Chapter 2
Centralising Information: Predicting and Managing the Risk of Pandemics at the WHO

2.1 Introduction

At last we are here, in The Room; the room to which so many researchers, journalists and external experts can only dream of gaining access. It has taken us almost 9 months to get permission to enter, and finally we are able to attend one of the daily morning meetings.[1] Caught between the emotion of actually being there and the requirement for confidentiality that has been made quite clear to us ('nothing that is said in this room may leave the room'), we settle down unobtrusively and listen. No recordings may be made, no notes taken.

Dr A. is in charge of the session. A qualified veterinarian, she is part of the Epidemic Intelligence and Risk Assessment unit. We are in the Upper SHOC Room (Strategic Health Operations Centre) of the World Health Organization (WHO). Opened in May 2004, this room is where any events that might have dramatic epidemic repercussions on a global scale are discussed. With the help of a large screen, Dr A. presented a list (prepared by her team), which was then discussed by the experts assembled round the table. This list contains the situations requiring careful monitoring; some have already been through the verification process and others still need to be verified with the member countries concerned. At the same time, other screens display the geographical location of the countries concerned

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[1] We are extremely grateful to David L. Heymann for having made it possible for us to visit and to meet the key figures involved.

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by the threat and the number of cases declared that day (as well as figures from the preceding days). The discussion determines the cases on which the experts will focus their attention.

Over the following days we continue to follow the observations and discussions. On leaving the building at the end of our few days of research, we are feeling distinctly shaky: the WHO, this international organisation with such a serious reputation and which puts so much effort into disseminating credible information, is essentially following ... rumours[2]!

We have entered into the highly regulated world of the circulation of information in the WHO, in particular into their system for monitoring pandemic diseases. We are able to observe at first hand how the various socio-technical intermediaries are deployed to capture, translate and transform the rumours to produce information, that is to say, identified risks or perhaps even alerts.

2.2 Institutional Framework and Investigation

2.2.1 The Risk of Epidemic and the Role of the WHO

Societies have always been subjected to epidemics of infectious diseases, the spread of which has often caused high mortality. The WHO defines an epidemic as 'a disease contracted by a relatively high number of people in a given region in a relatively short period of time'. The risk of an epidemic is the probability of a disease arising in a given time and place and spreading at different scales. During the course of history, populations, ignorant of how to protect themselves, opted to separate those affected from those in good health. The notion of quarantine goes back to at least the fourteenth century (WHO 2007). The idea was to guard themselves against evils of 'foreign' origin, such as the plague. Over time, scientific progress and, most notably, the introduction of sanitation to towns (in the nineteenth century) allowed some infectious diseases to be contained, such as cholera. Then, during the twentieth century, the advent of better hygiene, vaccinations and medicines enabled certain diseases to be brought under control. Smallpox, for example, has been totally eradicated, following a widespread vaccination campaign organised by the WHO.

The World Health Organization is an agency of the United Nations that specialises in public health. It was founded on 7 April 1948, shortly after the end of the Second World War, and currently has 194 member states. However, the origins of the WHO go back to the nineteenth century (Poulain 2003). The major European cholera epidemics which raged between 1830 and 1847 led to the first International Sanitary Conference, held in Paris in 1851. Following this conference, two conventions were signed: the first in 1892 on cholera and the second in 1897 on the plague. In 1907, a number of the states that had signed these conventions met

[2]Our findings are in keeping with the work of Elisabeth Remy (1993), who proposes that rumours be taken seriously and endorses the definitions given by the actors.

in Rome, where they established the International Office of Public Hygiene. After the First World War and the epidemic of Spanish influenza that was responsible for the death of over 20 million people in 1918–1919, the League of Nations set up a Health Committee, which was the 'embryo' of the WHO.

The various functions of the WHO[3] are defined as follows:

- Providing leadership on matters critical to health and engaging in partnerships where joint action is needed;
- Shaping the research agenda and stimulating the generation, translation and dissemination of valuable knowledge;
- Setting norms and standards and promoting and monitoring their implementation;
- Articulating ethical and evidence-based policy options;
- Providing technical support, catalysing change and building sustainable institutional capacity;
- Monitoring the health situation and assessing health trends.

Despite the considerable efforts made by the WHO, as well as by the Member States and other bodies, such as NGOs, there are still infectious diseases that develop as a result of the ability of microorganisms to adapt to their environment or their host. For this reason, the possibility of an outbreak of a new epidemic remains a reality and an unpredictable reality at that. Over the course of the last 30 years, epidemiologists have noted both the emergence of new diseases (such as legionellosis and AIDS) and an increase in the number of old diseases. There are various reasons for this: 'demographic and behavioural changes, economic development, land use, the internationalisation of travel and trade, changes in the climate and in ecosystems, poverty, conflicts, hunger and even the deliberate release of infectious or chemical agents' (WHO 2007).

The risk of an epidemic still exists, despite the considerable scientific progress that has been made. Diseases are not confined within borders, but cross them rapidly as a result of increased international traffic of all types: 'By altering viral traffic patterns, the introduction of modern agricultural or industrial technologies in one location – 'local' causes – might produce an international epidemic or pandemic – 'global' effects' (King 2004: 66). The aim of the strategies and methods deployed by the WHO is to counter such risk of an epidemic at the earliest possible stage, in conjunction with the Member States, who are also becoming increasingly active in this area. It is for this reason that a permanent monitoring system was set in place. This system covers all geographical scales (from local to global).

A pandemic – an epidemic that affects a vast region, possibly even covering all continents – is part of a phenomenon even greater than a simple epidemic. The WHO activities are intended to coordinate the actions of the various countries affected, or likely to be affected, by a problem that has been identified.

As we have seen, the WHO is an interstate organisation, which plays a central role in global public health. It works together with its Member States and through

[3]These are the functions as set out on the WHO website: http://www.who.int/about/role/en/.

treaties and inclusions in national legislation to ensure that its decisions are implemented on a wide scale. If a case arises that poses a threat to public health, no matter where in the world this may occur, a number of experts are ready to respond. WHO staff are in a constant state of watchfulness, and the role of the organisation in the management of epidemic risks is crucial.

The work of the key actors takes place in various locations: the Headquarters, regional offices, national laboratories and also with the help of intermediate bodies, such as NGOs.

2.2.2 Investigation

We chose to focus our study on the WHO SHOC Room in Geneva in order to provide the best possible illustration of our analysis of the *centralisation of information*. Our starting point is that it is this room that receives and collects all the information acquired by the Headquarters, verifies it and then decides whether an alert should be issued.

The field work was divided into two parts: individual interviews and time spent observing the operation of the room and the participants. Our core research questions were as follows: How does the information circulate? What are the technical resources available? What are the risks targeted? What sort of data does the central organisation receive? What are the most commonly used geographical scales? How is the information processed, then redistributed and disseminated to a wider audience? And, finally, how was this system set up?

During the 2 days spent on site, we were able to observe the operation of the SHOC Room and the tasks of the various experts who work and meet there. We took note of the technical resources and the various technological tools available in the room (screens, computers, etc.). We were also able to form an understanding of the 'life' of the central organisation; the monitoring and alert phases, as well as the working rhythms of the teams. This allowed us to visualise how information is communicated among the various public health professionals. Lastly, we were interested in the content of the resources, such as maps and charts, that were visible in the SHOC Room itself.

Significantly, the day of our study coincided with the entry into force of the International Health Regulations (IHR), on 15 June 2007. There was a degree of palpable excitement regarding the implementation of this tool. As explained later, it had taken a long time to get to this stage. The quotations and the information we gathered make it possible to understand the hopes invested in the new IHR; hopes which have since been confirmed as the IHR has been instrumental in transforming a certain number of practices, which we will also report on later.

The WHO, like any major organisation, regularly implements reforms and changes to its organisational chart. Since our visit the names of units have changed and new departments have been created. At that time the 'Epidemic and Pandemic Alert and Response Unit' was the unit in which we were interested for our study. It is now known as the 'Alert and Response Operations Unit (ARO)'. The primary

objective of this department is to set up efficient risk management systems in order to safeguard international public health. To a great extent, the reduction of risks is achieved through collaboration with Member States, which must have the capacity to detect and verify diseases rapidly in order to tackle an event more effectively.

In 2007, the organisational chart consisted of two major groups: Director's Office and IHR Coordination Programme. The former comprised four subgroups: Alert and Response Operations, Global Influenza Programme, Epidemic Readiness and Interventions and Bio-risk Reduction and Bio-terrorism Dangerous Pathogens.[4] These subgroups also have their own working areas. The second major group was also divided into four subgroups: Lyon Office for National Epidemic Preparedness and Response, including Training Support Programmes; National Systems Strengthening; IHR Secretariat; and SIG Public Health Map.

In 2011, the Health, Security and Environment Division (HSE) merged the teams responsible for epidemic and pandemic alert and response operations with those in the WHO department responsible for coordinating the IHR, to create a new department entitled Global Capacities, Alert and Response (GCR). This is divided into a number of units, including the ARO, that cover global alert and response operations in the event of an epidemic. This unit consists of four teams:

1. Risk Assessment and Decision Support, which processes the information on epidemics received and carries out a rapid evaluation of the risks;
2. Global Outbreak Alert and Response Network (GOARN), which brings together institutions and networks to pool human and technical resources in order to identify, confirm rapidly and respond to global outbreaks;
3. Logistics, which provides a comprehensive logistic capability to support the operations responding to outbreaks and maintains and distributes stocks worldwide;
4. Strategic Health Operations (SHO), which acts as the organisational hub for the WHO Headquarters and manages the JW Lee Strategic Health Operations Centre.

During our investigation we were able to talk to the following individuals:

– The Director of the IRH Coordination Programme. This interview was helpful as it gave us a better understanding of the functioning of the department in general and, more particularly, it provided an explanation of the revised IRH, in which he was greatly involved. The Director also explained the global implications of the changes and the perspectives of these new regulations, the new assessment criteria and the responsibilities of both the WHO and the Member States;
– A veterinarian working in the Epidemic Intelligence and Risk Assessment team, which is part of the Alert and Response Operations subgroup.[5] She first

[4]This also included Programme Management and Communications.

[5]The present-day equivalent of the Risk Assessment and Decision Support (ADS) team, in the Alert and Response Operations (ARO) group.

described the general context of the actions carried out by this department. This was followed by more detailed information on the work of her team, which is primarily concerned with assessing the risk and verifying the information available to the WHO through its various networks;
– A SHOC Room technician. His role is primarily to maintain the equipment in the room and to develop high-performance software;
– The coordinator of the Alert and Response Operations team. In this interview, he described the work of the group he leads. He emphasised the verification of the information and also the quality of the information required in order to respond rapidly to an outbreak;
– The manager of the Global Outbreak Alert and Response Network. He described an emergency response. He also set out the roles of the various institutions in ensuring a better response to epidemics in the field;
– A doctor from the Global Influenza Programme team. This discussion gave us a good overview of the measures and actions related to influenza. He also talked about avian influenza, which is being monitored permanently;
– The Assistant Director-General for Communicable Diseases and the Epidemic and Pandemic Alert and Response department. He explained the role of the WHO. The organisation is backed up by the revised International Health Regulations. He also described the way various teams operate within the department and their role on a global level.

2.3 Managing Epidemic-Type Risks

For many years, the WHO has attempted to contain those diseases liable to constitute an epidemic. The initial WHO International Sanitary Regulations of 1951 were revised and renamed the International Health Regulations in 1969. The aim of these regulations was to provide protection against the spread of infectious diseases on a global scale, with the least possible disturbance to trade or tourism. Initially, Member States were required to notify six diseases to the WHO: cholera, plague, yellow fever, smallpox, typhus and relapsing fever. Following a number of amendments, the number of notifiable diseases was reduced to three: yellow fever, plague and cholera. However, the rise in both the number of international exchanges, and the forms these take, favours the propagation of microbes and also increases the likelihood of new or re-emerging infectious diseases. Between 2002 and 2007, the WHO confirmed 1,100 epidemiological health events across the world (WHO 2007). Five years later, in 2012, 291 events were recorded for evaluation or response in the Event Management System (Department of Global Capacities, Alert and Response 2013). According to the organisation, no country is able to resolve or overcome the consequences of such events alone and to curb an epidemic. This is an event – a 'focusing event' as Birkland calls it (2007) – which has made a major contribution to transforming the categories of risk used within the WHO and to the contents of the new IHR: the Severe Acute Respiratory Syndrome (SARS) epidemic, generally considered to be the first major epidemic of the twenty-first

century, was able to spread very rapidly using international air travel routes, with no country being spared from this risk (Heymann and Rodier 2004).

This vulnerability led to the revision of the IHR, which had been decided upon at the WHO General Assembly in 1995, being brought forward, with a view to making it more appropriate and able to cope with widespread risks,

This re-evaluation of both the regulations and the links between the organisation and the Member States is based on a change in the approach to the risk of a pandemic, the management of the risk and the recommended action. In the context of the study of the centralisation of information within the WHO, we have applied the three phases of risk (Chap. 1: Fig. 1.7, p. 19) in order to understand the processes of managing the pandemic crisis and the reorganisation following an event within the WHO.

We identified key moments and intermediaries who play a vital role in the circulation of information. The thread of our investigation is based on the lessons learned from the SARS experience; this experience had a profound effect on the mindset of the organisation and has contributed to major changes on the management of epidemic risk within the WHO.

Indeed, SARS was mentioned as a turning point by all those we interviewed. It offers the most complete image of the transformation from rumour to risk, capable of triggering and relaunching action (Callon and Law 1997) in a variety of different directions. In other words, the pandemics detected at a very early stage through rumours, such as SARS, avian influenza and Ebola virus in particular, are nothing more than the result of a multitude of translations of a risk to public health. Our study will demonstrate that this is a continuum, bringing together simultaneously a number of temporal or spatial scales, in which a non-human element, linked to a range of repercussions – or a 'hairy' element, to use the term favoured by Latour (2004) – goes beyond the expected framework of the action.

2.3.1 What Did SARS Change?

When SARS arrived on the scene in 2003, it illustrated how quickly a new disease can travel around the world. SARS presented a serious threat to global public health: 'It spreads from person to person, requires no vector, displays no particular geographical affinity, incubates silently for more than a week, mimics the symptoms of many other diseases, takes its heaviest toll on hospital staff and kills around 10 % of those infected. These features enable it to spread easily along the routes of international travel, placing every city with an international airport at risk of imported cases' (WHO 2007: 37).

On 7 August 2003, the WHO noted 8,422 cases and 916 deaths (WHO 2003). The economic repercussions were also catastrophic, particularly for Asia. The economic impact on Hong Kong is estimated to have amounted to losses of over 3.8 billion euros, according to an edition of the electronic newsletter of the French Embassy that looked back at the situation 10 years later (Ambassade de France en Chine 2013).

The spread of SARS was halted 4 months after it was identified, thanks to the emergency systems already put in place and the collaboration between Member States. However, this epidemic highlighted shortcomings with regard to both management and coordination, particularly in relation to the speed of implementation of emergency measures. In addition, it brought about a change in the position of public and political opinion in the face of a potential pandemic.

SARS can be seen as a 'focusing event' (Birkland 2007). Indeed, this event drove the WHO and the Member States to rethink the way in which the risk of an epidemic is managed on a global scale. In addition, following this crisis, the World Health Assembly[6] urgently recommended the drafting of a revised version of the International Health Regulations (IHR) by May 2005.

The new version of the IHR, the 'backbone' of the directives to be followed by both the WHO and the Member States, entered into force on 15 June 2007. This was the result of a revision process that had taken 10 years and which contributed to a change in the understanding of health risks. The worldwide community now has a new legal framework. The primary aim of the changes was to allow better management of risks and emergency situations. However, the innovative feature of the approach adopted is the expansion of the notion of risk. The authorities and the WHO no longer await the arrival of an event before responding; rather they go to the source of any information linked to an 'extraordinary' event in order to verify the information for themselves. As one of our interviewees emphasizes it,

> Today every event is subject to analysis, a risk evaluation and proposed measures. Today we work on a tailor-made basis.

The notion of risk is therefore no longer limited to three diseases, but now includes events of chemical, radioactive, environmental and animal origin, meaning that the spectrum of risks has widened considerably. The Member States are equipped with criteria to be used as the basis for assessing the likelihood of a future pandemic. If two criteria are met, the event must be notified to the WHO. Furthermore, notification is mandatory in the case of the following diseases: 'smallpox, poliomyelitis caused by a wild-type poliovirus, human influenza caused by a new virus subtype and SARS' (WHO 2007: 12).

A Member State can also notify the case of a pathogen agent emerging in a different Member State. The WHO also has the right to request verification from all Member States. The information and the notifications are communicated to the WHO through the 'focal point' established in each Member State. The focal point receives information on a round-the-clock basis, allowing it to establish an efficient network between the WHO and its Member States. In addition, countries are responsible for developing their own national monitoring and health emergency systems. They are able to request advice from the WHO if they are unfamiliar with the pathogen agents involved. In the case of a very serious event, the

[6]Supreme governing body of the WHO, responsible for policy matters. http://www.who.int/mediacentre/events/governance/wha/en/

Director-General of the WHO, after consulting with the Emergency Committee, which consists of external experts, is authorised to take a decision in order to prevent the spread of disease on an international scale. The revised IHR has therefore improved communication between Member States. The effectiveness of the international response to a health emergency has been improved and information can be communicated more rapidly.

In order to detect the information at source, the WHO must monitor all events and verify them as soon as possible. As one of our interviewees put it,

> The information we receive here is the information we collect ourselves proactively.

The slightest bit of information (the rumours) that may announce the risk of a pandemic is immediately intercepted by the server located in Canada, according to a predefined classification established with the help of a WHO expert group. This information, whether official or non-official, comes from a wide range of sources: international and national newspapers, blogs and the Internet. The prototype, which was developed primarily thanks to the determination of an official in the Public Health Agency of Canada, detected the information in English and in French (Mawudeku and Blench 2006). The system is somewhat reminiscent of whistle-blowers, who provide an advance warning, or perhaps of the 'sombre precursors' referred to by Chateauraynaud and Torny (1999).

To achieve this, the WHO worked together with the Public Health Agency of Canada (in 1997) and they set up the Global Public Health Intelligence Network (GPHIN) (Michelson 2005: 382). The idea was to develop a system capable of detecting information by recognising key words in English and in French. The information came from all forms of telecommunications: television, radio, press, Internet, etc. In 2002, a new version appeared: GPHIN II (Mykhalovskiy and Weir 2006: 43). This search engine covers nine languages: all the official languages of the United Nations (Arabic, Chinese – traditional and simplified – Russian, Spanish, French and English), plus Farsi and Portuguese. What is interesting about this approach is that a 'rumour',[7] in other words non-official information, is taken into account at a very early stage in the chain. It is emailed to the WHO. This information has no official status, but as it is a 'rumour', it is important to check it out. This system for detecting events highlights the fact that information is traced right back to its source. Thanks to the range of key words selected by the WHO, the slightest bit of information pointing to risk of a potential pandemic is immediately intercepted by the server, then analysed in order to short circuit any problems. There is constant monitoring, making it possible to identify all the indications of the risk of a pandemic.

The first cases of SARS (when the epidemiologists discovered the symptoms) appeared in November 2002 in the province of Guangdong, in China. The GPHIN flagged up this information in Chinese in November 2002 and then flagged it up again in English in January 2003 (without however using the term 'SARS', as the

[7] This is the term used by the WHO.

name was only invented later). On 12 March 2003, the WHO published the first official report mentioning an outbreak of atypical pneumonia. On 2 April, a WHO team confirmed that the reported cases did indeed match the definition of SARS, and the first recommendations issued to travellers also designated the areas where there was a risk of infection. In the meantime, a doctor, who had himself been infected by one of his patients, 'exported' the virus to a hotel in Hong Kong. Within a few days, residents and travellers had carried the disease to hospitals in Hong Kong, Vietnam and Singapore. Cases were also recorded in Toronto.

The GPHIN should be seen as an assembly of human and non-human actors. Every day analysts examine the strength of the information received and verify the automatic processes incorporated in the system. As an indication of what these automatic processes entail, one might say that the articles are first filtered according to their classification (e.g. animal diseases, human diseases, plant diseases and natural disasters). Then each article is scanned and awarded a percentage figure according to the number of predefined key words it contains. If the level is high, the information is immediately entered into the GPHIN database and emailed to the WHO, as an alert. Conversely, articles scoring below the agreed threshold are discarded. In the case of articles with a median score, it is up to the analyst to decide whether the article should be published or rejected. In addition the analyst checks whether the articles discarded by the automatic system have been translated correctly, ensuring that no suspect case is missed. The human element is therefore essential as it offers a more discerning look at the elements collected by the machine. With the GPHIN there is a shift: rather than considering it as a system, it should be seen as a heterogeneous 'calculation centre' (Latour 1987), where risk situations are identified and considered to be a possibility. It is an intermediary that plays a role in transforming the qualities of the information, providing new translations on the subject.

2.3.2 Verifying the Information

The revised IHR is in keeping with what the WHO developed in 1996 a system for managing events. At the Headquarters and in the regional offices, there are 'strategic operations centres' capable of intervening in an emergency. The verification of information will, of course, give rise to measures that must be implemented in order to alleviate risks and crises.

The Headquarters receives the information and then decides on the appropriate measures that should be taken, in the knowledge that the regional and national offices (the focal points) are also involved in verification. One of the principal difficulties of the WHO is not so much processing the amount of information it receives, but rather guaranteeing the quality of that information. Within the Headquarters the department responsible for this task is the Epidemic and Pandemic Alert and Response department, which includes the Alert and Response Operations section. As the name implies, the objective is to respond as rapidly and as effectively

as possible to any alert of a potential epidemic. Within this structure is the Epidemic Intelligence and Risk Assessment team which is 'focussed on the information; on receiving it, digesting it, and assessing it in order to take the decisions needed, in collaboration with other teams'.

This team assesses the risks by analysing the sources of the information it receives as part of a 'generic box'. The source of the information is described as official or non-official.

The information from official sources, such as Ministries of Health, the WHO regional and national centres or national laboratories and institutes, is official, or formal, information. These sources represent 39 % of the total. Despite not being numerous, there has been a growing trend in recent years. More and more Member States communicate their information to the WHO. According to our interviewees, this increase is the result of a greater sense of mutual trust that has developed among the parties.

The information from non-official, or informal, sources (61 % of the information), is primarily based on rumour and is transmitted by the GPHIN, other websites or by the media. For example, data may be received from ProMED.[8] ProMED-mail was the first prototype of web-based data sources for the monitoring of infectious diseases (created in 1994). It is an electronic discussion group which raises public awareness of public health issues. It mainly sends articles to the WHO. NGOs also sometimes pass on information about potentially suspicious events occurring in their area.

Since then, other types of software based on informal information have been developed, such as Healthmap or EpiSPIDER. (For a detailed comparison of these two types of software and the GPHIN, cf Keller et al. 2009.) This trend continues to grow, thanks to digital detection and detection using automated web-crawling programmes, as well as increasingly sophisticated display tools (Brownstein et al. 2009).

According to Pollack (2013), both types of source have their strengths and weaknesses. As illustrated in Table 2.1, the informal, or nontraditional, sources allow information to be diffused more quickly and earlier, whereas formal sources transmit information more slowly and are not as good at early detection. In contrast, information obtained from formal sources is more credible and requires less verification. However, information from unofficial sources is disseminated through official circuits, although it is publicly available from informal sources, which Pollack considers to be a good point.

On receiving this type of informal information, the WHO instigates a procedure to verify the quality of the information. The aim is to have established information,

[8]ProMed (Program for Monitoring Emerging Diseases) is an 'Internet-based reporting system dedicated to rapid global dissemination of information on outbreaks of infectious diseases and acute exposures to toxins that affect human health, including those in animals and in plants grown for food or animal feed. Electronic communications enable ProMED-mail to provide up-to-date and reliable news about threats to human, animal, and food plant health around the world, seven days a week', in www.promedmail.org.

Table 2.1 Strengths and weaknesses of formal versus nontraditional information sources

Issues	Formal source	Nontraditional source
Quick, early dissemination of information	Often a weakness	Strength
Early detection	Often a weakness	Strength
Reliability of information	Strength	Variable
Accessibility to information	Often private	Publicly available
Forms of information dissemination	Official channels	Multiple sources, freely available
Language used for communication	Language of country	More in English

Adapted from Pollack (2013: 61)

verified by the structures of the WHO, where the list (cf point 4.2.) is an intermediary that enables the status of the information to be negotiated.

The team contacts the regional offices in order to obtain more information on the disease concerned. Clearly, the regional office closest to the location will deal with this rumour, using the same criteria as the Headquarters. It then asks the Ministry of the Member State, through the intermediary of the WHO national office, to carry out its own examination. If the government of the country affected submits a request to the WHO, the Headquarters will also contact the reference laboratories to carry out the required analyses. However, at this stage of the proceedings, the WHO is willing to provide any assistance requested.

Once the information has been verified and confirmed, it returns to the Headquarters. There a re-evaluation takes place and, on the basis of the same criteria, a decision will be made regarding the importance of the event:

> We carry out a re-evaluation with the information, which has now become official, and decide whether we were right or whether it was a false alarm. At that point we decide whether to reject the event or to generate a response if the need is felt.

The Headquarters usually receives a reply within 24 h.

The following principal criteria are used to determine whether an event has an international nature (according to the new criteria of the revised IHR):

- The severity of repercussions on public health;
- Unusual or unexpected nature of the event;
- Significant risk of international disease spread;
- Significant risk of restrictions being imposed on trade;
- Significant risk of restrictions being imposed on international travel.

If two of these five criteria are met, notification is obligatory.

Following the adoption of the new IHR, risk has gradually been expanded to include new situations and new objects (travellers, trade and unexpected events), and the definition of risk has also been extended.

Information is then shared, as one of our interviewees explained, adding that ‘informing those who have a need to know in order to act is a key step’.

The information is then delivered 'to the heart of the WHO and the key people who play an important role in the response – of whatever nature – to a given event. The information may also be published on the IRH secure website, to which the focal points in all Member States have access'.

Within the Headquarters, the information is also shared among the various experts (cholera, plague, smallpox, influenza, viral haemorrhagic fevers, SARS, etc.). In the evening, the Epidemic Intelligence and Risk Assessment team prepares a list containing the new elements likely to spread at an international level. This list includes information from both official and non-official sources. The next morning this list is passed on to the various experts for discussion and risk evaluation. At this stage decisions are taken; these are then communicated within the Headquarters and to the regional offices.

The Epidemic Alert and Response department is responsible for detecting risks at the earliest possible stage. It is part of a global network and thus is able to receive information, verify it and, where required, transmit an alert to key personnel. The aim of this coordinated action is to detect any indications of an infectious disease that could have disastrous consequences if it were to spread. As viruses propagate so rapidly, it is important to receive information in 'real time' in order to be able to respond as promptly as possible. The diagram (Fig. 2.1) gives an overview of how information is verified.

2.3.3 Setting Up Emergency Responses

In 2000, the WHO decided to set up a collaboration mechanism: the Global Outbreak and Response Network (GOARN) (Heymann 2006: 351). This network incorporates 140 institutions in 60 countries that guarantee a rapid response to Member States in the event of a global epidemic. It facilitates the coordination of operations, by following a number of basic principles, and provides an operational framework which enables countries to be supplied rapidly with resources (such as vaccines and medication) and expert assistance. GOARN's primary aims[9] are to:

- Assist countries with disease control efforts by ensuring rapid and appropriate technical support to affected populations;
- Investigate and characterise events and assess risks of rapidly emerging epidemic disease threats;
- Support national outbreak preparedness by ensuring that responses contribute to sustained containment of epidemic threats.

This network is a system intended to aid emergency response when faced with the risk of an epidemic. The aim is to reduce as far as possible the scale of the

[9] http://www.who.int/csr/outbreaknetwork/goarnenglish.pdf

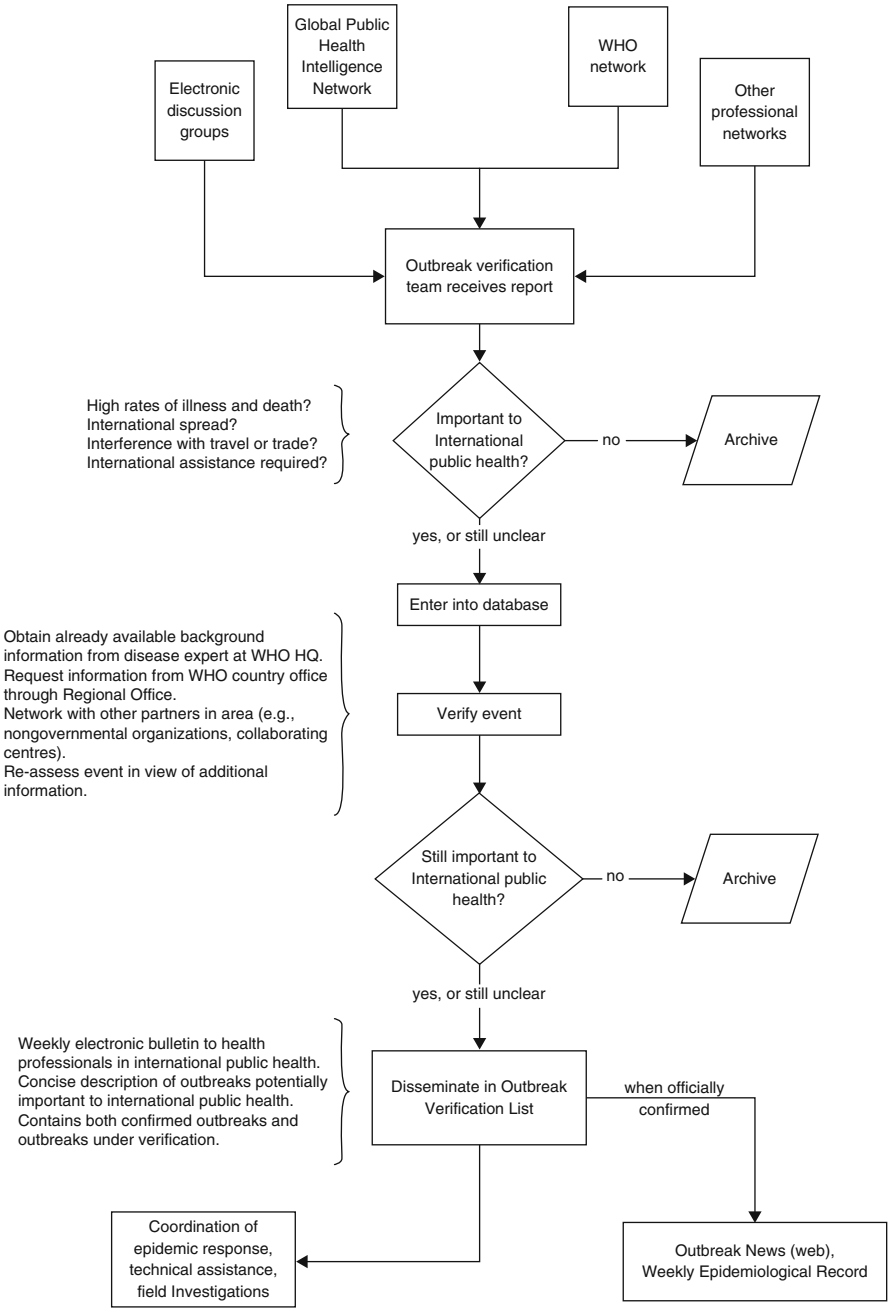

Fig. 2.1 Outbreak verification at the World Health Organization (With kind permission from Grein et al. (2000: 98, Figure 1))

disaster through rapid and effective action in the field, thanks to the information received being communicated in a timely manner.

One of the doctors working in the Epidemic Intelligence and Risk Assessment department explained that once an epidemic starts to spread and the situation gets out of control (and thus has the potential to become an international public health emergency), the WHO experts carry out an assessment of the situation, which they then pass on to the GOARN institutions in the form of a request. GOARN then compiles a list of experts appropriate to the emergency. This response is provided within 24–28 h of the WHO request, depending on circumstances (visas, tickets, logistics, etc.). Then, provided the WHO and the country affected agree, the experts and the logisticians are sent to the area to provide help and support.

Between 2000 and 2007, the WHO and GOARN responded to over 97 events across the world, deploying over 500 experts in the field, in 63 countries. Michelson (2005) highlighted how effectively GOARN performed during the SARS episode. It linked 13 laboratories, located in 9 different countries, with over 50 doctors from 14 different countries in an attempt to identify the causes, means of transmission and possible responses to SARS.

GOARN has a heterogeneous range of partners. The network makes it possible to bring together the technical and operational resources of diverse scientific establishments[10]: Member States, medical surveillance initiatives, regional technical networks (e.g. laboratories), universities, United Nations organisations (e.g. UNICEF, UNHCR), the Red Cross and non-governmental organisations (e.g. Médecins sans Frontières Doctors Without Borders).

In the case of an urgent and serious event, the Director-General (DG) of the WHO is entitled to decide on the measures to be adopted, in accordance with the revised IHR. However, as one of our interviewees explained, before making such a decision, the DG must consult with an emergency experts committee and his own experts.

This information communication phase is a final resort as this is an extremely rare international health emergency. This is the final link in the internal decision-making chain that governs emergency intervention in the event of an international epidemic.

The WHO keeps the public informed through its website 'Disease Outbreak News (DONs)'. The information on this site is official; that is to say, it has been subject to prior verification, and the Member State concerned has agreed to the publication of this event. The WHO publishes the 'Weekly Epidemiological Record (WER)', which is a means of disseminating rapidly epidemiological information that may have consequences for public health, including on emerging or re-emerging infectious diseases. This newsletter includes all the latest information on the Member States and is automatically archived. Following an epidemic, the WHO also writes an article giving a summary of the information relating to the crisis. The WHO also publishes annual reports. These various publications keep the public abreast of the different events that occur. They provide background information for

[10] http://www.who.int/csr/outbreaknetwork/en/

any re-examination of an event and assist in improving the procedures and resources deployed in managing a crisis, as discussed previously.

2.4 The Intermediaries in the Circulation of Information

2.4.1 The SHOC Room: A Modular Space

The SHOC Room (Strategic Health Operations Centre) was opened in May 2004, at the WHO Headquarters in Geneva. Following the death of the Director-General, Dr Lee Jong-wook, in May 2006, the room was renamed in his memory and is now known as the JW LEE Centre for Strategic Health Operations (WHO 2006). It is in this room that events that could have dramatic epidemic repercussion on a global scale are discussed. Here the experts analyse the various situations: both those that have already been confirmed and those still awaiting confirmation from the countries affected.

In short, the SHOC Room is where rumours are examined and transformed into information. It has a range of 'high-tech' infrastructure and security is high in order to be able to withstand any form of attack, either deliberate or unintentional, such as attacks, earthquakes, computer viruses, etc. To this end it has a bunker-like construction, with an airlock entrance, autonomous generators and a stock of food.

This room actually consists of three separate areas, with complementary roles. Firstly, there is the SHOC Room itself, which is the main room in the event of a crisis. It is only activated when a problem situation arises. Next to this room is the technical room, where the technicians work on the development of the IT system and the maintenance of technical equipment. There is round-the-clock monitoring. Finally, on a mezzanine level above the technical room, there is the Upper SHOC Room, the location of the daily meetings at which discussions take place and decisions are made. It has an oval table, a wall screen and two telephones.

The SHOC Room is the largest of the rooms. It has seating for 16 people and there are 8 desks, each of which has a computer. (If necessary, two people can share a desk.) Each station is equipped with a telephone and microphones in order to allow a telephone conference with over thirty participants simultaneously. The meetings are recorded by a suite of cameras. On the wall opposite the work stations is a large screen, which is used during video conferences. On the side wall there are four screens, each of which has a separate function. The first displays a table giving the data for a particular disease at a specific location at a specific time. It lists the number of deaths, the number of people who have contracted the disease and the potential or actual risk that it will spread. The second screen shows the list of events currently under investigation and those that have been confirmed. These events are dealt with and discussed, and the information is displayed at the morning meetings.

The third screen displays maps of the places affected by the events defined in the lists. They are shown at different geographical scales in order to give a better idea of the territorial implications of the crises. The fourth screen displays a photo of Dr LEE, as homage to his work.

The Upper SHOC Room is considerably smaller. It has a central table, with six seats and six microphones. It is used primarily when it is considered preferable to reduce the number of participants when important decisions have to be taken. There are telephones, and two screens on the wall facing the table. The first displays the list of events to be discussed. The second displays maps related to the subject of discussion.

The SHOC Room is only activated in the event of an international public health emergency. The room can be used for activities related to different types of emergency, including pandemics (such as avian influenza), natural disasters (such as earthquakes or tsunamis), bio-terrorism and chemical accidents. It is a modular space that can be arranged to suit the needs of the unit using it. The room was set up in order to improve coordination between the Headquarters, the regional offices and focal points. Experts spend a lot of time in this room and are kept abreast of the situation in 'real time' through video conferences.

In contrast, the Upper Room is used every day to provide easy communication between the Headquarters and the regional offices.

> We always work in close collaboration. Every day we have a video conference with the regions; there is a constant dialogue with the regions.

In this way the Headquarters can keep a regional offices informed on a daily basis. Together they reassess the risks related to a particular disease and exchange new data.

The Upper SHOC Room is in use most of the year. Every morning, at the same time, there is an internal meeting to assess the information received on a specific case:

> The information is shared systematically at 09:00. The key element in managing the information is the risk assessment.

This is the moment at which the key decisions are taken. Every evening the Epidemic Intelligence and Risk Assessment team prepares a list for discussion in the meeting the following morning.

The SHOC Room and the Upper SHOC Room offer a place to meet and to exchange information, forming a 'node' where all the networks come together. The Upper SHOC Room is the place where the key decisions are taken by the experts with the aim of ensuring optimum management of the risks associated with an epidemic. It is the principal site for communication between the different actors involved: within the Headquarters, with the regional offices (via a video conference) and with the focal points (which can also be contacted via a video conference if necessary).

2.4.2 The List

As has been shown, one of the main problems for the WHO is not the processing of the quantity of information it receives, but rather the ability to guarantee the quality of this information. All this information, whether from formal or informal sources, is recorded and put on a list drawn up by the Epidemic Intelligence and Risk Assessment team.[11] This is the list presented by Dr A. at the daily meeting held in the Upper SHOC Room.

This list is a crucial element in the health monitoring system established by the WHO in 1997 (Martinez 2000: 223). Its use makes the process of identifying and confirming cases that are out of the ordinary more transparent. The aim of this system, known as the 'Outbreak Verification System', is to verify, on the one hand, that the unofficial information is indeed current and, on the other hand, that the epidemic has an international dimension (Heymann and Rodier 2001: 349). The Outbreak Verification System makes use of rumours – the actual term used by the WHO – which are defined as non-official information relating to the risk of an epidemic on an international scale (Grein et al. 2000: 97). However, this list may also contain information received from official sources. It is this list that determines the expertise required and thus who will attend the meetings. If, for example, a cholera epidemic has been identified, cholera experts will come and bring their analyses and assessments of the subject. They will also be responsible for any monitoring required. The length of the meeting depends on the list and the ongoing events.

2.4.3 Databases for the Monitoring Process: From Rumour to Event

The mission of the Epidemic Intelligence and Risk Assessment team is to populate the databases used for decision making and so to create an archive of events. All events, whether confirmed or not, are entered into the database. Rumours are included alongside other validated sources or information. This creates the history of each event: when it took place, whether it was verified, how serious it was and so on.

The most important, and most commonly used, database is the Event Management System (EMS). It is an Access database. Information on events likely to present a risk to international public health is stored in this database. All stages – from receiving the information to making the decisions, via the verification phase – are recorded here, as well as resources and the records of communications (emails).

[11] As mentioned earlier, this team belongs to the Alert and Response Operations group, which is part of the Epidemic and Pandemic Alert and Response unit.

> This database will record all the stages, from the opening of the event to its closure. It will record all the decisions taken, all the actions, all the updates and all the documents linked to them. So, everything will be there.

The information is primarily entered into the database by the Alert and Response Operations team. This database is particularly important as it forms the basis for the lists discussed during the daily morning meetings.

Another database used in this context is the Field Information Management System (FIMS). Using the FIMS it is possible to follow the development of a disease. The initial case is registered as case no. 1. This is followed by the contacts, such as father, mother, brother, etc. The team will then attempt to find out whether there have been any new cases or deaths. It is a very useful tool in the field. 'It is a system that travels with our teams' was how one of our interviewees described it.

There is also the Early Warning Alert and Response System (EWARN). According to this same interviewee, this is a system allowing countries 'to set up their own monitoring system'.

It is quite clear that these databases are indispensable tools in identifying a risk as rapidly as possible. They follow the various cases – from rumour to event – in order to have a clear overview of the situation. They also allow the 'memory' of an event to be carefully preserved, thereby making it possible to reassess the decisions taken.

2.4.4 Collaboration and Expanding the Sources of the Alert

The revised International Health Regulations, together with the new methods for managing epidemic risk, have contributed to changing the contours of the notion of risk. Nowadays, the WHO no longer waits for the notification of an event before taking any action. Rather, it makes great effort to anticipate as far as possible the arrival of an international health crisis. In order to pick up on very first indications of such an event, the very notion of risk needs to be redefined and expanded. The event can then be examined from its source; the investigation of the first signs of a probable epidemic begins immediately. There is an announcement of an irregularity identified using GPHIN, or one of the databases or a formal or informal source. The aim is constantly to make further progress. Scientists have become aware that human and animal diseases are closely linked. For this reason, the investigation of indications is no longer limited to humans but also includes animals. The management of a pandemic risk is expanding its circle of interest to ensure that any risk will be detected and treated. It has therefore become essential to monitor the animal world: 'We have realised that over the last 10 years, 75 % of emerging diseases were zoonoses'.

There is a certain degree of porosity in the border between animals and humans. This means that as well as detecting any risk of an epidemic, it is essential to take account of the risk of an epizootic, both of which also need to be considered

in connection with food. As a result of this expansion of the area of risk, the WHO is faced with an even more complicated risk management task, as its field of action is also expanding. For this reason, the WHO is opening up its range of collaborative partners and approaching other organisations, such as the World Organisation for Animal Health (OIE) and the Food and Agriculture Organization (FAO). This expands the field of monitoring. Any rumours relating to animal cases are also included in risk reduction management operations. This was explained to us by a member of the Alert and Response team:

> In fact, this is an agreement reached between the three organisations – the OIE, the FAO and the WHO – to ensure that within each organisation there is a 'focal point' designated by the organisation and that, through this network [...] information is circulated and any rumour of animal origin is verified.

The case of avian influenza is a good example. The WHO set up a group of experts specialising in this field: the Global Influenza Programme. These experts study the pathogenic agents of the disease, but their primary focus in on avian influenza because

> it's a virus playing hide-and-seek between the world of birds and that of humans. We are interested in the H5N1 because that is the one that may cause a pandemic.

This is why they are studying every event:

> For avian influenza, and for probably no other disease, we are interested in every single case. The theory is that each case (...) could be the initial source of the pandemic. Thus we cannot afford to miss any of them (...).

To this end they work together with laboratories throughout the world in an attempt to pre-empt the risk and to avoid the uncontrolled and uncontrollable spread of avian influenza.

> What we say at the moment is that what we would like is, if not to be able to stop the start of a pandemic, at least to be able to put a brake on it in order to minimise its effect on the human populations. (...) Broadly speaking, what we have at the moment is a virus that is solely animal, but there have been some cases in humans. (...) This disease could be transmitted from person to person very quickly, and the whole planet could be affected. That could be tomorrow or in a month or in ten years. It's something that is very difficult to manage. In my opinion, it's the time factor that is the problem. (...) We would like to see signs as soon as possible that something is happening (...) then we could put measures in place to stop it spilling over into a pandemic.

The experts have available to them an evaluation scale which allows them to measure the risk. Depending on how it develops, they alert the authorities who can then put in place the emergency measures required. This scale consists of six levels:

> Roughly speaking, it goes from phase 1 – low risk – to phase 6 – pandemic (...). We go through the various stages. Currently [June 2007] we are in phase 3 – increased risk.

The risk of an epizootic is fully integrated into the human pandemic risk. There is no longer any barrier between human and animal pathology. The WHO has expanded and developed its fields of investigation and verification of the sources of alerts. It considers and verifies every case, both human and animal, with the aid

and support of the OIE in particular, as well as of Member States. The notion of epidemic risk has been expanded and is investigated right back to its source. The human and the animal factors are essentially two sides of the same coin.

2.5 Analysis: From Centralisation to Globalisation

When this research project began, observing the SHOC Room was intended to provide an example of the centralisation of information. Our aim, at that time, was to understand how information was processed in a monitoring centre. We had assumed that the SHOC Room was a place where information would be centralised as part of crisis management. However, after completing the field study, we had to reconsider this idea.

2.5.1 Nuances in the Centralisation of Information

During the interviews, and also during the time we spent observing in the Headquarters, we realised that this idea of general centralisation did not apply to the way the SHOC Room operated when dealing with a pandemic crisis and that we needed to modify our ideas. We were frequently told that the WHO is a fully decentralised organisation. Indeed, the coordination system is not highly centralised, as the Headquarters prefers to delegate the actions required.

> Starting about a year ago [2006], we have been regionalising our teams. So we have the same teams at regional level. It's more logical because they are closer to the real situation. They can get information much more quickly. But we still work in close collaboration.

The Headquarters is made aware of the most important information and is involved in its verification. However, it is not the only place where decisions are made. The regional offices also play a key role in both communicating and verifying information. There is no exclusive centralisation of all information at the Headquarters, as was explained by one of our interviewees: 'Not all the decisions are taken in any one place'.

One of the actors we spoke to told us that

> The SHOC Room is the centre of our activities, but with a decentralised organisation. Many initiatives are taken by our regions. And sometimes they respond even before notifying us. There is no rigid system. We want to keep bureaucracy to a minimum, so that we can act when we need to.

The SHOC Room should be seen as a "hub" (November and De Conto 2010). It does play a key role in risk management as it enables the various experts from around the world to connect easily and allows authorities to obtain information in real time and to act, or even react, to events, thanks to the technical resources available to them.

WHO staff responsible for coordinating the actions of the various actors involved in risk management have access to sophisticated technological equipment. The SHOC Room has a range of technical instruments, enabling staff to process and disseminate the information obtained: computers, Internet, telephones and video conferences. These are part of the information and communication technology (ICT) equipment. The use of these instruments plays a major part in allowing decentralised coordination. Indeed, the various locations where decisions are made are not confined to the Headquarters in Geneva, as we had previously supposed. Thanks to modern technology, the actors spread across the world can communicate in real time, in collaboration with the other key experts. For example if the Headquarters has some information that needs verifying, the experts in that field meet in the SHOC Room, where they can communicate with the regional office closest to that case. They communicate by telephone or video conferencing, thereby enabling the intelligence to be transmitted directly to the appropriate person. It also works the other way round if the regional office has crucial information to pass on:

> The work is facilitated by being closer together, by having quicker access to telephones, by having too many video conferences to constantly run to and fro, by sitting face-to-face rather than being lined up like ducks in a row. It's purely for practical considerations; there is nothing else beyond that. We have telephone conferencing capabilities on every telephone, but if we want to link in 17 parties instead of two, if we have two or three video conferences, or if the Director-General is there, then we activate the SHOC. It's completely needs-driven and depends on whether it makes our life easier or not.

The same is true of the focal points that use the technical resources available. However, thanks to the new IHR, Member States are more actively involved in identifying cases and notifying the WHO. The network has thus taken on a global dimension and is no longer central. All Member States participate actively in transmitting information through their focal point.

As was mentioned earlier, the WHO makes use of an IT tool that is intended to group together and store all the information received: the database of the Event Management System (EMS). As part of its quest to decentralise the Headquarters activities in order to give the regions greater responsibility, the WHO has set up a 'global EMS'.

> I told you that we have regionalised our monitoring team across the six regions. Instead of waiting for information to arrive and to be entered into our database, we are constructing a 'global EMS'. This will be a 'web-based' database, making it accessible to all six regions and to the Headquarters. Thus, if the African region has an event involving Uganda or Kenya, they will enter the information and, in the Headquarters I will be able to see the information in the database. I will also be able to amend it or to add information. So, instead of relying on getting emails from the African region, I will know that something has been added. The plan is to have it up and running on 15 June 2008.[12] It will be introduced at regional level. It will save us a lot of time. It will also improve the flow of information, and the quality (...).

[12]In the meantime this system has been successfully brought into use.

In this way, the notion of centralising information has changed. The organisation of risk management within the WHO is no longer physically located in one place in the Headquarters, more exactly in the SHOC Room. Information will now be centralised within the 'global EMS', which will also mean that it can be more easily accessed and amended by the people concerned, at any time and from any location:

> It is not correct to say that it is centralised in the SHOC Room. It is centralised in the EMS. This is a global system. (. . .) It is not centralised in the SHOC Room; it is centralised using a platform known as the Event Management System.

In contrast, one of the roles of the WHO is to gather together the key experts required to deal with the new cases of a disease that have been identified. Using modern technology it is possible to put experts from around the world in contact with each other, in a manner appropriate to the urgency of the situation. Thus, there is a global coordination of events at one main point, which means that there are different geographical scales:

> The project talks to the regions electronically every day to exchange views through the event management system. They also have telephone conferences at least once a week when they go through all the events in the region. It's important to understand that the world has moved on and that expertise no longer resides in one place. Everyone has something to contribute: the regional aspect, the country aspect and the truly global aspect. Everybody needs to be heard and our job is to bring together the right people.

2.5.2 'Living' Information

Currently, an item of information can follow a variety of paths. It can be picked up by a number of protagonists and be transmitted in different ways. In a crisis, the speed at which it is picked up and then transmitted to the relevant actors is the determining factor. Following the development of new communication technologies, and thanks to the Internet and the increasing use made of it, information can be disseminated on a very 'small' scale. This makes it impossible to keep control of everything:

> You can't hide or control information, and you can't force it to go one way or another. We are constantly adapting to this ever-changing environment.
>
> Information just gets disseminated everywhere and some of it comes up to us here.

The WHO therefore has to adapt constantly to this new way in which information is communicated, which can no longer be centralised at one specific location:

> It's all becoming interconnected. The notion that you can centralise and control, information is screwed.

The WHO is paradoxically also very wary when it comes to rapid dissemination on a large scale. It is concerned about the possible onset of a sense of panic within the population, leading to panic-driven movements, which could have disastrous repercussions within a country or even at international level. For this reason, it is

important to verify and confirm information with official institutions before taking decisions and communicating the status of a crisis situation to a wider audience. The WHO needs to monitor all the information it possesses, in a proactive manner:

> (...) in today's world you can't control information. It is going to leak out in some place or another or in many places all at once. And rather than waiting for that to happen, it requires a much more proactive approach to managing the media and the risk communication aspects.

While it is impossible to control the quantity of information on a global level, the WHO goes to great lengths to analyse the quality of the information. Risk management at the WHO includes verification and an examination of the truth of the information. These are the criteria which Member States and the experts then use to analyse and study the risks inherent in the situation under consideration and then act accordingly. In the words of the head of the Alert and Response Operations team:

> Obviously, information is available and nobody can control it, but it's the quality of information that counts. Even if there is tons of information about the same event, our role is to bring quality to the information that exists. Many others disseminate information on our behalf.

The dissemination of information is something that cannot necessarily be controlled, as the information can be picked up and sent around the world as widely as technology will permit. This information 'lives' or exists if it is received by an active receptor and subsequently confirmed to be true. In order for it to be useful, and to be used as long as it is still useful, it must be picked up by key actors, who will then transmit it to the appropriate people, who will act upon it if required. For the WHO it is the quality of the information that determines whether it will be kept. This is the goal of this risk management system, which uses these networks linking together different scales, people and decision levels.

2.5.3 Transcalar Circulation of Information

As a result of the decentralisation of the structure of the WHO, every scale has to be taken into consideration, both in the information circulation process and in decision-making. Communication does not only flow upwards or downwards, passing through a central point. The flow may circulate between the focal point and one of the regional offices, or between the focal point and the Headquarters, or even between a regional office and the Headquarters. If the information proves to be important, it will automatically pass through these three decision-making levels. Each of these stages forms an important node in the WHO risk management system. Each transmits information aimed at one of the other receptors or even both simultaneously. It is worth pointing out that the Headquarters represents one node, the regions 6 and the focal points 193 nodes (reflecting the number of Member States). However, they are mutually interdependent. When a crisis occurs, the information must reach all these levels in order to allow a response as fast

as possible, as well as to respect the revised IHR. Also there are subnodes that interact with the principal actors, most notable the laboratories, the NGOs, the IOs the GPHIN and the GOARN.

The key actors involved in risk management are located at different levels: national (focal point), regional (regional office) and international (Headquarters). Their role is to circulate and disseminate information across the various levels. This management system and its associated efficient logistic system allow rapid and effective coordination (according to the WHO) in the event of an increased risk or a crisis. Each level is composed of experts, notably doctors and veterinarians.

The decisions taken within the nodes have repercussions at different levels, depending on the severity of the event. If there are only a few suspect cases, any intervention required will be arranged at the location in question, so at local level. If, however, the isolated case or cases spread to national and then to international level, the intervention measures will be taken on a corresponding scale. The primary aim of risk management in this case is to 'contain' the disease at local level as far as possible and then to eradicate it. For this reason the WHO developed the Global Outbreak Alert and Response Network, which makes it possible to respond immediately, as soon as the first suspect cases are reported:

> In terms of a preference, we would prefer the event to stay local and, if it can't stay local, at least only regional . . . We really would prefer the event not to become global. That's why many of WHO's activities are focused on building national capacities, so that events can be identified and dealt with as quickly as possible, so that they remain local issues.

The circulation of information is relevant to all geographical scales, each of which is important in its own way. However, it would be wrong to classify and restrict each node to a single geographical level. If we take the Headquarters, we see that it is in Geneva, in other words, in a canton (regional level) and in a country (national level). However, its role is to coordinate actions on an international scale, for example, by organising conferences between Member States. At the same time, the Headquarters may also affect the local level, for example, by sending a team of experts to Nairobi. The scales are not fixed, but random, being determined as a function of the aims and intentions of the actions agreed:

> Here at headquarters we work at global level, and regional offices are also international for us, because they deal with many countries.

2.6 Conclusion

This excursion into the WHO system for monitoring epidemic diseases brought home to us that information only 'lives' if it is grasped, translated and eventually transmitted to the next level, which should then proceed in the same way, and so on, forming a succession of 'holds'. A rumour follows this route and is transformed. It is reconfigured at every stage of the analysis, thanks to the interweaving of human and non-human actors. These are the socio-technical intermediaries that make it

possible to create links between the different levels, ensuring that information can move rapidly across the networks and facilitating an effective system of monitoring the risk of a pandemic. The list, the Global Public Health Intelligence Network and the IHR are examples of such intermediaries. As for the severe acute respiratory syndrome, as it passed through the successive phases and translations, it gradually became 'SARS', progressing from a rumour to an identified epidemic. During the identification process, and the many translations it underwent, SARS has played a role in improving practices in detecting and managing epidemic risks on a global scale.

The intermediaries would not have the same capacity for translation if it were not for the information and communication technology resources available. ICT is able to amplify the range of possible human interventions, using diverse spatial logic. As we have seen, SARS played an important role in bringing about a review of the monitoring system. Paradoxically, to a certain extent it was new technology that enabled this virus to emerge, as once it had been identified it started to exist. It moved from a state in which it did not exist, to acquiring an individuality, on which an identity was conferred. It was precisely the circulation of this information, with the help of ITC that brought it to everyone's notice. For this reason, these technologies must be considered as actants allowing, in this case at the WHO, the creation of both new objects and new knowledge, which can lead to new actions.

Finally, we can highlight the fact that the intermediaries have played a role in expanding the notion of risk and in demonstrating the emergence of a new spatiality. The IHR now demands collaboration with new international organisations. The WHO and the GPHIN work closely with the World Organisation for Animal Health (OIE) and the Food and Agriculture Organization (FAO). In this way, risk is forcing an interstate organisation to go beyond the spatial logic on which it was founded and to follow the spatiality demanded by the risks. Furthermore, the barriers between the human and the animal world have also undergone considerable change, becoming more 'porous' – scientists have noted that 'over the last 10 years, 75 % of emerging diseases were zoonoses'. In addition to this, consideration must be given to food and food production and the need to get to grips with risks at source. In other words, it is not only disease that has proved to be a vector of change but rather the new spatiality inherent in the risk.

Risk management within the WHO has been improved to allow better coordination between experts, Member States and institutions, as well as to increase the effectiveness of actions carried out on site. The SARS epidemic, which has been mentioned as a turning point in the management of pandemic risk, allowed lessons to be learned within this international organisation and led to a rapid revision of risk management measures. All the phases involved in this process, which we have assimilated to 'the three stages of risk' (November 2002), have been included by the WHO. First, the 'before' and the detection of early indications anywhere in the world and their verification by experts at the earliest possible stage; then the 'during', with the emergency measures introduced in the field, notably by the GOARN; and finally, the 'after', including training experts in national laboratories (especially in developing countries), so that all Member States are able to stem the risk of a pandemic.

Another new feature of the WHO's working method is the increased emphasis on seeking to discover the source of the event, no longer restricting the search to humans. The risk of an epizootic and the need to monitor the quality of food are now firmly included in the prevention of epidemic risk. The notion of 'rumour' referred to by our interviewees also demonstrates a desire to strengthen and improve pandemic risk management. All information received is verified and analysed by the experts, including that emanating from unofficial sources. Since it is not possible to manage and control information on a global scale, the emphasis is now on the quality of the information so that it is usable and also used wisely by the various decision-making levels (Headquarters, regional offices and focal points).

The Outbreak Verification System works on the basis of rumour – it is important to recall that this is the term used by the WHO staff themselves – which it defines as non-official information regarding the risk of an epidemic on an international scale (Grein et al. 2000). For this reason, rumours are subject to particular vigilance. This vigilance (Jacques Roux 2006), requires there to have monitoring, together with a cautious approach to unknown or little known risks. The conditions required to deal with unexpected danger are adjusted to allow a response where needed. This is the way the WHO sees rumour, remaining vigilant at a very early stage in the process that may lead to an actual alert. We understand that SARS, before becoming a risk, also started as a rumour and required vigilance, monitoring and warning.

Following the discussion of the agenda at the daily meeting, the Headquarters contacts regional and national offices (focal points), which then also proceed with the task of verification. (Generally speaking, the verification process takes 24–48 h.[13]) Once rumour becomes information, having passed through the stages of verification and becoming official according to the WHO, it is transformed into a fact. At this point the actual action mechanism (the response) is initiated, following a further round of discussions in the SHOC Room. Within the WHO, it seems to have been established that 'information lives', as one of our interviewees put it, and it is simply not possible to control the vast amount of information that is available across the globe. For this reason, the WHO has chosen to adopt a strategy of verifying the quality of the information. This is the construction of an item of information verified by the structures of the WHO, whereby the list acts an intermediary, allowing the status of information to be negotiated.

The circulation of information is no longer centralised, rather it has become a global process. Information and communication technologies make it possible to operate across the different geographic and institutional levels using a decentralised organisation. For this reason, we can state that information circulates on the basis of relations of connexity. This term 'describes the density of the links between the nodes of a network' (Brunet et al. 1992). As we have already seen, the transmission of information within the WHO takes place within the networks, where it transits through three major nodes: the Headquarters, the regional offices and the national focal points in the Member States. In addition, this same proximity can be found at

[13]This was the information given to us by Dr A during our interview.

all levels and is intensified by the regionalisation of activities within the WHO. The teleconferences between the experts (from these three nodes) are a good example of this connexity. The transmission of information does not depend on the physical distances between locations, but makes use of platforms and networks that negate the geographical distances. The transmission of the information and the communication between experts is possible thanks to technology (in this case the video conferences) and can be achieved in 'real time', with no physical or temporal obstacle preventing the information from reaching the desired target. This makes for greater precision regarding the decisions made, the choice of the most appropriate personnel and the action aimed at the location or locations affected.

Air travel has shortened distances. Travellers can go from one country to another, without having to suffer the inconveniences caused by the climate or the territory. The same is true of viruses. They are carried round the world by tourists and can easily adapt to their new environment. Microbes are transmitted in a similar way. National borders have been eliminated, both with regard to the spread of microorganisms and in the management of epidemic risk across the globe, thanks to the interconnecting networks that have been established. The borders, and the links to a particular territory, exist only in terms of identifying the source of the risk. As soon as an event has been detected, the networks take on the key role in ensuring the circulation of information and also the management of epidemic risks within the WHO.

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