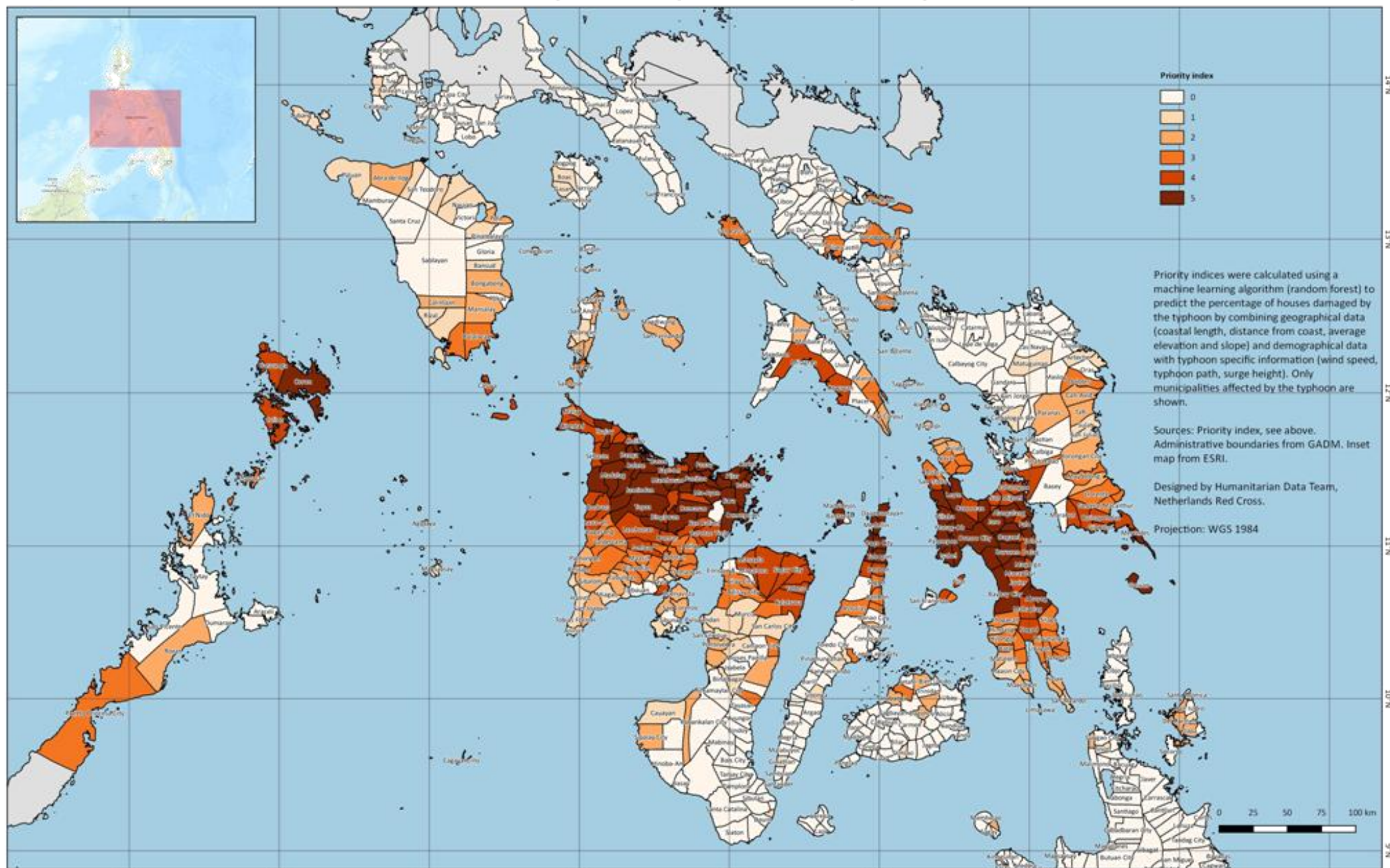
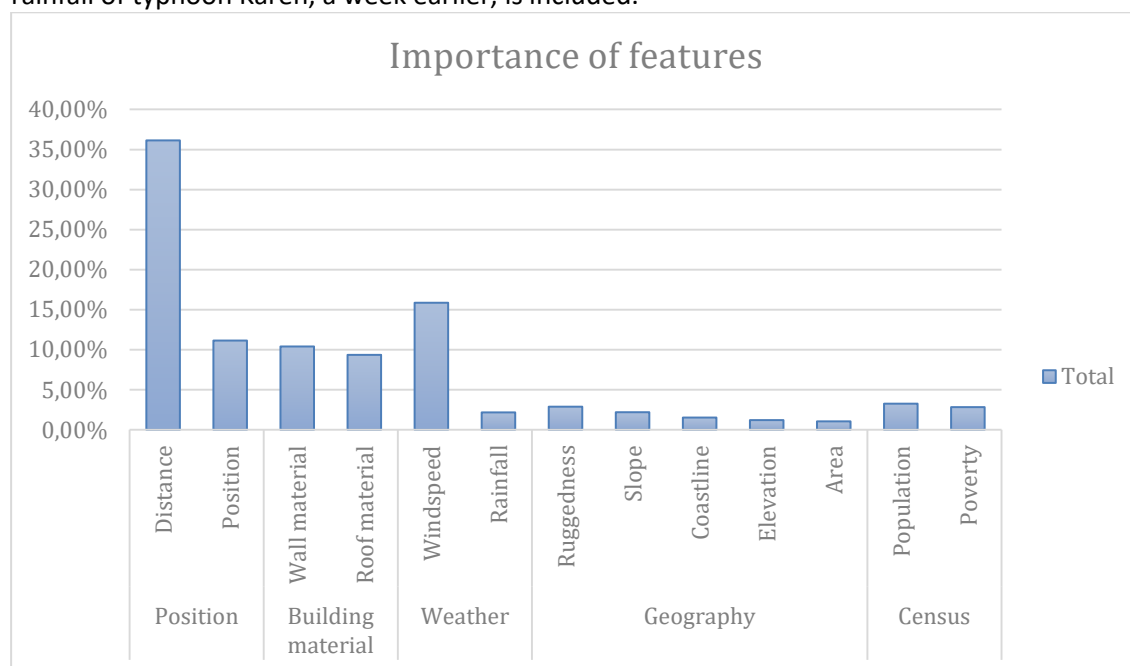


Figure 9 Red Cross priority Index Model per municipality for typhoon Haiyan (Yolanda) (June 2016, Netherlands Red Cross 510.Global).



### 5.1.2 Typhoon Haima

Feedback from the field and updated data-sets are taken into account in the research phase, and an updated version (October, 2016) of the Priority Index Model has been published in the response to typhoon Haima (Lawin). On October 19, 2016, typhoon Haima made landfall in Northern Luzon, Philippines. Awaiting this super typhoon, the 510.Global team prepared the data-sets and the model, so that it could be calculated directly after landfall. The Priority Index Model has been trained on data-sets of 4 typhoons that have been collected in the Philippines: Typhoon Haiyan (Yolanda; 2013), Typhoon Rammasun (Glenda; 2014), Typhoon Hagupit (Ruby; 2015) and Typhoon Melor (Nona; 2015). By training the model to 4 past typhoons, the 510.Global team figured that the importance of features changed and some of the added indicators turned out to be important for the model (Figure 10). As Figure 10 shows the distance to the typhoon path is the most important indicator. The model for Typhoon Haima (October, 2016) includes indicators for building material, such as 'Wall material' and 'Roof material'. The model for typhoon Haima has been visualised (Figure 11); red areas have been given the highest priority and white has been given to areas with the lowest priority. The rainfall of typhoon Karen, a week earlier, is included.



**Figure 10 Importance of features of the Priority Index Model for Typhoon Haima (Lawin; 2016) (Netherlands Red Cross 510.Global, 2016).**

Data sources included in the second run of the model for Typhoon Haima:

- Administrative boundaries (P\_Codes) – Philippines Government; Published by GADM and UN OCHA (HDX)
- Census 2015 (population) – Philippine Statistics Authority; Received from UN OCHA (HDX)
- Avg. Wind Speed (km/h) – University College London
- Typhoon Path – University College London
- Houses Damaged – NDRRMC
- Rainfall – GPM
- Poverty – Pantawid Pamilyang Pilipino Program (aggregated)
- Roof and wall materials – Census 2010 estimated for 2013
- New geographical features

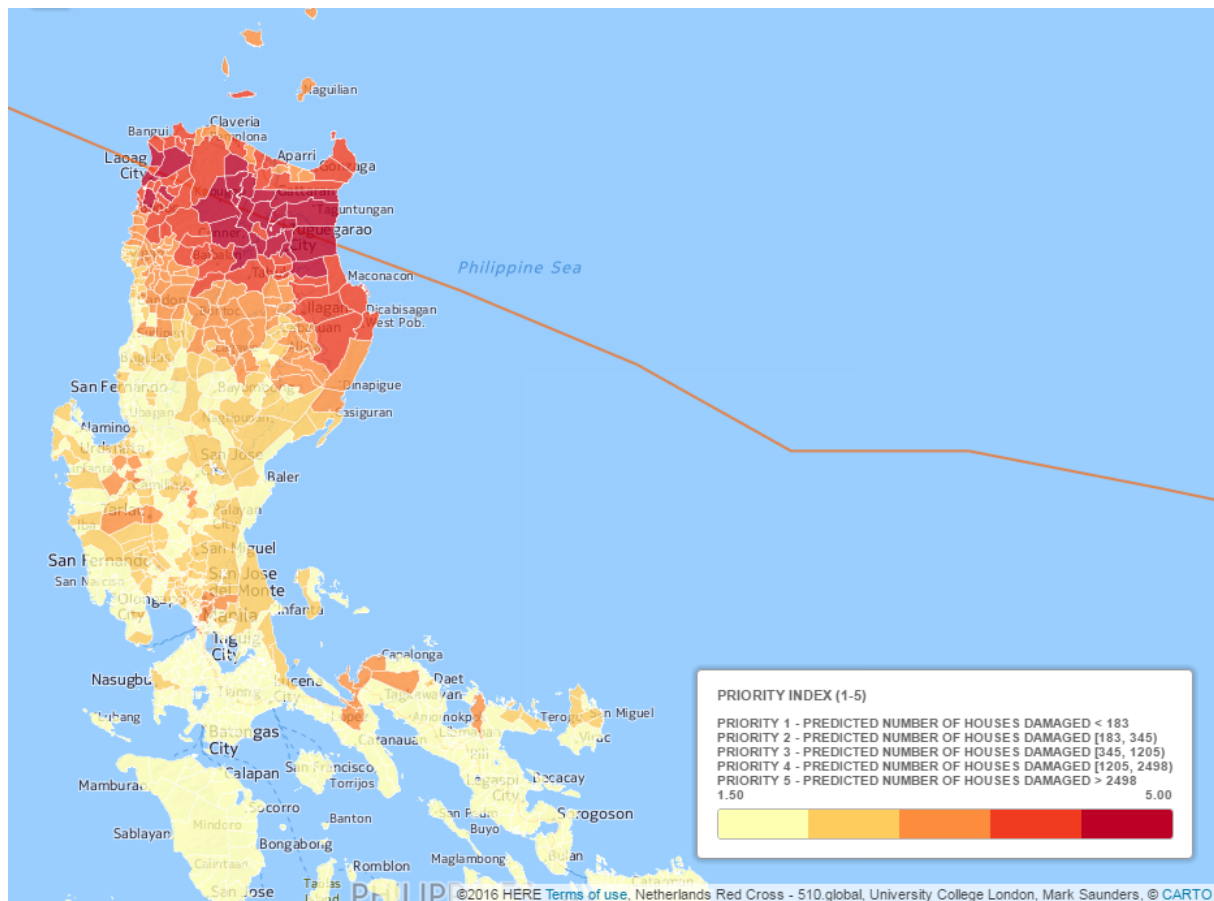


Figure 11 Priority Index Model for Typhoon Haima, October 2016 (NetherlandsRedCross, 2016b)

The absolute number of houses damaged or people affected is insufficiently validated at the moment. The model should just be used for further training and ground-truthing (NetherlandsRedCross, 2016b). Although the damage predictions by using data are not perfect, they are more transparent than other prioritisation methods, because the underlying data, assumptions and methodologies are shared openly. This accounts also for similar models, however the strength of this model is that it can in principle improve with time (by training the model). The predictions contribute to a more efficient prioritisation of municipalities and can be validated afterwards.

A blog has been published in the beginning of November to inform the humanitarian community about the Priority Index Model that has been trained to predict the estimated number of houses that are damaged during typhoon Haima. This blog can be found on the website:

[www.510.global/Philippines-typhoon-haima-priority-index](http://www.510.global/Philippines-typhoon-haima-priority-index)

Additionally, the accuracy of the predictions for typhoon Haima have been analysed and this analysis has been showed upon a dashboard for transparency: <https://rodekruis.github.io/priority-index-haima-accuracy/>

Finally, all datasets that are used in this Priority Index are published on the Humanitarian Data Exchange (HDX): <https://data.humdata.org/dataset/philippines-typhoon-haima-priority-index>

## 5.2 Existing indices

Several existing initiatives seek to measure humanitarian needs and prioritise countries or areas for humanitarian assistance, however '*an universally suitable algorithm*' nor widely accepted methodology to establish these kind of priority indices has not been established (Benini, 2015). Challenges, related to the objectives, scope, methodology, data, process, interpretation and use of these tools, remain while designing these kinds of comparison tools (INFORM, 2016). This paragraph identifies the existing indices and compares these tools with the Red Cross Priority Index Model. The existing indices may differ in the used key concepts, indicators, and mathematical operations.

### a) OCHA and JRC – Nepal Earthquake Severity Index

Benini compares two severity indexes that have been calculated for the Nepal Earthquake: 1) index of April 2015 and 2) index of June 2015 (Benini, 2016). The severity measurement of June differed with the severity measurement of April; it included lower-level indicators, a different weighting for the indicators and it was not combined with a population component. Table 3 shows the different components and the data sources of the severity index that OCHA and the Joint Research Centre (JRC) designed in April 2015 for the Nepal Earthquake, and Figure 19 (Appendix A) shows the map that is an outcome of this severity index. The formula used is:

$$Severity = Hazard^{1/3} \times Exposure^{1/3} \times Vulnerability^{1/3}$$

Nepal earthquake severity index (April, 2015)												
Dimension	Hazard			Exposure			Vulnerability					
Component	Earthquake intensity			Total population			Housing (1)			Poverty (1)		
Indicator							Wall type (1)	Roof type (1)	Human poverty index			
Scale	Admin (village)	Level	4	Admin (village)	Level	4	Admin (district)	Level	3	Admin (district)	Level	3
Data source	USGS			Nepal Census 2011			Nepal Census 2011			Nepal Human Development report 2014		

Table 3 Nepal Earthquake Severity Index of April 2015 (Benini, 2016).

Figure 12 presents the indicators that were used for the severity index that is published in June 2015. As you can see OCHA and JRC included more indicators in the second severity index. The weighting of the indicators has also been changed for the severity index that was published late June 2015. OCHA and JRC identified some of the challenges that they noticed while calculating these indices: 1) ranking vs rating, 2) measuring the impact or severity of needs, 3) information rich vs information poor countries, and 4) weighted vs unweighted (INFORM, 2016).

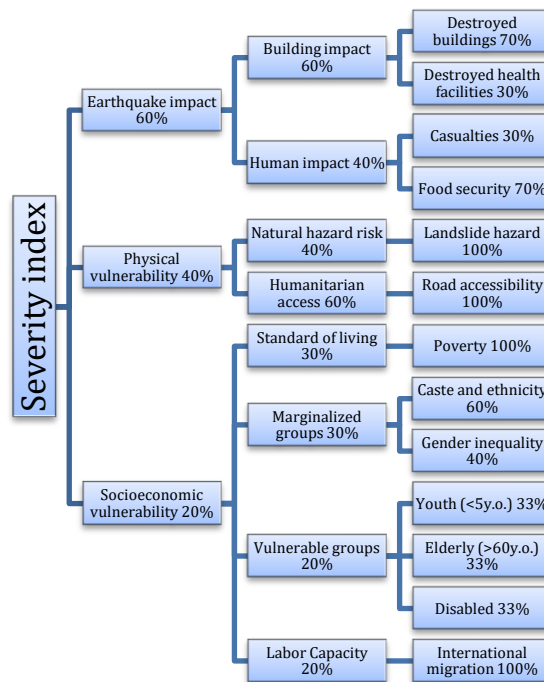


Figure 12 Nepal severity measurement in June 2015 (Benini, 2016).

#### b) UN OCHA – Sudden Onset Disaster Impact Severity Estimate Index

This draft index is designed by UN OCHA in the aftermath of typhoon Haiyan (OCHA, 2014c). This index is composed with simple and advanced indicators that are relevant for the specific disaster and is ranked according to the geographical areas. If the date of pre-disaster indicators is prepared beforehand and the disaster specific-indicators are gathered directly, the goal is to deliver the index within hours (OCHA, 2014c). Kaveckis (OCHA, 2014a, 2014b) also designed a draft of the list of indicators that should be used in the sudden onset disaster impact severity estimate index. He placed the various indicators in six categories: hazard; physical properties/impact; assets; economy; population and adaptive capacity (Figure 14). The index is very preliminary and is intended to help inform early responders the degree of severity of each situation. OCHA argues that due to *'its focus, scale and high uncertainty of input data, the index cannot replace formal risk, impact and damage assessments. It should only be considered valid for a few days'*. The scale of the index in the case of Haiyan, are the affected regions or zones within the Philippines (OCHA, 2014b). Figure 13 visualises the outcome of this index: an high onset is indicated with red and a low onset is indicated with green.

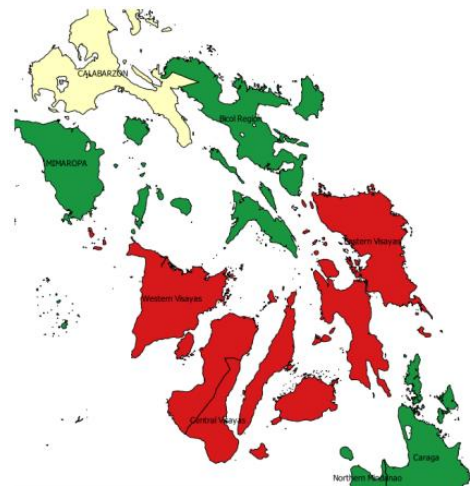


Figure 13 Sudden Onset Disaster Impact Severity Estimate Index: high onset (red) and low onset (green) (OCHA, 2014c).

This index follows a few steps for ranking the regions (OCHA, 2014c):

1. Identify disaster and select disaster sheet;
2. Determine and fill the list of zones/administrative areas (provinces, regions etc.) for severity estimation;
3. Review recommended indicators and compare with your obtained data. Add, remove or edit indicators as needed based on available data and emergency realities;



4. Based on the data you have, identify each indicator for each zone and distribute the values between 1 and 5;
5. After all indicators are filled, the weights for each of them can be applied.

## Hurricane, Storm surge, Tsunami



● Disaster specific ● Generic ● Non-disaster specific and non-generic

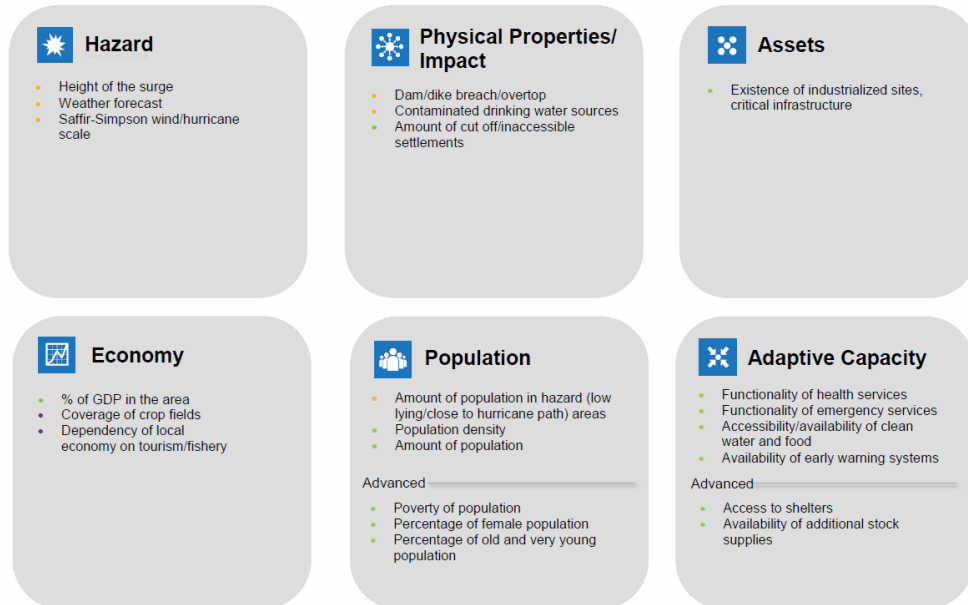


Figure 14 Recommended indicators for hurricane, storm surge, tsunami to use in the Sudden Onset Disaster Impact Severity Estimate Index (OCHA, 2014a).

### c) Protection cluster - Prioritisation Matrix

The Protection Cluster, with UNHCR as the leading agency, presented a prioritisation matrix approximately one month after landfall of typhoon Haiyan (4<sup>th</sup> of December 2013): Yolanda Priority Vulnerable Municipalities. The Protection Cluster scored 408 affected municipalities and the result of this matrix is visible in Figure 20 in appendix A. The total score of this index is a composition of indicators (Benini & Chataigner, 2014):

- Primary: ratios of Internally Displaced People (IDPs); damaged houses to the affected population; and poverty incidence.
- Secondary: ratio of affected persons to the estimated 2013 populations; number of villages/neighbourhoods (barangays) affected by armed opposition groups or inhabited by indigenous populations.
- Tertiary: government-defined top 171 municipalities; number of villages/neighbourhoods in which two conflict and peace programs (PAMANA and NAPC) were carried out.

Within this index the 'first at-risk group, captured in the poverty rate receives the highest score, which means that a highly affected municipality with a low poverty rate would receive a similar score as a mildly affected municipality with a high poverty rate (Benini & Chataigner, 2014). The analysis of Benini and Chataigner found that the ratio IDPs to affected population and the ratio persons with destroyed or damaged homes to affected population were most influential within this matrix. The authors argue that the indicators regarding poverty should be transformed or weighted different so that they have a significant contribution (Benini & Chataigner, 2014).

d) Additional tools

There are several tools or websites that estimate the severity or risk of a disaster or country. Some of these tools compare the different countries or disasters with each other, while some of the tools only state the severity or risk of the country or disaster. The tools could be relevant for a donor or international agency to determine the severity of an area, but they are not aggregated to a local level so that prioritising assistance or further needs assessments is possible. In addition most of these tools are updated (bi-)annually and are more general, while the Priority Index Model is calculated directly after a typhoon has made landfall. The various tools that have been discussed at the INFORM Partners meeting are: Global Disaster Alert and Coordination System (GDACS; published by OCHA and EC JRC), Rough Severity Estimation Tool (RSET; published by OCHA), Global Emergency Overview (GEO; published by ACAPS), Global Conflict Risk Index (GCRI; published by EC JRC), Global Needs Assessment and Forgotten Crisis Assessment (GNA and FCA; published by ECHO), Humanitarian Needs Comparison Tool (UN OCHA) and the Health Care Severity Tool (internally published by Karolinska Institute) (INFORM, 2016).

*Comparison with the Priority Index Model*

The severity indices of OCHA and JRC have been calculated for the Nepal Earthquake, and thus incorporate different geographical indicators than the Priority Index Model uses for a typhoon. Benini (2016) does not explain why OCHA and JRC decided to use these indicators and why the weighting has been set differently within the two severity indices. The Nepal Earthquake Severity Index has been calculated using components in a formula, while the Priority Index Model is trained using data of past typhoons. The Sudden Onset Disaster Impact Severity Estimate Index of UN OCHA is aggregated to a regional scale, therefore this index is not useful for the prioritisation of municipalities or barangays in order to decide upon assistance. The Priority Index Model is aggregated to a municipality level. Additionally, the Sudden Onset Disaster Impact Severity Estimate Index has been published without data and decision-makers have to add accurate data-sets themselves and do the calculation. The calculated version for typhoon Haiyan is not published, and thus a comparison with the outcome of this tools is difficult. This tool is not very practical for decision-makers, who are not trained in IM, in a messy and busy emergency response phase. The focus of the prioritisation matrix of the Protection Cluster lies merely on municipalities that are vulnerable or have a high poverty score. Ongoing conflicts in the area and conflict and peace programs by the government are not included within the Priority Index Model. The focus of the Priority Index Model lies on the characteristics of the typhoon itself, the distance to the typhoon path, the building materials and census. One of the respondents mentioned that quite a number of recovery programs focused on the recipients of the 4P program of the Philippines Government (4p program provides conditional cash grants to the poorest of the poor); while Haiyan affected other people worse and these worst-hit people or areas were not included in the recovery programs due to their '*a little bit higher pre-typhoon status*' (OfficialGazette, 2016). Data-analysts of the 510.Global team figured out that when adding the building materials to the Priority Index Model, the importance of the 'poverty' indicator decreased.

## 6. Decision-makers information needs

### 6.1 Decision-makers

In total 18 different ‘decision-making bodies’ were mentioned by the respondents, which we can subdivide in three main categories: the Philippines Government and its various departments, humanitarian agencies and the UN OCHA and the humanitarian clusters. In the interviews the media has been identified for their ‘special’ role as influencer within the decision-making process. They do not make decisions upon the prioritisation of assistance, however they do have a choice in what to present to their audience. This research discusses (social) media as a source for information (section 6.3); but does not examine their decision-making processes (about what to publish and/or where to go for news). The Cluster meetings and IM-TWG/IM-WG meetings are mentioned repeatedly as situations where decision-makers come together to discuss how they should prepare for disasters and who has been doing what and when (3W and 4W) during the different phases of a disaster. Those meetings are relevant for the Philippines Government and humanitarian agencies to share information and data. Although ‘officially’ decisions are not made within Cluster meetings, in reality these meetings are recognized as a situation where decisions are made or where the different actors can influence decisions-makers. A total of 18 decision-makers have been given codes, these can be divided in the three main categories described above. 145 quotations have been assigned to these 18 codes in Atlas.Ti7. Each of these decision-makers is entitled to different roles and to make different decisions in the emergency response process. Figure 15 shows the three main categories in which all the decision-makers are grouped. The codes that are colouroured light blue are functioning at a local level, the OCD at a regional level and the dark blue functions as a national and/or international level.

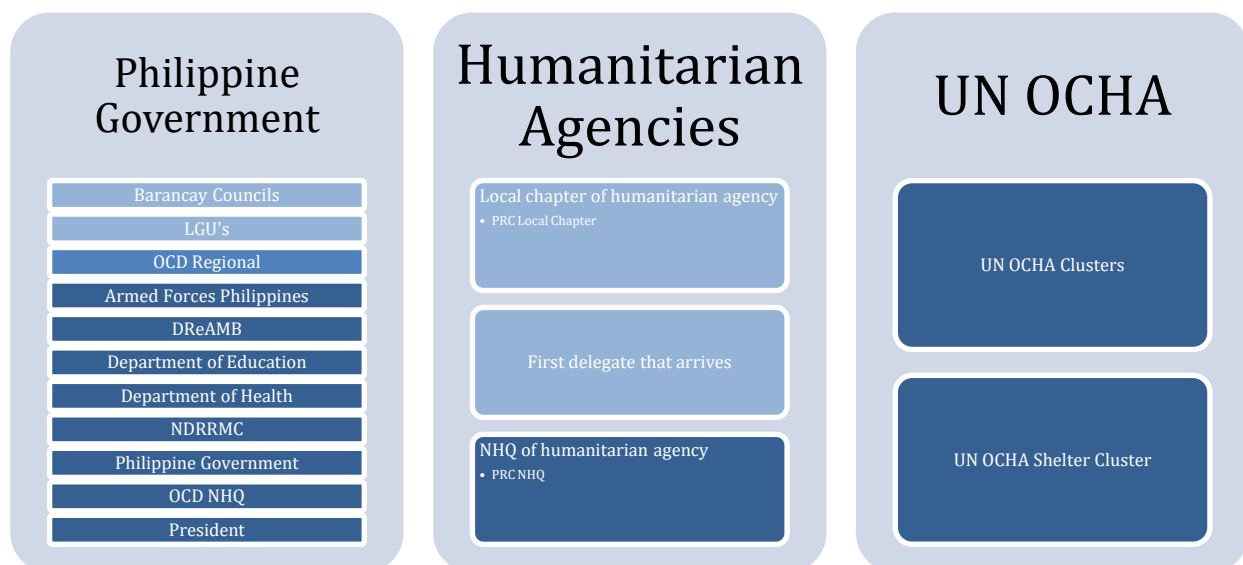


Figure 15 The three main categories of Decision-Makers in the Philippines with their sub-categories.

#### 6.1.1 Philippines Government

Within the Philippines Government decisions are made at different levels and within different departments. Some respondents were unsure about the specific level or department that the decision was made, and mentioned therefore ‘the Philippines Government’ as a decision-maker. Other respondents could be more specific and named the following sub-codes: Armed Forces Philippines, Barancay Councils, Department of Education, Department of Health, DReAMB, LGU’s, NDRRMC, OCD, and the President (Figure 15). When talking about decision-making, a total of 41 quotations have been given to the main code ‘Philippines Government’ and it’s sub-codes, by 16 different respondents. This research argues that the main governmental decision-making bodies during the emergency response are: the LGU’s, the NDRRMC and the OCD. Numerous respondents

argued that the concerning departments are responsible for decision-making; for example the Department of Health is responsible for the WASH response. The administration of the Philippines Government is in charge of the Ministries and the departments at a local, regional and national level. Remarkable is that within the diverse range of government departments and layers only a few people have been mentioned. Typhoon Haiyan made landfall three years ago, so the respondents might have forgotten the names of decision-makers that they have spoken to, or they might have other political or diplomatically reasons to reply without specific names of people. Another possibility is that the balance of power is something remarkable for the Philippine Government. A single respondent mentioned the President as one of the key decision-makers. She marked that *'... What is really important to know about Tacloban is that the mayor reported directly to the President. All the main cities, above a certain number of populations, they report directly to the President. And that creates a completely different dynamic, because everyone else reports to the Mayor, and the Mayor to the Governor, and the Governor to the President'* (Respondent 10, IOM NHQ, personal communication, 2016). This privilege benefitted Tacloban during the typhoon Haiyan emergency response and might have led to an unequal view of the needs in various areas in the post-disaster situation.

If we take a look at a local level, the key decision maker is the LGU with the Mayor as its representative. A few respondents argued that the LDRRM (Local Disaster Risk Reduction Management) Officer also held a key role within the LGU, by coordinating and communicating with the DRRM Officers at a regional and national level, respectively of the OCD and the NDRRMC. The municipality council is responsible for making decisions at a local level and the LDRRM Officer and Mayor are co-responsible for presenting these numbers to the regional and national offices. The LDRRM Officer and Mayor should inform them about the information needs in their municipality and the complete list of beneficiaries.

#### 6.1.2 Humanitarian agencies

The (inter-) national headquarters (NHQ) of the humanitarian agencies are seen as key decision-makers during the emergency response phase, 14 respondents argued that the decisions are being made at this NHQ level. Decision-makers that are working at local chapters of the agencies collect information in the field and verify this with their own observations and those of colleagues. They make sense of a situation and decide to report certain information to NHQ. Noticeable is the fact that in the case that the humanitarian agency does not have a 'permanent' local chapter in the affected region, the first delegate who arrives is marked as an important decision-maker. Due to the fact that it will take a few days before the first delegate has arrived in the affected area, this will also slow down the sense- and decision making process. Different decisions are made at the NHQ and local level. Decision-makers at the NHQ level decide which areas should be prioritised regarding the division of assistance. Local chapters decide upon the practical side and implementation of these decisions. Respondents argue that the question that is essential for the model that is leading this research: 'which areas should we prioritise for humanitarian assistance?' should be answered at a NHQ level and information collected by local decision-makers is used as an input to decide upon these matters. In practice however it might be different. The Red Cross Field Assessment Coordination Team (FACT) is responsible for writing up the International Emergency Appeal, which is eventually used by NHQ. In practice we see that the field team and thus first delegates, are in the lead of determining the priorities. The NHQ adopt the choices that are made at a local level after validation. Eventually when a municipality has been selected to receive assistance, the LGU council and local chapters decide upon the division of the assistance that international agencies pledge to provide to their municipality.

### 6.1.3 UN OCHA and the Humanitarian Clusters

UN Office for the Coordination of Humanitarian Affairs functions as a coordinating body that supports the government before, during and after a disaster or conflict. The Clusters are activated after government requests assistance from the international community. In the aftermath to typhoon Haiyan, the clusters were integrated in the Government response. Tollenaar (2016) explains that during the response to typhoon Haiyan there was a mismatch of the cluster system of the UN and the Philippines Government. According to one respondent there is a *'360-degree turn since Haiyan'* regarding the coordination of clusters by the Philippines Government and the integration of humanitarian agencies and the government (Respondent 22, PRC, personal communication, 2016). Respondents of this research found it difficult to identify the exact changes three-year post-Haiyan. One-third of the respondents mentioned that they felt at some point a disconnection between the Philippines Government and the humanitarian clusters. Respondents marked that the integration of the Government and the humanitarian agencies within the clusters was still a struggle, because of the partial integration of the clusters. Government officials recognized this coordination problem as well and argued that the Philippines Cluster structure has changed a lot since Haiyan. Still, the Governmental and UN Cluster system are not matching fully. As an example, the Governmental system is including a cluster for the Management of the Death and Missing (MDM), which does not have a corresponding UN Cluster (Respondent 6, OCD, personal communication, 2016).

The humanitarian clusters are not established to function as decision-makers, the cluster meetings are set up to inform all agencies and coordinate the response better.

*'A cluster is a coordinating body, and is providing information to the agencies. Data is analysed and it is decided how to fill the gaps. Agencies make the decisions and use the information to do so. The Shelter cluster for example doesn't have a lead role and is also not authorized to. The Shelter Cluster doesn't make decisions, but can advocate for (decisions) or influence'* (Respondent 13, personal communication, 2016).

Officially the humanitarian clusters do not make decisions, respondents argue that in reality decision-makers are triggered and influenced at the meetings and often make (collective) decisions.

According to this respondent a *'lot of coordination'* is needed during the decision-making process in the early emergency response phase, and the Government departments are leading the emergency response (Respondent 13, personal communication, 2016). The respondents were mainly active in the Shelter, WASH and Protection, these humanitarian clusters are mostly related and often one focal person from a humanitarian agency is attending multiple cluster meetings. These focal persons do know the other attendees and start reporting information also informally in between meetings. A benefit is that information is shared more quickly, a negative side effect that was noted by respondents is that if your organisation is not attending all the cluster meetings you will not have (quick) access to all information. A challenge that has been identified by one of the respondents is the coordination with the private sector; *'the private sector is invited for the cluster meetings, but they often don't attend these cluster meetings'* (Respondent 8, PRC, personal communication, 2016).

Although the humanitarian clusters established to bridge the coordination gap, coordination among the agencies remains one of the main challenges. A total of 21 quotations have been given in Atlas.Ti7 to the code coordination challenge. The absence of representatives from the private sector and government maintains the coordination challenge. Few government representatives are present during meetings and the decision-makers from humanitarian agencies argue that OCHA is still leading the clusters, while the government is expected to take the leading role. This research argues that the government representatives should act more pro-active and take this leading role; UN OCHA can act as their 'right hand' and help the government with the organisation of the clusters and cluster

meetings. A few respondents argued that it is quite difficult to reach out to private sector representatives; the government should continue seeking contact with representatives of the private sector and knowledge institutes to include their response as well.

Cluster meetings are organised at various levels: NHQ or country level, regional and local. Different decisions are made within each level of meetings. An example that has been given is that although the humanitarian clusters do not have decisive power, in reality decisions are made within the cluster meetings. At an NHQ the humanitarian agencies and government bodies that are present in the cluster meetings make decisions upon the provinces and, if possible, municipalities that should be prioritised for the emergency response and first assessments. The present agencies will provide information on the gaps and motivate agencies to work in those areas. At a regional or local level the information needs, as explained in paragraph 6.2, will be discussed and the present agencies will decide which agency is going to assist in each of the affected municipalities or even barangays.

## 6.2 Information needs

A total of 52 different codes have been given to information that is needed during the emergency and relief response. Decision-makers need different types of information during the various phases of emergency and relief response; this thesis focuses on the types of information that are important during the early emergency response. This section highlights the indicators that are found significantly relevant for decision-makers in the Philippines. If information is combined, more clarity can be given about the scope or scale of the disaster, and decision-makers can make sense of the situation before prioritising. This paragraph highlights the ten indicators that are marked as important by decision-makers from humanitarian and government agencies. This research argues that after decision-makers make sense of the scope of the disaster, they will prioritise municipalities based on the absolute numbers or percentages of 'affected people' and 'damaged houses' as their main indicators.

### 1. Affected population/people/families/households

Decision-makers identified that it is essential to know 'as fast as possible' how many people or families are affected by the typhoon. One of the key findings of this research is the identified challenge for humanitarian work: there is not one fixed definition for 'affected population'. It starts with the fact that some agencies mention the affected population, others refer to affected people, affected families or affected households. A question that rose during the interviews is *'if the baseline information, with the numbers of houses also differs per LGU or Barangay, whether it is based on the family members or on the housing structures, how do Government Officials count?'* (Respondent 3, PRC NHQ, personal communication, 2016). Second, all agencies interviewed mentioned that *'everyone is affected'* in the first phase after a typhoon made landfall. People that have capabilities to recover often still have needs (e.g. food, water, evacuation, communication to family) in the first 24-72 hours. Third, there is a misunderstanding between the various humanitarian and governmental agencies what is included in the term and this leads to ineffective coordination. For the term 'affected population' most respondents mentioned that they include:

- People that have been (pre-) evacuated;
- People that are injured, missing or dead (casualties);
- People whose house is partially or fully damaged

All decision-makers argue that their organisation is striving to assist the affected people that need it the most. They argued that when reaching out to the 'most vulnerable groups or people', they have the highest chances at reaching the highest number of people that need assistance the most. The tricky part of this reasoning is the question how to define which people are 'vulnerable'? The PRC provided a list of criteria that are used to select the beneficiaries for their projects. Decision-makers



often referred that they were using a similar list as the PRC is using. This list of criteria is not decisive yet; the final list of beneficiaries will be confirmed in agreement with LGUs and Barangays officials (PRC Management, personal communication, 2016). *'Priority will be given according to vulnerability criteria (guidelines; looking at the capacity to repair their own house, through participatory approach)'*, the information needed can be collected while assessing the Vulnerability Capacity Assessment (VCA) pre-disaster or the Needs Assessment post-disaster (PhilippineRedCross, 2015):

- Single female headed households
- Child-headed households (head of household is below 18 years old)
- Families with small children less than 5 years old
- Families with equal to or more than five members
- Families with pregnant and lactating mothers
- Surrogate parents of orphaned children living in evacuation centres
- Families whose head of household died or were incapacitated as a result of the disaster
- Families with seriously ill members or persons with disabilities or with special needs (persons are considered with special needs if they have physical, mental, sensory, behavioural, cognitive or emotional impairment or limiting conditions that require medical management, health care interventions, and/or use of specialized services or programs)
- Households with members more than 60 years old
- Households that live in poor physical and health conditions (lack of services, hazardous shelter, poor quality and quantity of household materials)

Normally, geographical targeting is done by NHQ, with the hazard risk maps (pre-disaster) in mind. Other agencies follow the same approach and also ask communities or local officials to decide upon the vulnerable groups. In addition, some agencies look at a breakdown of wealth in a community or its poverty levels. Not one definition of the most 'vulnerable people' could be given because this is very much depending on the pre- and post-disaster situation and the context of the barangays and LGUs. There is an opportunity for the NLRC to explore whether including the population distribution (gender, age, disability) would give a different outcome when training the Priority Index Model.

Most agencies stated that they work with a 'blank approach' in the first week(s) after the typhoon made landfall, meaning that everyone is affected and that everyone should receive assistance. When the results of the interagency and their own assessments come in, they will use these results to prioritize areas for their longer term projects. The respondents mentioned that a 'blank approach', in addition to reaching out to the 'most vulnerable', is very important because 'everyone is affected'.

## 2. Damage to the houses

A second essential indicator identified by the decision-makers is the damage to the houses. Decision-makers would like to be informed on the absolute numbers and percentages of the houses that are damaged, both partially and fully. Depending on the damage to the houses (partial or full), decision-makers have to decide upon the number of houses that they will repair (repair-kit; owners do the work) and the number of houses that they will rebuild (temporarily shelter and agencies will rebuild houses). If estimates can be done about these numbers, decision-makers may include this information in their pre-liminary appeals. Based on those numbers decision-makers can also make sense of the total scale of the disaster; the decision-maker has an idea of the number of people who have damaged houses and possibly no shelter at all. The number of people without sufficient shelter is certainly relevant for the Red Cross Movement and Shelter Cluster, but also for many other agencies such as IOM, Save the Children and Oxfam. The organisations that are also contributing to the Water Sanitation and Hygiene (WASH) cluster argued that the impact to WASH indicators, such as latrines and running water, could be derived from the indicator 'damage to the houses'. When houses are fully damaged, we can assume that the WASH conditions need to be a priority as well.

### 3. Type of walls of houses

To understand the numbers of damaged houses, it is important to know more about the types of houses that are damaged. Two indicators could be used: types of walls and the types of roofs. Decision-makers found the typology of the houses relevant to include in the Priority Index Model. Both the types of walls and types of roofs are very important for long term planning afterwards and determining the risks beforehand. Decision-makers added that if they have to choose one, they argued that the wall types are more important than the roof types. If a wall is damaged, we will also find the roof impacted. In the case that a roof is damaged or blown away, it does not necessarily mean that the wall has been damaged. It is important to train the model and determine the importance of these indicators for the Priority index Model. The Census of 2010 (published by the Philippines Government) has included percentages of the types of walls and roofs for each municipality.

### 4. Access

The indicator 'Access' includes access to airports and ports, centrality of the municipality, access to communication, access to health facilities, access to (working) markets and access via roads or available infrastructure. Within these terms respondents included both temporarily access as an important point, but also a permanent lack of access to areas or services. 87 times the relevant codes for access have been connected to quotations in the interviews, with some co-occurrence of the codes. The 6 sub-codes are coherent to the main code 'Access'. When the road is completely inaccessible, teams will explore the possibilities to make use of helicopters to reach the affected areas and to decide upon the helicopters, one must know whether airports or other landings sites are accessible.

Beforehand, with knowledge gained during my studies, I assumed that information about the access to communication and to infrastructure would be important for decision-makers. Respondents identified these two indicators as crucial information needs. Before responding, decision-makers at a national level need verification of numbers from the area, hereby access to communication is crucial. To provide assistance to the affected people and to receive their requests for assistance in the cases that there is no access to communication, decision-makers need a working infrastructure.

Twice the importance of centrality has been addressed in the interviews. Those respondents mentioned that Cebu City was quite important due its international airport and port. Combined with the fact that Cebu City was not affected as much as other places, its centrality has been used and the city served as a logistics hub. One of the actors recommended us to incorporate a score for centrality in this model; based on the place of the city in the country, airports and ports, two segment roads, and to give places a heavier weighting based on the level of connectivity/access (Respondent 7, UNHCR, personal communication, 2016). Another idea is looking at the number and kind of roads and infrastructure that is leading to barangays, municipalities and central points. An opportunity that has been mentioned is to incorporate data collected by volunteers, for example on OpenStreetMap (OSM) or via the Philippine Red Cross 144 Volunteers.

### 5. Baseline data: such as Admin boundaries and Census

Decision-makers confirmed our previous choice to include baseline data such as admin boundaries and the census in the model. All respondents mentioned that it is quite important to use the most up-to-date version of the administrative boundaries and the census. The former demarcates the boundaries of municipalities and barangays, while the latter informs decision-makers about the population count and how the population is divided. In the Summer of 2016 the Philippines Government published the census of 2015, respondents informed the researcher about this update so that the NLRC is able to include this in the next version. The current census of 2015 is not its final version, the final version is expected at the end of 2017. Remarkable is that most respondents



emphasized the importance of having information about the population distribution, preferably aggregated to a municipality or barangay level. The final version of the census 2015 is expected to include the population distribution per gender, age groups and disabilities. Furthermore information such as employment, wall type, roof type, whether houses are owned or rented, sources of water supply, toilet facilities, number of playgrounds, number of high schools, number of households per barangay and number of health facilities and hospitals will be added. The decision-makers who are interviewed in this research also found these indicators very relevant as an baseline for their decisions. UN OCHA Philippines will calculate the estimated numbers for those indicators for census 2015 based on census 2010, so that humanitarian agencies are able to work with the estimated numbers while awaiting the official final version of census 2015.

#### 6. Displacement

Decision-makers identified that they would like to know as fast as possible how many people are displaced. In the case of typhoon Haiyan, a total of 4 million people were displaced. In the initial phase, there is displacement of people and as stated: *'this displacement deeply affects the assessments that are done'* (Respondent 26, Samaritan's Purse, personal communication, 2016). In short, respondents mentioned that people expect assistance at the place where they currently are based, and when they come 'home' and they figure that assistance has been given to others in their streets or neighbourhoods, they also expect assistance there. Many people are moving around to receive more assistance in the wake of a disaster. One respondent also specified that the first response and relief should be provided to people that are most 'vulnerable' after the typhoon hit and identified those groups as the 'affected people' and the 'displaced people' (Respondent 32, DReAMB, personal communication, 2016). He argued that the total number of displaced people includes people seeking shelter or living in evacuation centres and buildings that are functioning as evacuation centres, and people that are temporarily living with friends or family members.

#### 7. Evacuation Centres

The number of people seeking shelter in evacuation centres correlates with the numbers of people displaced. Decision-makers indicated that they would like to have an overview where the evacuation centres are based, how many people are (pre-)evacuated and how many people are still looking for shelter. Municipalities that have one or multiple evacuation centres, or schools and health centres that can be used as an evacuation centre, have higher chances at a lower number of casualties. The PRC HQ added that they have information regarding the evacuation centres, schools and health centres and that it would be valuable to include this kind of information in the model.

#### 8. Geographical information

With this indicator, decision-makers indicated that they would like to have more information about the areas that could be affected by the typhoon. They mentioned that they need to know whether a municipality is based in a rural or urban area and whether it is in a mountainous area or near the coastline.

#### 9. Hazard specifics

To determine the scale of the disaster it is quite important to be informed about the hazard specifics. In our model, applied to typhoons, we include the following indicators: distance from the typhoon path, the average wind speed, surge height, distance from the coast and the rainfall. Respondents mentioned the same indicators and agreed upon the methodology of including these indicators in the model. The Mayor of a LGU in Leyte province argued that rainfall is a depending factor for flooding's and landslides, which causes a lot of post-typhoon damage (Respondent 18, personal communication, 2016).

## 10. Hazard risks

The hazard risk maps identify the vulnerable areas where the chances are higher that hazards (with side-effects) occur. The Bureau of MJB (GovPH) provided a listing of disaster, typhoon, landslide and flooding prone areas. During her time in the Philippines, the researcher received the full detailed hazard risk maps, that are created by the Bureau of MJB, from UN OCHA. The 510.Global team will identify whether it is possible to include the pre-identified risks in the Priority Index Model.

### *Additional information needs*

Additionally to the information needs that could be reviewed for inclusion in the Priority Index Model, the respondents shared some information needs that should be discussed within the humanitarian community. The Who-does-What-Where-and-When (3W/4W) is created by the humanitarian clusters and is, when 'lucky' published within a week (Respondent 2, AmCross, personal communication, 2016). Ten respondents identified the 3W/4W as very relevant information within the first few weeks and mentioned that all agencies need to share their 3W/4W information with the Clusters. In a few interviews it was mentioned that the presence of the humanitarian agencies is taken into account when planning the development projects. The added value of the model is to prioritise municipalities for emergency response and further assessments. If this would be combined with a 3W/4W map, it will become clear which areas should be given priority based on the predictions and which areas are already covered by agencies.

Other information needs that were mentioned during the interviews: beneficiaries, capabilities of agencies, costs to agricultural damage, distribution of goods, food security, lessons learned from previous typhoons/disasters, the political situation in a country, and waste disposal, health data (e.g. diseases), livelihoods, casualties, damage to livelihoods and employment (Appendix E). Decision-makers from two humanitarian agencies emphasized the importance of having access to markets. Before deciding upon their developmental programs, it is crucial for them to do a market analysis and identify within which municipalities the markets are still up and running. Based on their findings, they can provide assistance such as cash for recovery to people or giving credits to the local business. As argued, this kind of information is very relevant and needed for long-term development planning, but less relevant for emergency response. Some of these information needs are post-typhoon, while others are private and will not be published by the Philippines Government. Information such as the names of beneficiaries are not published by the government. It is not possible to collect and publish data-sets about these sorts of information needs and include that in the model. Decision-makers make sense of the situation by overlaying this kind of information on the presented Priority Index Model.

## 6.3 Sources

The previous section identified the information that decision-makers need in order to prioritise assistance. In this section we identify the various sources of information and determine the sources that could be used in the Priority Index Model. In total 51 different sources have been identified by the respondents (Appendix E: List of codes). Similar to the different groups of decision-makers, we can also divide the sources in groups (Figure 16 Four categories of sources. Figure 16). This figure also shows the local sources as light blue, and regional or national sources as darker blue. Important to note that decision-makers did trust most upon their 'own' internal assessments and upon information that they could validate.

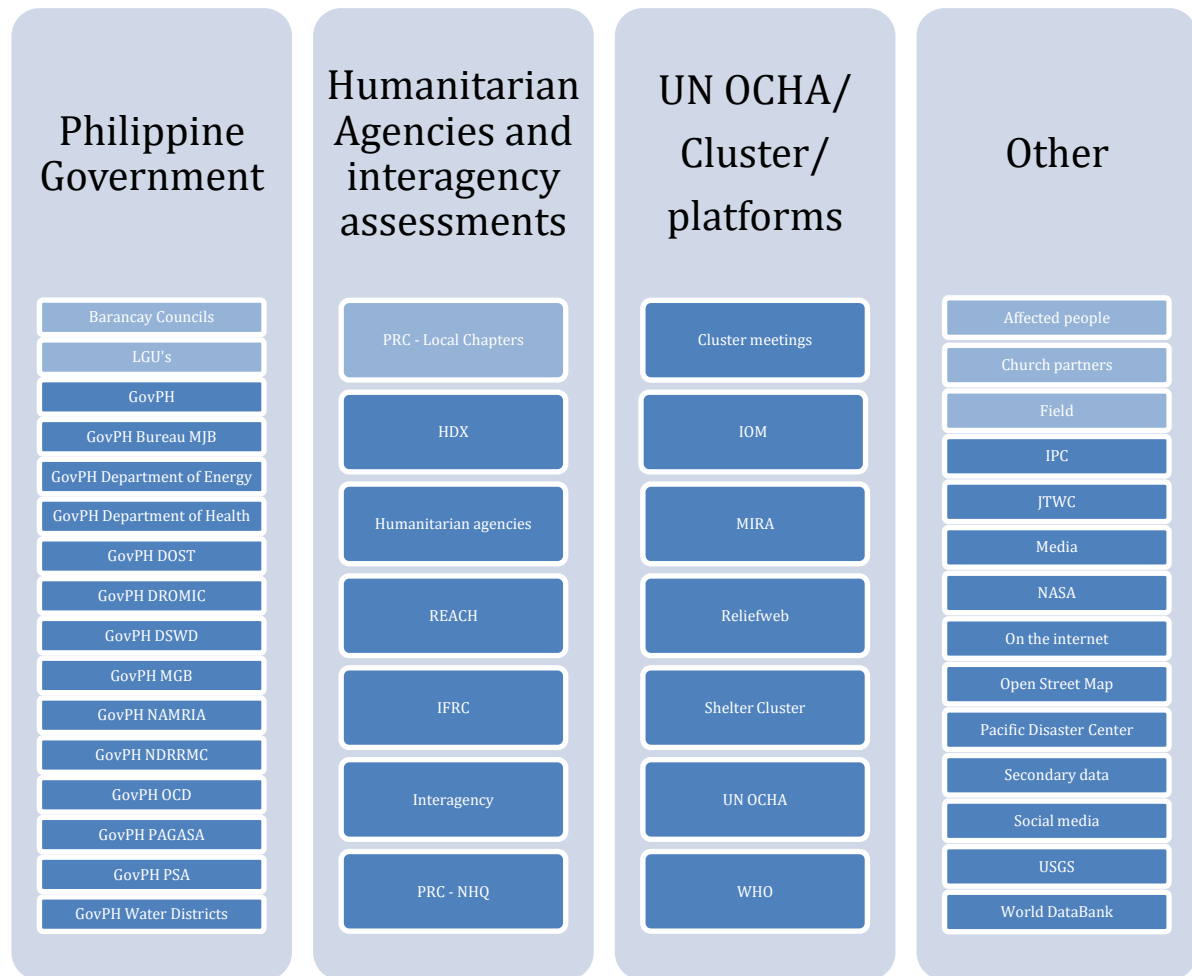


Figure 16 Four categories of sources.

### 6.3.1 Philippines Government

Within the Philippines Government many different departments have been referred to as sources for information. Comparable to the categories of decision-makers, not all respondents could name the exact government department that they used as a source; therefore one code has been formed for the Government. The Philippines Government overall is mentioned as one of the main sources, and thus 53 quotations are linked to this code. Second, the LGU's are a very relevant source for information. Respondents argued that the LGU's are close to the affected people, receive information from the barangay councils and have an insight in the local needs and whether areas are affected because they are living there. Although the LGU's report to their superiors at regional and national levels, many respondents explained that they find that information is more accurate, up-to-date and on time when they were speaking with the LGU officials themselves (via phone or face-to-face). The humanitarian agencies all mentioned that when possible, they would validate the information that they receive from the National Government with the LGU officials, especially the Mayor, and/or with barangay councils. They are aware of the local context and are in contact with schools, health centres and evacuation centres. For these reasons they can present *'very good reports as well'*, however a concern raised by decision-makers is that often information is outdated (Respondent 28, Oxfam Novib, personal communication, 2016). The timeliness of information will be discussed in section 7.1.3, information can already be outdated within 12 to 24 hours according to respondents. At a national level decision-makers identified that the NDRRMC, the DSWD, the OCD and the PSA are relevant sources. Furthermore, agencies identified that it is important to address the Government departments that are responsible, e.g. if you need information about schools you have

to address the Department of Education. From the previous mentioned government agencies the NDRRMC, which is led by the OCD, has a special role. As highlighted in section 1.5.1 the NDRRMC is a council that consists of members from all Government Departments and sub-departments that are involved in DRR. Jointly with the DReAMB, they lead the national government response.

The Government is the official distributor of a few important documents such as the census (2010 and 2015); numbers of affected, damage to the houses and casualties; Lista Hannan (includes poverty and 4P beneficiaries); Post Disaster Needs Assessment (PDNA) and Rapid Damage Assessment and Needs Analysis (RDANA).

### 6.3.2 UN OCHA

UN OCHA is appointed as an important source for information by decision-makers from both humanitarian and government agencies. OCHA co-coordinates the activation of the humanitarian clusters and collects the available information and presents this in humanitarian dashboards and situational reports (SitReps). As one respondent argues: *'OCHA is established to prevent overlaps and gaps'* (Respondent 20, IOM, personal communication, 2016). A majority of the decision-makers indicates that they use information that is published by UN OCHA and they find this information trust-worthy. All agencies report their assistance and projects in the cluster meetings, subsequently the humanitarian clusters report the collected information to UN OCHA and UN OCHA builds a centralized overview of the work of humanitarian agencies, the needs for assistance and the provided official numbers. UN OCHA presents these overviews in the various documents that they publish (SitReps, Humanitarian Overview, 3W/4W). In addition, OCHA also brings together the different Information from Management teams. While collaborating, in for example the IM-TWG and IM-WG meetings, they are collecting data and information, try to analyse this and look for ways to present this information to decision-makers.

The Philippines Government and OCHA are leading the activation of the clusters, this is also the main reason why many decision-makers believe that *'OCHA is mainly connected with the government and the government is partnered with the UN, so the Government is directly feeding them first-hand information, and then the clusters are giving information to the cluster organisations, like us'* (Respondent 26, Samaritan's Purse, personal communication, 2016). A respondent from an international agency recalls that it was very difficult to get data during the initial phase of typhoon Haiyan, *'the local governments, the municipalities lost their data, so we had to wait for OCHA. So we had to rely on what OCHA could provide'* (Respondent 29, Save the Children, personal communication, 2016). One challenge for OCHA that has been highlighted by many respondents is that they do provide very good information, but sometimes they are also relying on 'outdated government sources' (Respondent 28, Oxfam Novib, personal communication, 2016). When publishing the Priority Index Model, various respondents argued that the NLRC should consider UN OCHA as a partner who has a very large reach in the humanitarian community. The only remark that respondents gave is that OCHA has to stay long enough in the country to become fully aware of the country and situation specifics. Since 2010 UN OCHA is represented in the Philippines with a Country office.

### 6.3.3 Clusters

One respondent stated that *'a cluster is as strong as the agencies are contributing to it'* (Respondent 12, IFRC Shelter Cluster, personal communication, 2016). The clusters are activated to coordinate the response and to contribute to the information sharing; the latter which is done online via OCHA's website, Reliefweb.org, Skype and email-groups and offline in cluster meetings. If areas are inaccessible and no information can be retrieved from the field, organisations will retrieve information by asking partners and fellow cluster organisations. In the five months following typhoon Haiyan, over 200 needs assessments were conducted by the humanitarian community and many of

those assessments were classified within one of the humanitarian clusters (Benini & Chataigner, 2014). Some of these assessments are published on websites, such as Global Assessment Registry (HumanitarianResponse, 2016), Reliefweb and Humanitarian Response. The conducted assessments differ widely in clusters, agencies that are involved and scale. The Multi-Cluster/Sector Initial Rapid Assessment (MIRA) and REACH Rapid Assessment are both referred to within the interviews.

The InterAgency Standing Committee publishes the MIRA report, which is seen as one of the key assessment reports to inform agencies about the scope of a disaster, the humanitarian needs, the offered assistance and the humanitarian gaps. The MIRA is the first step in the humanitarian's Country Team's response to an emergency and consists of three important components. On the basis of the Secondary Data Analysis (SDA) and primary data that are available, they produce a Preliminary Scenario Definition (PSD) within the first 72 hours following a disaster. The second output is the MIRA Report, which is based on municipality assessments component that is conducted in the first 2 weeks. The MIRA Framework, which guides *'the collation and analysis of secondary and community level assessment data and information'*, is the third crucial component of the MIRA. After the publication of the MIRA Report, the in-depth assessments will be done by the OCHA clusters (Inter\_Agency\_Standing\_Committee, 2012). The MIRA assessment for typhoon Haiyan, Philippines, has been conducted by more than 40 agencies and covered 92 municipalities and 283 barangays (MIRA, 2013). The complete MIRA report was published 2,5 to 3 weeks after Haiyan made landfall on the website Reliefweb, this timeframe makes the MIRA less relevant for the initial emergency response.

The REACH Rapid Assessment has been conducted for two clusters: Shelter and Water, Sanitation and Hygiene (WASH). Two months after typhoon Haiyan made landfall, 15 January 2014, REACH published its needs assessment report. For the assessment REACH selected 320 barangays, within 16 different municipalities, and a maximum target of 7133 households were surveyed. REACH used two categories of vulnerable households: 1) single headed households, and in particular women-headed households; and 2) households with including member(s) with specific needs: pregnant and/or lactating women; persons living with a physical disability; seriously ill, or members with special needs; persons living with a chronic illness; and separated children (REACH, 2014a). Their findings are regarding the livelihoods, income sources and partially or fully damaged houses. Upon these detailed findings, various organisations base their decisions. March 2014 and September 2014 REACH published monitoring reports (REACH, 2014a, 2014b, 2014c).

A few respondents used the REACH assessment, however most respondents used the MIRA or internal assessments as soon as these documents were published. As argued, the MIRA report was published too late for initial response, but its outcomes are considered for longer term response planning. Decision-makers trust and use the information presented by the MIRA, since the UN Clusters/Sectors work via a *'mutually agreed template for rapid assessments'* (Respondent 19, Relief International, personal communication, 2016). One respondent mentioned that information published on any humanitarian website would make sense, but only if you have internet and this is not always the case in a post-disaster situation. Otherwise you have to go to the field, the social department of the regional government or the LGU to request the information.

#### 6.3.4 Humanitarian agencies

Similar to the government officials, respondents working in humanitarian agencies argued that they would trust their internal assessments most. They explained that they know the methodology, they are aware of errors and local chapters have validated the information. All respondents said that they would request additional information from the other agencies, but that they have to triangulate it. Decision-makers put more trust in the agencies that are working within the same field; for example

they follow Shelter Cluster organisations. Respondents also agreed that when you, as a decision-maker, know the decision-makers of other agencies you are more willing to share information and it will be easier to retrieve information and trust upon the given information.

The lack of trust within the humanitarian community is a challenge for all agencies working in it. Humanitarian agencies do not have the means to have a presence everywhere; in the response to a typhoon they must trust on other agencies for their information needs. Essential is one methodology of collecting information, analysing it and publishing it. By investing in the establishment of Common Operational Datasets and Fundamental Operational Datasets (COD's and FOD's; COFOD's) the Philippines humanitarian community is cooperating with the Philippines government to establish a Common Operational Picture. Implementation of the COD's and FOD's means that agencies work with the same baseline information. At this moment the agencies participating in the IM-TWG meeting have documented a so-called wish list for datasets that should be collected and added to the COFOD's. When participating in the IM-WG meeting agencies argued that so far none of the datasets that is on the wish list has been collected and shared, except for the census of 2015.

#### 6.3.5 *Media*

The media do not hold a decision-making role during the emergency response, rather they do have an influential role. Both the news and diverse social media pages are followed closely in order to hear more information about the affected areas, certainly when the area is not easily accessible via communication lines or infrastructure. Although the media is not deciding upon the assistance given to areas, their choices about the content that is published is influencing the assistance that is given to the various areas. An example that has been discussed widely and was also mentioned by a few respondents is the media attention that has been given to Tacloban in Leyte province. The conducted research does not further specify the role of media.



## 7. (Collective) Sense-making

### 7.1 Priority Index Model

#### 7.1.1 Corresponding with reality

The first version of the model predicted the number of damage to houses, but still has quite some municipalities with an over- or underestimation (both for Haiyan and Haima). The first run is also shown to respondents in the Philippines. The second run or version of the model has made an improvement and has a more accurate prediction for typhoon Haima (<https://rodekruis.github.io/priority-index-haima-accuracy/>). This new version predicts a weighted sum of the partial and total damage ( $\text{total} + (0,25) \cdot \text{partial}$ ) and gives more weight to the totally damaged houses. Second, priority areas are those where a high percentage of houses is damaged, instead of a high absolute number of damaged houses. In this way, priority is not given to municipalities because of their population size.

#### 7.1.2 Recommended indicators that should be added

Decision-makers agreed that the indicators that are included in the current version of the Priority Index Model are important. The current model is trained to predict the number of damage to the houses. Some decision-makers made an recommendation to include an additional indicator. In the interviews, the researcher explained that the NLRC team made an effort to additionally train the model to predict the number of affected people. So far, this effort has not turned out the way we were hoping for. The data analysts identified that in many municipalities the percentages of affected population are 0%, 50% or 100%. This indicates that in the messy, post-disaster situation many municipalities did report an estimation of the affected population in their municipality. As discussed in paragraph 6.2, it is still unclear who to include and exclude in the 'affected population'. A suggestion is to train the model with the number of casualties, since this data-set is validated before it is published. Casualties are only noted when they have the name of the person that is injured, missing or dead and when this has been confirmed by the barangay and LGU officials. A data-analyst of the NLRC argued that for Haiyan these numbers were large, but only a few casualties have been assigned to the other typhoons.

When running and improving the model (version for Typhoon Haima, October 2016) the 510.Global team made the discovery that the 'importance of poverty data seems to be overestimated in other Priority/Severity models' (NetherlandsRedCross, 2016b). The model showed 10% importance of poverty for all 4 typhoons. After adding wall and roof type data to the model, the importance of the poverty indicator has been reduced. This indicates that the indicators 'poverty' and 'building materials' are related.

Other recommended indicators:

- Number of water tanks and filtration units or water routes per municipality; no data set available yet
- Number of health centres and hospitals per municipality; information available at the Department of Health
- Number of evacuation centres per municipality; information available at the NDRRMC
- Number of schools per municipality; information available at Department of Education
- Hazard risks; hazard risk maps of Bureau MJB
- Type of employment; sub-set of census 2010
- WASH data (for example diseases and epidemics); no data set available yet
- Rural/urban; indicator of census 2010, 2015
- Access – centrality, (air-)ports, infrastructure; no dataset available yet

When discussing the incorporation of these indicators within the 510.Global team, we found that these indicators would be very helpful for a severity index, but not for a model that predicts the damage to the houses. So far there is no data that can be used to train a model to predict the severity, as severity is a very complex indicator.

### 7.1.3 Timely

This research defines how 'timely' the Priority Index Model need to be in order to be useful for decision-makers. According to the preparedness frameworks, when a typhoon of the scale of Haiyan hit, the clusters will be activated in 24 to 48 hours. If the Priority Index Model is published within 12 to 24 hours, the predicted damage to the houses is visualised. The government and humanitarian agencies can use this information to decide if the clusters need to be activated. It is recommended that the model is published for typhoons that make landfall in the Philippines and have a possible impact. Most agencies that have presence in the affected areas decided upon time frames for their organisation to be informed and to make decisions upon their response: the first results of rapid assessments will be published within 24 hours and the initial assessment will be published between 48 and 72 hours. Most agencies referred to their mandates and the standards of the Sphere Project that define that they have to respond within 72 hours (TheSphereProject, 2011). It takes around 1 week before *'they have a clear picture of the situation'* (Respondent 17, personal communication, 2016); the MIRA is published after 2,5 weeks, by this time most information is publicly available. Respondents specified that information published in the MIRA report, and its revisions, is 'good enough' to use while writing appeals for long term programs. When asking for a timeframe when they have the 'full picture', respondents replied that even now after 2 to 3 years they still do not know everything.

Respondents confirmed that they were facing an information gap during the initial phase (chapter 1). During the first 24-48 hours in the aftermath of typhoon Haiyan, the networks were gone and it was very difficult to receive any information. According to one respondent, the first 24-48 hours were a complete speculation and decision-makers in Manila had to guess where to send their first resources to (Respondent 13, personal communication, 2016). The NDRRMC released some information in the 1<sup>st</sup> week; this was based on the census and *'so these were purely estimations and assumptions'*. According to this respondent, in week 3 they published *'close to reality figures, maybe not close to accurate. But at least something that we can work with'* (Respondent 31, personal communication, 2016). Many respondents said that a lot of the information was published late or even too late; if information is 24 hours old it is already out of date (Respondent 2, personal communication, 2016).

Decision-makers recommend the NLRC to publish the Priority Index Model as soon as possible. As identified before, *'the first few days everything is one big mess'* (Respondent 5, personal communication, 2016). From day 10-14 onwards, decision-makers are working with validated information and their internal assessment; the priority areas calculated by this model are outdated. Therefore it would make sense to publish this model, based on secondary data, within 12 to 24 hours. Within 24 hours the first information is published, but *'within 24 hours the information is still very vague'* (Respondent 8, personal communication, 2016). Decision-makers defined that it would be timely when they have the map with priority areas in their hands within 24 hours. If the Priority Index Model aims at providing an estimation of priority that should be given to areas; agencies recommend the NLRC to provide this information at least within 48 hours, but preferably within 24 hours.

### 7.1.4 Reliable

One of the key findings is that respondents explained that validation of the presented information is essential to them. Decision-makers stated that they do this via their own eyes, colleagues or friends who are working on the ground (ground-truth) or by calling the LGU's and Local Chapters of their



organisation. Noteworthy that although the various agencies strive for sharing their knowledge and cooperating to reach the affected people that need assistance the most, they do not 'trust' upon information or numbers that are provided by others, and they trust information provided by their 'own' organisation or by people they know very well more than information from unknown actors. There are some gradations in the level of trust and this differs per organisation and per person. When there is no possibility to validate the information as described earlier, they would use the information with a 'grain of salt'. The post-disaster environment is an environment that is constantly changing, caused by among others the displacement and constant movement of people. This challenging environment is difficult for decision-makers and they find it hard to trust each other. Respondents confirmed that it is difficult to decide which data-sources and which data-sets are accurate. Most decision-makers argue that you have to use the numbers that are published by the government; these are the official numbers. One respondent from an UN agency added that it is also important that the government trusts work of the humanitarian (including the UN) agencies. The agency mentioned that they try to clarify the received data, any inaccuracies are communicated back to the agency with the request for validation. From the various government departments, data provided by LGU's is found to be the most reliable. It is not a 100% accuracy, but it is the most accurate information. Information that is gathered by the barangay councils is not officially published.

*'Because if you go to a barangay, like no matter how good your internal assessment team is, there will always be changes, because of the displacement of people. Records can show that one person is living here, but in practice he can be death, moved in with family or others, or still missing' (Respondent 26, personal communication, 2016).*

Initial information is published within 48 to 72 hours, in this timeframe the LGU council only received information from barangays which are close to the municipality centre or which are still connected. The Priority Index Model aims to overcome this information gap. The model is trained and validated with ground-truth data, within these datasets it is still relevant to include all municipalities and barangays. Three years after Haiyan, there are still municipalities or barangays that have not reported their data to the regional OCD offices. An example given by respondents is LGU Basay which is located within the typhoon path and has been reported as devastated by respondents.

#### 7.1.5 Accurate

While conducting this research, many questions were asked about the accuracy of the information. Challenges which were identified by decision-makers are: 1) *'when the numbers of families affected in an LGU is large, they will receive a higher number in prioritisation and so they will receive assistance faster'*, 2) different measurements for counting the numbers (Respondent 30, personal communication, 2016). The first challenge leads to a higher or round up number of the affected population within the official government numbers. The fact that the percentages of the affected population are 0%, 50% or 100% show that the government numbers are round up. The second challenge leads to a misrepresentation of data. The data that is used by the Priority Index Model is normalized, in order to avoid the first challenge. As mentioned before the model can only be as good as the data is that the model is trained with. Therefore it is very important to be aware of the accuracy of the data that is being used and the sources that provide it.

#### 7.2 Useful

According to the literature, one of the challenges during the response to typhoon Haiyan was a distribution of assistance that serves the people that need it most. This was also identified as one of the key challenges by the respondents of this research. The assistance of international humanitarian agencies was focused at the same areas for a few reasons:

- a) Areas that were affected badly were not able to communicate their needs and their numbers of affected people and damaged houses to the LGU's and NDRRMC officers;
- b) Influence of the media;
- c) Donors decide where agencies will work;
- d) Within the humanitarian agencies there is no flexibility regarding projects. If an appeal has been written for one project in a certain area it has to be implemented in that area, while in the meantime the agency might have identified a larger need in another area.

One respondent argued that the *'Priority Index would be useful to provide 'evidence' where assistance is needed and to provide information about other areas that might need help'* (Respondent 12, personal communication, 2016). The NLRC intends to calculate and publish the Priority Index Model within 12 to 24 hours, this timeframe is seen as a positive standard. As discussed in section 7.1.3, decision-makers identified that there is 'one big mess' in the first 24 to 48 hours. The Priority Index Model provides an estimation of the houses that are damaged by the typhoon and could help agencies to prioritise LGU's to conduct initial assessments and to provide initial assistance. Decision-makers argued that the index would especially be helpful if they don't receive reports from the local chapters, because *'the contact persons of the chapters are affected themselves or the connection of the chapter might be lost'* (Respondent 22, personal communication, 2016). Chapter 6 identified that for prioritising LGU's headquarters of humanitarian agencies and the national department of the Government are the main decision-makers. Local chapters are depending on the NHQ's, for example for the deployment of people to the areas, so respondents recommend that the NLRC should send the model directly to NHQ's. The NHQ's can use the model to make more specific recommendations and to maximise the resources of their organisation after prioritisation of the affected areas (Respondent 14, personal communication, 2016). Moreover, respondents at a regional level also recognized the value of the Priority Index Model for them; they argued that this model also should be distributed to regional offices.

The Priority Index Model is focused on Shelter and has been trained to predict the number of houses that were damaged by typhoon Haiyan (see section **Fout! Verwijzingsbron niet gevonden.**), and is thus very interesting for the Shelter Cluster and the Government. Respondents from UNICEF, Oxfam and Save the Children, who are focusing on WASH identified this model as useful to make sense of the situation and to prioritise their assistance. They made sense of the model in the following way: *'One of the key things if you look at WASH are the latrines. If the houses are damaged, immediately we know that in another Haiyan this is the impact. And that is what we need to know.'* (Respondent 28, personal communication, 2016). If houses are partially or fully damaged, the chances are high that the latrines are also damaged. The respondents would use the model to identify which areas should be prioritised, and do their own assessments in those areas for the specific WASH needs. Besides the number of damaged houses, this model can say something about the number of people affected because their house is damaged or destroyed. The average size of families in the Philippines is known per municipality or region. This would redefine the term affected to a damaged or destroyed house, instead of using the current wide definition.

Doubts were raised about the reliability of the numbers of the damaged houses and the affected population that are published by the government. Unclear are the methods and dates of collection. When asking these questions to the LGU's and OCD offices, different answers were given. Normally the barangay officials, or captains, present the data to the LGU's and the LGU's present the collected data to their superiors at a regional and national level. Respondents told that if this is not possible, the LGU's have two options: estimate the numbers or exclude the barangay. Although data is collected at a barangay level (Admin 4), data is only published at a municipality level (Admin 3). As

discussed earlier, not all humanitarian agencies are convinced that the numbers, especially of the affected people, presented by the government are accurate. On the contrary, all agencies said that they must use the numbers that are presented by the government for several reasons: a) these numbers are the closest to reality, b) never able to reach 100% accuracy, c) collaboration will be better if you use the same data and talk about the same issues and d) the government still has to trust them and their projects. This is leading to the fact that all humanitarian agencies are using data with a 'grain of salt'.

Nineteen respondents said that they would find it 'very useful' if they would receive the map of the Priority Index Model. None of the respondents stated that they would or could not use the Priority Index Model at all. Respondents were eager to find out more about the model and to test it during a new typhoon. One respondent stated that *'normally agencies are gathering field information and presenting a map afterwards, it would be very useful to turn this around. First use the data which are available, turn these into a map for user-friendliness and do in depth assessments afterwards'* (Respondent 20, personal communication, 2016). Most respondents argued that it would be very helpful if the Red Cross Movement is creating a Priority Index Model and if its willing to share the information. Numerous agencies mentioned that the Red Cross is seen as a trustful actor, and that they would be grateful if any information is presented to them quicker than the information from the assessments. UN OCHA has been mentioned as a second actor that could share the outcome of this model, because of their coordinating role in the emergency response. OCHA is part of all the different clusters and could cover more humanitarian agencies and government departments in its reach. It is important that the NLRC is transparent about the information that is included, the sources that are used and the learning algorithm. Additionally one respondent explained that the NLRC can aim the model to be used in a certain way; yet there is an possibility that agencies do not use the model according to the expectations of the NLRC.

Regarding the visualisation of the model, decision-makers mentioned that it is quite important to have a separate category for municipalities that are lacking information. The path of the typhoon could be added to the map, so that decision-makers can make their own decisions based on their sense-making of the model and its map.

### 7.3 Challenges

Quite a number of challenges have been identified by the decision-makers that were interviewed. As discussed before the timing, the reliability and the accuracy are important to keep in mind. A lot of data is generated and could potentially be used in an model such as the Priority Index Model. Unfortunately, the majority of these data-sets are either not available or not reliable. Datasets are often kept within the organisation, although the humanitarian community has agreed to share more data with other actors so that this joint effort can help the affected. In the evaluation of the response to typhoon Haiyan the IM managers and decision-makers identified what kind of information they were missing, and they developed a wish list for information and data-sets. Almost three years after Haiyan, in August 2016, a lot of thought was given to these needs; in reality not many data-sets of this wish list have been generated and published. When in the Philippines, the researcher requested a couple of data-sets, often the answer was 'no, we do not have it right now'. Some respondents said that a specific government department might have that information, but that it is not willing to share it now. As we have seen with typhoon Haiyan, data preparedness is important and the focus should be placed on collecting information prior to a possible disaster.

OCHA has designed a website where data can be shared safely: HDX. In 2015 the Philippines Government also opened an website to promote open data, where they will be sharing some of their datasets. HDX seems as a better alternative; it has an option to work in a 'closed' group, where

confidential data-sets can be published (e.g. Admin level 3 and 4). The COFOD's should be published on these websites. As the decision-maker from the NDRRMC told me: *'everyone is part of the COD's and FOD's project'* (Respondent 6, personal communication, 2016). All agencies should contribute to make this a success.

One challenge of the Priority Index Model is that it is being improved all the time. When the 510.Global team receives more information or data-sets the model can be improved. The model has been improved in order to respond to typhoon Haima, October 2016, and it has been distributed, printed and used by the various agencies. After training the model and adding more up-to-date datasets, the model was able to give a better prediction which is positive news. The challenge for the 510.Global team is how to update these predictions and how to keep everyone informed about the changes in methodology and outcome. The 510.Global team published the model for Haima upon their and its methodology upon their website. This research recommends to do so in the future. It would make sense if humanitarian agencies and the government receive a notification or email if there are any changes regarding the methodology and if there is a model published for a new typhoon. Transparency is seen as one of the key values for humanitarian work, it is important to strive for a transparency about the model. Besides, it would add value when humanitarian agencies and the government are invited to give their feedback about the usefulness of the model.

## 8. Conclusions

The Priority Index Model aims to identify the high priority areas for humanitarian assistance on the basis of (open) secondary data of the affected areas combined with disaster specific data. The model (version of October 2016) is trained to 4 past typhoons and predicts the damage to houses per municipality. The most important indicators are the position of the LGU to the typhoon path, the building material and the disaster specific data. Additionally the Census and Geography is included. One of the findings of this research is that the building materials, and especially the wall types, are an important indicator to include. The data-analysts of the 510.Global team found that when including the building material in the model, the importance of the indicator poverty decreased. The prioritisation of the second version of the Priority Index Model coincides more with the identified priority areas and official damage counts than the first version.

Similar priority or severity indices have been developed in the past few years. UN OCHA and JRC have developed a Severity Index for the Nepal Earthquake. This index has been calculated using components in a formula. Second, UN OCHA developed a Sudden Onset Disaster Severity Estimate Index. This index is aggregated to a regional scale, while the Priority Index Model is aggregated to a municipality scale. Third, the Prioritisation Matrix of the Protection Cluster focuses on vulnerable municipalities and includes ongoing conflict and development programs targeting conflict and peace. Chapter 5 argues that data-analysts of the 510.Global team figured out that when adding the building materials, the importance of the indicators changed. The indicator poverty that has been found as very important by the Protection Cluster, is still included in the Priority Index Model. However its importance has decreased and the 510.Global team found that the indicators for building materials (wall and roof type) are more relevant.

The decision-makers that make sense of the priority given to municipalities and make the final decision are predominantly working at a global or national level. Respondents working at national or regional offices of either the Philippines Government or one of the humanitarian agencies all argued that this model would be very useful for them. Respondents working at a local level, such as the LGU committees or Mayors, argued that it would be useful to see the priority that is given to their LGU and the LGU's that are close by. By presenting it to the LGU's they also become aware of the big picture instead of a focus on the local reality. Although this model will have more added value for humanitarian agencies and the government. The decision-makers at a local level argued that the decisions, such as the prioritisation of municipalities for assistance, are made at a National Head Quarter level. Respondents recommended the Netherlands Red Cross to send this model to NHQ's, various Government departments, UN OCHA and the clusters. The decision-makers who are important to reach out to are management layers of humanitarian agencies and the Government and the IM Managers. An 'easy way' to reach and stay in contact with them is via the IM-TWG and IM-WG meetings organised by UN OCHA and the Philippines Government. This model is interesting for sense-making and decision-making within strategic roles.

The following information needs are found most relevant by the interviewed decision-makers: 1) Affected population, 2) Damage to houses, 3) Type of walls of houses, 4) Access, 5) Baseline data: such as admin boundaries and census, 6) Displacement, 7) Evacuation centres, 8) Geographical information, 9) Hazard specifics and 10) Hazard risks. As identified in section 6.2 there is not one fixed definition for the term affected population and in the humanitarian community it remains unclear what the working definition is. All respondents argue that their organisation is striving to assist the affected people that need it the most and within the first few days most agencies work with a 'blanket approach'. For the Shelter Cluster this model is very relevant when trained to estimate the damage to the houses and the outcome so far is perceived as very positive by the decision-makers. Decision-makers agreed that it is essential to know as soon as possible, preferably

within 24 hours, the numbers of houses damaged and population affected. The WASH and Protection Cluster find the Priority Index Model also very interesting for sense-making of priority areas. The respondent working at Save the Children mentioned that adding a dataset that includes the toilets, latrines and other WASH conditions per municipality would be interesting. When asking her whether such a data-set is available, she mentioned that this was not the case yet. By looking at the estimates of damage to the houses and priority given to municipalities, she could make sense of the situation for the aim of her agency (Respondent 29, Save the Children, personal communication, 2016). Other recommendations are: number of water tanks and filtration units per municipality, water routes, number of health centres and hospitals per municipality, number of evacuation centres per municipality, number of schools per municipality, hazard risks, type of employment and access or centrality of each municipality. A few of those data-sets are available, however they are not widely shared. To incorporate those data-sets, we have to discuss this with all separate Government departments.

In chapter 7 we have identified that information comes in after 24 hours and that the initial assessments will be published between 48 and 72 hours. The decision-makers referred to their mandates and stressed that they have to respond within 72 hours. Although in 72 hours they will not have the 'full picture', often it takes around 1 to 3 weeks before most information is published. The MIRA, which is seen as a very trustful assessment, is published after 2,5 weeks. In week 3, the official figures and numbers of the NDRRMC are published. All agencies stress that they 'have' to use these numbers, since these are the official government numbers (published at a National level). Respondents argued that these numbers may not be absolutely accurate, but they are the closest to reality as we can find. In detail, respondents working at NHQ level in Manila stress that certainly the numbers received when reaching out to an LGU or Barangay are closest to reality. For various reasons they do use the numbers that are published by the Government, but with 'a grain of salt'.

Respondents are facing an information gap during the first 48 hours and were 'excited' to hear that the Netherlands Red Cross is working on this model. During the first 48 hours after typhoon Haiyan decision-makers in Manila had to base their decisions upon a guess where to send their resources to, there was almost no information shared with them. Respondents recommend the NLRC to share the Priority Index Model as soon as possible and preferably within 12 to 24 hours. The model has an added value for the decision-makers when it is published in this time-frame, after that decision-makers will use internal information for sense-making. Decision-makers argue that they trust information that is shared by colleagues or acquaintances from the field, whom they know very well, the most. Decision-makers stated that validated information is essential before trusting upon it. To do so, they can ground-truth by calling colleagues, friends, LGU's or local chapters whom are working in the field. If one of the well-known and trustful agencies, such as UN OCHA or the Red Cross Movement, are sharing well-reasoned information respondents tend to use this kind of information.

While conducting this research, many challenges were pinpointed by decision-makers. Chapter 7 identifies the challenges for the development of this model and sense-making of it in the emergency response phase. Decision-makers stressed that this model might become one of the methods that agencies will use, but it will not be the only method. As pointed out in this thesis decision-makers are willing to look at information provided by other actors, but look at it with a 'grain of salt'. A second challenge identified is that the NLRC cannot assume that every decision-maker will use it according to their expectations of use.

During the IM-TWG and IM-WG meetings agencies in the Philippines identified that they are longing for Common Operational and Fundamental Operational Datasets (COFODs). The humanitarian agencies and the Philippines Government co-created a so-called 'wish list' of datasets that they want



to have and share with the group. The agencies are willing to contribute to the establishment of these data-sets, however so far only a few data-sets have been updated and shared. For example, the initial version of the Census of 2015 has been shared in the summer of 2016, the full version is expected in 2017. The vast majority of the data-sets on the wish list can be prepared and shared beforehand. If the COFODs are accurate and up-to-date, they may also be used in the Priority Index Model. In this way the Priority Index Model can, in addition to the COFODs, contribute to a shared understanding of the post-typhoon situation. The literature identified that a degree of collective sense-making is an important factor in decision making between and within agencies (chapter 3.1). To achieve this shared understanding it is important that both decision-makers from humanitarian agencies as well as from Government departments make sense of the model. To do so, the NLRC can partner with UN OCHA to distribute the model. UN OCHA has many contacts in the Philippines and is perceived as a trusted agency. Respondents argued that it is important to ensure that the model is sent to NHQs and regional offices of all agencies, the model is most valuable for them.

The NLRC aims to make the prioritisation for humanitarian assistance faster and more cost-effective by publishing the Priority Index Model. By publishing this model within 12 to 24 hours it is perceived as useful by the decision-makers. The Priority Index Model presents an estimation of municipalities that should be given priority based on the damaged houses. This prediction may be used for prioritising humanitarian assistance in the initial emergency response phase and for further assessments. Decision-makers argued that they find the Priority Index Model in particular useful for the following questions:

- *'We can make decisions like: where should we go next?'* (Respondent 22, PRC, personal communication, 2016).
- *'It would help if we knew the following information: where is the most affected areas? How many households are affected? What are the basic needs?'* (Respondent 26, Samaritan's Purse, personal communication, 2016).

Respondents agreed that in the aftermath of a typhoon a model, like the Priority Index, would make sense and could definitely make the process of prioritising more efficient. The Priority Index Model, when provided within 12 to 24 hours, could contribute to a timely prioritisation of municipalities in the Philippines after a typhoon has made landfall. The Priority Index Model can contribute to the 'Common Operational Picture' of actors in the Philippines in a post-typhoon situation.

## 9. Discussion

In this research 32 interviews have been conducted with decision-makers of humanitarian agencies and the Philippines government. As showed in chapter 4, the research included 27 decision-makers who are working for humanitarian agencies and 5 whom are working at the Philippines Government. In addition, this research includes decision-makers from global/national, regional and local levels. It was challenging to include decision-makers that are working at various departments of the Philippines government for a couple of reasons. For further research, I would recommend to take a longer research period and to contact more key decision-makers in the government. Because of bureaucracy and changes within the administration, I could 'only' conduct interviews with 5 decision-makers of the Philippines Government. Also for this research I did not include civil society organisations or the private sector, it would be interesting to identify whether their information needs in the emergency response phase are similar. The reason for not including civil society organisations or the private sector is that the NLRC aims to inform humanitarian agencies and the Philippines Government on priority areas.

Chapter 4 also identified that conducting interviews in English or with my colleague as a translator was perceived fine by the respondents of this research. During all the interviews, the respondents reacted professionally regarding the researcher. Most respondents were curious why a young, white woman is working in the Philippines on behalf of the Philippine Red Cross, Netherlands Red Cross and her University. A professional and kind welcome of the Philippine Red Cross and Netherlands Red Cross Delegation also opened doors to decision-makers of other humanitarian agencies and the Government. The official invitation letters, signed by the Secretary-General of PRC, were necessary to plan meetings with those organisations.

There is an opportunity to build the Priority Index Model for typhoons in additional countries. We have identified that the model and its current indicators can predict priority areas for decision-makers in the Philippines. This model is perceived as an useful model for decision-makers from both humanitarian agencies and the government. Within the Philippines several indicators are found relevant, in other countries the importance of indicators might change. Also, it may turn out that this model is not perceived as useful by decision-makers in other countries.

Additionally, the Priority Index Model could be developed for other hazards, such as a flooding, an earthquake and a tsunami. The Philippines Government and humanitarian agencies responded very positive towards this new development to make emergency response more efficient. In 2014, the numerous agencies have started the conversation to collaborate in order to create the COFODs for the Philippines. Research can identify the information needs and possibilities in other contexts for the priority index model. Graduates, who also joined the 510.Global team, are exploring the opportunities of developing a model for a flooding in Malawi (Thomas Plaatsman and Jurg Wilbrink) and an earthquake in Nepal (Evelien Bulte). For further research it is interesting to explore the importance of indicators in a different context or hazard. It is essential to explore how agencies (humanitarian and governmental) make sense of the model in another context.



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## Appendix A: Figures

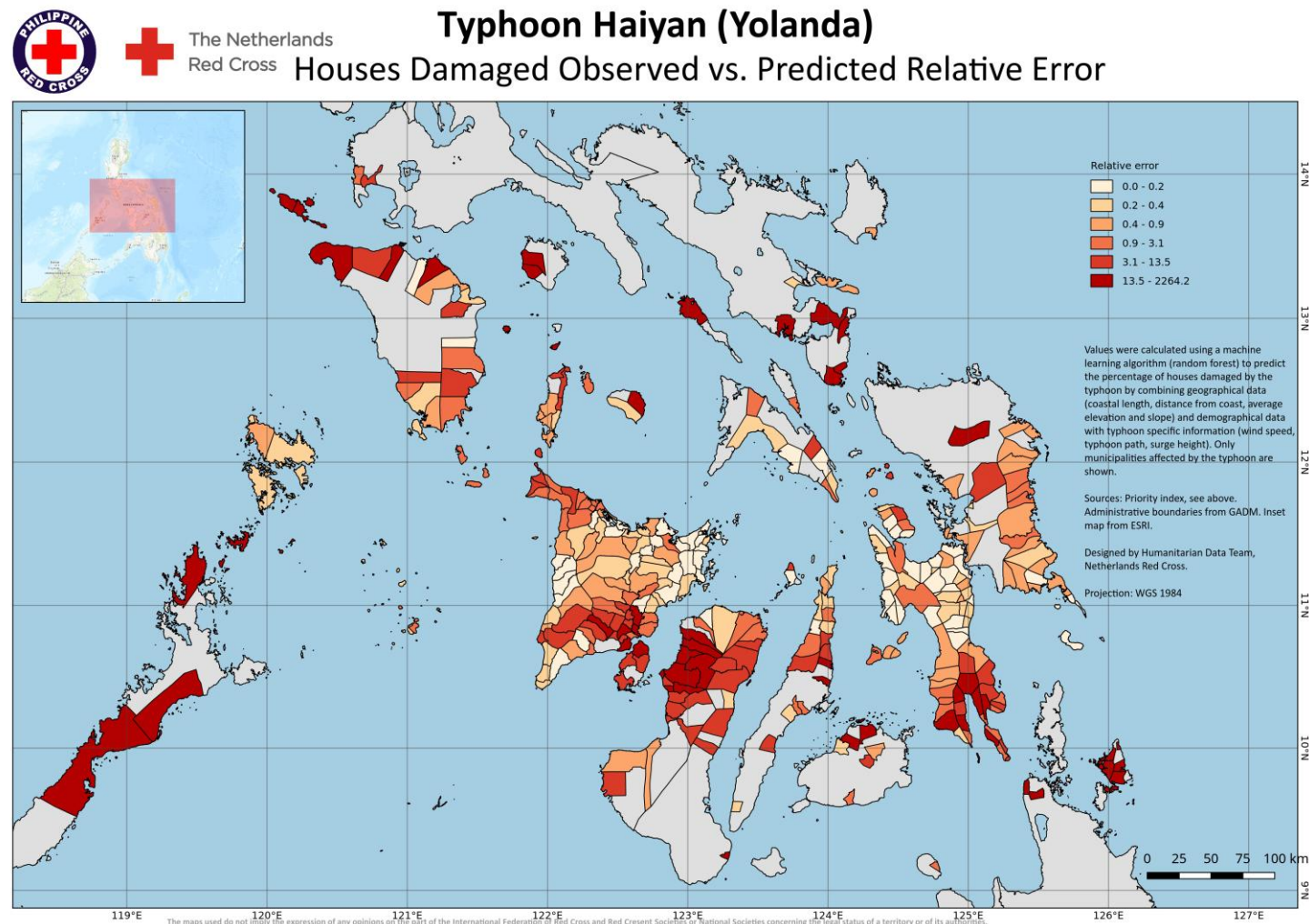
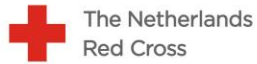


Figure 17 Priority Index Model Typhoon Haiyan, Houses Damaged Observed vs. Predicted Relative Error (510.Global, Netherlands Red Cross, 2016).





## Typhoon Haiyan (Yolanda) Houses Damaged Observed vs. Predicted

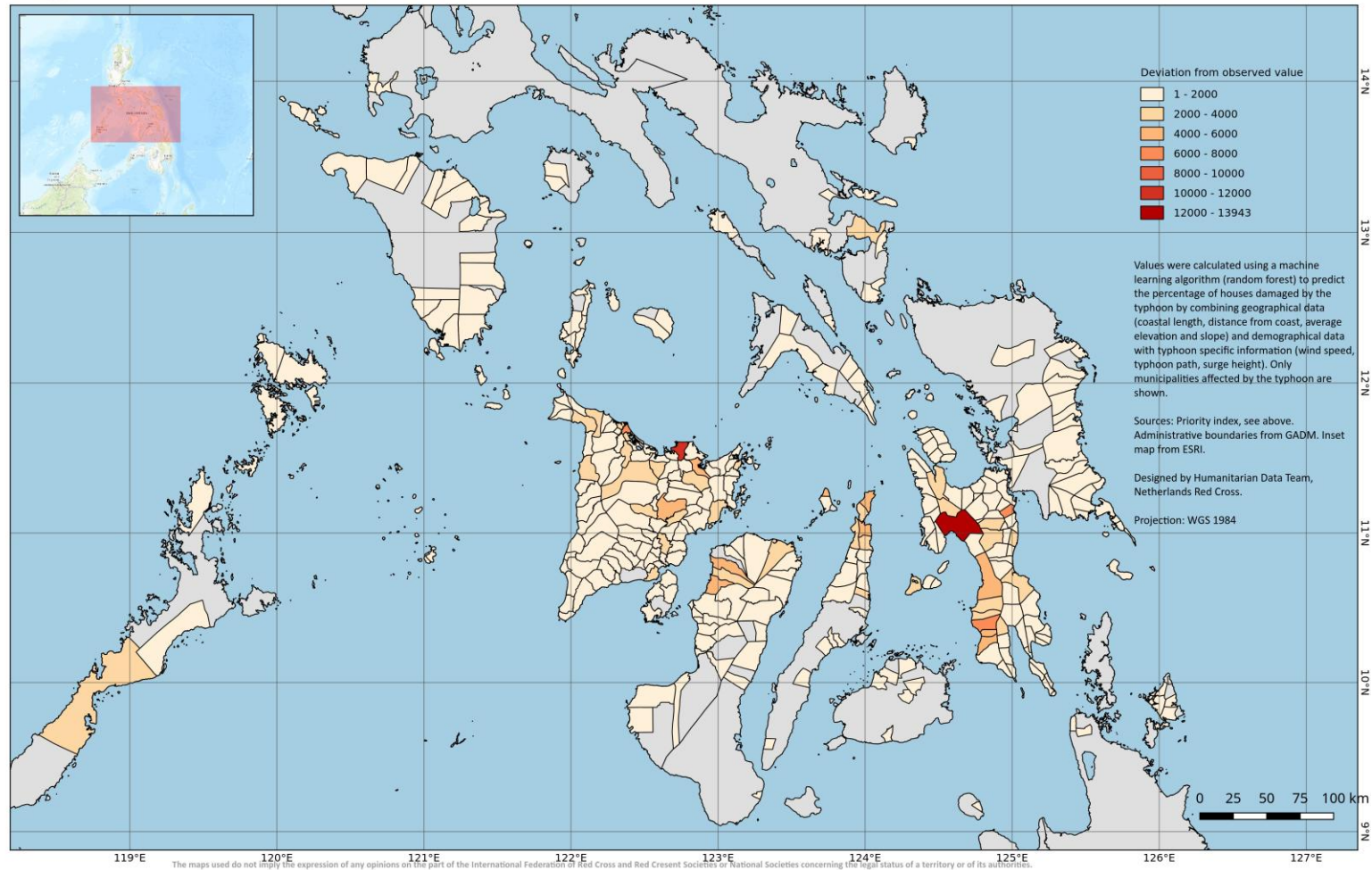


Figure 18 Priority Index Model Typhoon Haiyan, Houses Damaged Observed vs. Predicted (510.Global, Netherlands Red Cross, 2016).





## Appendix B: Respondents

Below we can find the alphabetical list of the respondents and for which organisation they are working. The number of the respondent linked to each quotation within this thesis are not identical to the numbers given to respondents in this Appendix.

<b>Interviews</b>		
	<b>Organisation</b>	<b>Function</b>
1	ACTED	Senior Project Development Officer
2	American Red Cross	GIS Analyst IM
3	DReAMB; sub-department of DSWD	Director
4	Habitat for Humanity	Head, Central/Western Visayas Region
	Habitat for Humanity	Monitoring & Evaluating Staff, disaster response program – Visayas
5	-	GIS Consultant
6	IFRC	Global Focal Point for Shelter Coordination/Information Management
7	IFRC - Tacloban	Head of office - Tacloban
8	IFRC – Manila	IM Manager
9	IFRC	National Shelter Cluster Coordinator
10	IFRC; Habitat for Humanity	Shelter Cluster Coordinator; Consultant
11	IOM – Manila	Regional Shelter Expert Asia and Pacific
12	IOM – Tacloban	Architect
	IOM – Tacloban	Coordination Assistant
13	LGU Isabel	Counsellor
14	LGU Medina	Mayor
15	Norwegian Red Cross	Head of delegation
16	OCD – NHQ Manila	Office of Civil Defence (Deputy) Director
17	OCD – Region 8	Civil Defence Officer
	OCD – Region 8	Deputy Director – Engineer
18	OCHA – Philippine Country Office	IM Manager
19	Oxfam Novib	Rapid Assessment Team in Tacloban; Member of Humanitarian Team
20	PRC	Haiyan Operations; Head
21	PRC	Haiyan Operations IM Manager
22	PRC	Operations Centre Manager
23	PRC	Sector head for shelter and settlements for Haiyan Recovery and other projects
24	PRC – Leyte Chapter	Field Operations Head
25	PRC – Leyte Chapter	Chairman
26	Relief International	Head of Office
27	Samaritan's Purse	Operations Manager
28	Save the Children	Program Coordinator
29	UNHCR	Shelter Coordination within UNHCR
30	UNICEF	WASH IM Manager
<b>Short meetings</b>		
1	IFRC	IM Manager in Manila
2	American Red Cross	Head of delegation



## Appendix D: Interview guide

The interview guide that is presented is semi-structured and serves as a baseline for the interviews that are conducted for this research. Additional information that is presented by the respondents may influence the questions and may add this research by defining the important needs of decision-makers in the initial post-disaster phase.

### Priority Index Model

*In 2015, the NLRC has collaborated with the British Red Cross in the development of a new methodology to identify high priority areas for humanitarian response, based on (open) secondary data of affected area, combined with disaster impact data, such as wind speeds. This method was piloted during typhoon Pam (Vanuatu) and typhoon Maysak (Micronesia) (both in 2015). The priority index model has the potential to provide timely and trustworthy data on priority areas in case of disasters. The result of this new method is a priority index map that presents an overview of the priority areas at Level 3: districts. Ideally, the priority index model and its outcome (a map) are presented to decision-makers within a few hours after the disaster.*

Interview
1. Name
2. Agency
3. Function
4. During Haiyan

#### Questions:

5. As a decision-maker what are your crucial information needs? With different moments?
6. Did you receive information on the priority areas? If yes, what was your source?
7. Who prioritises? Who makes the decision? What was your role?
8. When do you need the priority information? What kind of decisions?
9. In the initial response phase: did you receive all the information that you needed to respond to typhoon Haiyan?
10. What are your information sources?  
(individuals, organisations, government? official, unofficial?)
11. Do you trust upon the given information that is provided by these sources?
12. What kind of information sources do you regard as reliable/trustworthy?
- (13. What kind of information on the priority areas was still missing in the response to typhoon Haiyan?)

#### Priority Index Model

14. Does the priority index model and map corresponds with the priority areas that you observed in the Philippines?
15. If you received this model (and map): what sort of decisions can you make upon the given information?  
Within how many hours/days do you need to receive it, in order to be timely?
16. Do you think that the PiM/PiM indicators correspond with the concepts 'appropriateness and reliability'?
17. Which indicators should we add to the model? How do we receive the data-sets?
18. What is an actor that you would trust if they would present this model to you?
19. Do you have any suggestions for this research/next interviews?

## Appendix E: List of codes used in Atlas.Ti7

The table below presents a list of codes used in Atlas.Ti7 and the number of assigned quotations to these codes.

	Nr. Of quotations Total:
<b>Challenge</b>	<b>379</b>
Challenge: A lot of data	1
Challenge: Aggregation level	10
Challenge: Analysing data	10
Challenge: Availability of data	33
Challenge: Blank distribution/approach	18
Challenge: Change of situation pre-post disaster	6
Challenge: COD/FOD	11
Challenge: Communication	8
Challenge: Concentration of assistance/ remoteness	2
Challenge: Coordination	21
Challenge: Culture differences	2
Challenge: Data changing over time	9
Challenge: Data was scattered	2
Challenge: Decision-making	13
Challenge: Definition	11
Challenge: Disconnection between humanitarian agencies and government	12
Challenge: Everyone is affected	15
Challenge: Haiyan first disaster with IM teams	2
Challenge: IM emergency response	1
Challenge: Level of precision	4
Challenge: Manual (assessment)/paper	1
Challenge: Methodology	7
Challenge: need for information	8
Challenge: Overwhelmed	7
Challenge: Present only the confirmed number	4
Challenge: Sharing data	15
Challenge: Validation	34
Challenge: Political	3
Challenge: Presenting information	1
Challenge: Sense-making	1
<b>Decision-makers</b>	<b>149</b>
DM: First delegate that arrives	3
DM: Gov Armed Forces Philippines	2
DM: Gov Barancay Councils	1
DM: Gov Department of education	1
DM: Gov Department of health	5
DM: Gov DReAMB	1
DM: Gov LGU	12
DM: Gov NDRRMC	7
DM: Gov OCD	7
DM: Gov President	1
DM: Philippines Government	14

DM: IM-TWG	3
DM: Media	4
DM: NHQ of humanitarian agency	17
DM: PRC - Local chapter	2
DM: PRC – NHQ	7
DM: Shelter cluster	21
DM: UN OCHA	6
DM: UN OCHA Cluster	34
<b>Information Need</b>	
Info need: 3W/4W - Who is doing what where	18
Info need: Access	24
Info need: Access – airports/ports	8
Info need: Access - centrality	6
Info need: Access - communication	14
Info need: Access - health facilities	11
Info need: Access - markets	7
Info need: Access - roads/infrastructure	17
Info need: Admin boundaries	1
Info need: Beneficiaries	8
Info need: Capabilities of agencies	4
Info need: Capabilities/capacity	9
Info need: Casualties	16
Info need: Census 2010/2015 - population	20
Info need: Cost to agricultural damage	1
Info need: Damage to houses	38
Info need: Damage to livelihoods	10
Info need: Displacement	17
Info need: Distribution of goods	2
Info need: Employment	2
Info need: Evacuation centres	7
Info need: Exposure	5
Info need: Food	18
Info need: Food security	1
Info need: Geographic information (coastal, mountainous, etc.)	12
Info need: Hazard risks	16
Info need: Hazard specifics	15
Info need: Health data (diseases, epidemics)	4
Info need: Lessons learned	1
Info need: Livelihoods	14
Info need: Local authorities	1
Info need: Needs/priority	33
Info need: People affected	26
Info need: Political situation	4
Info need: Population density	7
Info need: Population distribution (gender, nr of people and age categories in hh)	14
Info need: Population reached with programmes	2
Info need: Poverty levels	22
Info need: Power	3
Info need: Presence of agencies	10

Info need: Protection	1
Info need: Rural/urban	3
Info need: Scale of disaster/scope	8
Info need: Schools	8
Info need: Security	1
Info need: Shelter	25
Info need: Typology of houses	8
Info need: Vulnerable people (children, age, disability)	46
Info need: WASH	19
Info need: Waste disposal	1
Info need: Water	29
<b>Priority Index Model</b>	<b>91</b>
PiM: Critical note	20
PiM: Data accuracy	8
PiM: Data preparedness	24
PiM: Data rough estimates	5
PiM: Useful/added value	34
<b>Source</b>	
Source: Affected people	2
Source: Barangays	8
Source: Church partners	4
Source: Cluster meetings	7
Source: Field	10
Source: GitHub	2
Source: GovPH	53
Source: GovPH Bureau MJB	1
Source: GovPH Department of Energy	1
Source: GovPH Department of Health	5
Source: GovPH DOST	4
Source: GovPH DROMIC	1
Source: GovPH DSWD	20
Source: GovPH LGU	26
Source: GovPH Lista Hannan	1
Source: GovPH MGB	1
Source: GovPH NAMRIA	4
Source: GovPH NDRRMC	12
Source: GovPH NOAA	1
Source: GovPH OCD	8
Source: GovPH PSA	11
Source: GovPH Water districts	2
Source: HDX	1
Source: Hospitals/schools	2
Source: Humanitarian agencies	19
Source: IFRC	2
Source: Interagency	2
Source: Internal assessments	19
Source: IOM	1
Source: IPC	2



Source: JWC	1
Source: Media	11
Source: MIRA	14
Source: NASA	1
Source: On the internet	5
Source: Open Street Map	2
Source: Pacific Disaster Center	1
Source: PAGASA	3
Source: PDNA	2
Source: PRC - Local chapters	11
Source: PRC – NHQ	7
Source: RDANA	2
Source: REACH	8
Source: Reliefweb	6
Source: Secondary data	6
Source: Shelter cluster	16
Source: Social media	2
Source: UN OCHA	29
Source: USGS	1
Source: WHO	1
Source: World Databank	1
<hr/>	
Time	
Time: 1 month	5
Time: 1 week	9
Time: 2 weeks	12
Time: 3 months	6
Time: 3 weeks	4
Time: 7/8 months	2
Time: 24 hours	15
Time: 48 hours	12
Time: 72 hours	19
Time: as soon as possible	10
Time: depending	9
Time: preparedness	6
Time: takes too much time/late	10
Time: twice a day	2
<hr/>	
Trust	31
Trust	21
Trust: Drawn up	1
Trust: First hand – someone in the field	4
Trust: Grain of salt	2
Trust: More trust	3