THE MEDICAL AND PHARMACEUTICAL INDUSTRY
IN IRELAND AND ITS CHALLENGES FOR THE
FREIGHT FORWARDER

Dissertation for the Young Freightforwarder of the Year Award 2011

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FOREWORD

Without challenges life is a routine, a slow death.

— Albert Einstein [12]

It is our duty as freight forwarders to embrace the ever-changing challenges that this profession offers; its beauty lies in finding solutions to an infinite variety of shipments from a standard parcel shipment with a courier to a more challenging out-of-gauge piece, a high temperature-sensitive shipment or the transport of dangerous goods.

In a not very blooming global economy, Ireland has been hit by a devastating economical downturn that has left nearly 20% of the country’s population unemployed and has forced Ireland to accept financial help from the International Monetary Fund and the European Union.

Still, even in this harsh economical climate, the country’s medical industry has managed to maintain a modest but measurable growth, and so have their shipping requirements. It is currently one of the most demanding industries for a freight forwarder and dealing with it often presents a real challenge.

In this project I will investigate these challenges from two drastically different angles: in my first shipment, I will describe an airfreight import from the United States to a laboratory in Ireland of a sample of a rabies-infected animal brain. This shipment is highly sensitive to time and temperature, and it will require special attention in packaging and labelling as well as in properly documenting it in order to avoid customs delays.
The second shipment, on the other hand, will consist of a seafreight export of a piece of medical equipment from Ireland to Tanzania. Although documentation and marking are obviously also important for this shipment, its main challenge lies in its heavy and delicate nature which will require specific care regarding handling and packaging.

It is important to keep in mind that regulations for different means of transport can vary dramatically from country to country; a similar argument can be made for customs evaluations and regulations regarding taxes, duties and import or export licenses.
Part I

Importing infected brain tissue
Laboratory Lab-IE in Dublin, Ireland, is trying to improve an existing commercial vaccine by studying different strains of the virus. In order to obtain a specific strain, Lab-IE has contacted Lab-US, a laboratory in Albany (NY), United States, with which it frequently collaborates. Lab-US has agreed to supply Lab-IE with a sample of racoon brain tissue that is infected with the considered rabies strain.

Shipping infected brain tissue is a non-trivial matter as the sample must remain frozen in order to protect the integrity of the virus. For this purpose, the sample needs to be stored at a temperature of $-70^\circ\text{C}$; if the storage temperature rises above this limit, the sample will no longer be usable for the laboratory’s research. Dry ice will be used in order to meet this temperature requirement.

Lab-IE has nominated Hawthorn Logistics, with which it has a long-standing business relationship, as the designated freight forwarder for this shipment. Due its frequent business with Lab-IE, Hawthorn Logistics has designated a separate area in its warehouse to the lab.

As part of the operations team of Hawthorn Logistics, I will take on the task of arranging this shipment. It will be my responsibility to organize the transport and give advice to the shipper regarding documentation. Since the shipment consists of an average size parcel, I decide to use an air courier for the carriage. Regarding customs clearance on exportation, it will be the courier’s responsibility to obtain the necessary documents from the exporter. I, on the other hand, will be responsible for preparing the
air waybill, as well as for arranging a suitable time for delivery with the importer. I will give advice on the documentation they might need for importation, arrange customs clearance and make sure that the chosen carrier has all the necessary qualifications for handling dangerous goods.

Even though my actions are of rather limited scope, I still need to be aware of the whole shipping process as I am directly dealing with the importer and arranging import customs clearance. Should any problems arise during transportation, I might be asked for advice and since this is a highly temperature- and time-sensitive product, it is very important that fast action is taken in such case.
2 | SHIPMENT DETAILS

2.1 DESCRIPTION

The project shipment consists of a small sample of rabies-infected racoon brain tissue (weighing 4g) surrounded by 15kg of dry ice. The package will have a total weight 16kg and the dimensions of its outer layer are 39.05cm x 34.93cm x 31.75cm. Samples of brain tissue have no commerical value, and it is good practice in medical research to supply such samples free-of-charge to collaborating and trusted laboratories.

The shipping terms for this shipment are Ex-Works New York. The collaborating laboratories have decided that Lab-US will only be responsible for the provision of a properly packed sample in compliance with the corresponding regulations; all other charges will be payable by Lab-IE.

2.2 METHOD OF TRANSPORT

We are arranging most of Lab-IE’s shipments as airfreight but because of the small weight and dimensions of this specific package, I decide to ship it using an air courier. This option is cheaper than airfreight and equally efficient. I will choose FedEx as the courier since their “White Glove Services” can provide trained personnel and specialty equipment for the safe transport of temperature-sensitive shipments.
I will organize collection of the package at a suitable time for the shipper and will prepare and send the air waybill to Lab-US by email before collection; this way, once the package is picked up, the air waybill will be scanned and I will be able to track it online.

The package will be transported by road from Albany (NY) to Newark Airport (NJ) from where it will be flown to Dublin. Overall, it should be possible to arrange this transport within significantly less than 48 hours of pickup.\(^1\)

Since FedEx’s White Glove Services do not operate in Ireland, I will have to arrange a separate courier who will have to pick up the package from Dublin airport and deliver it to Lab-IE. This is a trusted courier with which we frequently cooperate, and I specifically instruct him to deliver the package to the named recipient in person in order to ensure that the shipment can promptly be processed in the lab. Since the packaging is reusable, I offer our client to organize collection of the packaging and to store it in our warehouse.

### 2.3 Relevant Regulations

Infected brain tissue can be classified as an “infectious substance, category B” (see section 3.2) and as such any relevant dangerous good regulations\(^2\) need to be taken into account. Since this is an international shipment from the US to Europe by both road and air, we will need to comply with such regulations on national and international levels:\(^3\)

- USA Department of Transport Regulations.

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1 for more details see appendix G.1.
2 for an overview, see [6]
3 for more information see [8]
• International Air Transport Association Dangerous Goods Regulations.

• European Agreement concerning the International Carriage of Dangerous Goods by Road.

2.4 PARTICIPATING AGENTS

In order to ensure that our shipment arrives without delays and in good condition, we will need to arrange a good coordination and communication between the shipper, the shipping agent and the consignee. For this matter, it is crucial that all parties involved in the transport comply with their specific responsibilities.

I, as the shipping agent, will prepare the necessary documentation for transport, such as permits, dispatch and shipping documents. I will also provide advice to the sender regarding the necessary shipping documents and will give instructions for their completion (i.e., commercial invoice, packing list, air waybill, etc.). Likewise, I will provide information to the importer about import permits and other documentation necessary for transport and customs clearance. Finally, I will arrange the most direct routing in order to ensure a speedy delivery.
The other involved parties are:

- **THE SHIPPER (LAB-US):** the shipper will make advance arrangements with the consignee (Lab-IE), including the need for export permits. He will also make sure that the shipment qualifies for appropriate transportation by using correct packaging.

- **THE CARRIER:** the carrier will be a courier company that will also act as the customs clearance agent for exportation. The carrier will need to make sure that the vehicles used for transportation comply with any applicable regulations regarding the transport of infectious substances, Category B.

- **THE IMPORTER (LAB-IE):** in order to facilitate the process of customs clearance, the importer will obtain necessary authorizations from national authorities and will provide me with all required import permits and documents. He will also advise the most suitable time for delivery and will acknowledge receipt to the sender.
This chapter will outline the packaging, documentation and transport requirements that have to be addressed during the planning phase of such a shipment.

3.1 BINDING TARIFF INFORMATION (BTI)

Since a sample of infected brain tissue is temperature-sensitive item, delays (such as customs delay or delays due to inappropriate documentation) should best be avoided. For this reason, appropriate documentation and a correct tariff classification are crucial.

This is the first time that Lab-IE is importing such samples. In order to make sure that the tariff code used for its importation is acceptable, we will apply for a BTI to the Irish Customs administration. This will provide us with a tariff classification for our samples that will be legally binding throughout the EU and will be valid for up to three years.¹

¹ a BTI application form can be found in appendix A.
When shipping biological material, a proper classification of it is important as packaging and transport regulations may vary for differently classified shipments.

According to both ADR and IATA regulations, rabies-infected animal brain tissue can be classified as an “Infectious substance, Category B”. The UN number for this commodity is 3373 and its proper shipping name is “Biological substance, Category B”.

### 3.3 Packaging

There are specific requirements for the type of packaging used for Infectious substances, Category B; they must be triple-packaged and compliant with the specifications corresponding to class 6.2 of the UN regulations as well as with the Packing Instruction PI650 of the IATA Dangerous Goods Regulations for air transport and the P650 of the ADR.

The shipper must ensure that the shipment is performed in compliance with such regulations and that the package is prepared in a manner such that it presents no hazard to persons or animals during transport and arrives in good condition at its destination.

A sample of infected brain tissue needs to be triple-packaged in the following fashion:

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2 see [3] and [4]
3 see [4], pages 475-478
4 see [3], pages 146/147
• The sample is contained in a primary receptacle which must be sifter-proof.

• This primary receptacle is enclosed in secondary packaging, also sifter-proof.

• The outermost layer is a layer of rigid outer packaging which must not contain more than 4kg, excluding any added dry ice.

In our case the brain samples are frozen and placed in zip-locked plastic bags; in order to avoid breakage, it will be supported by two hard cardboard plaques. This will be our primary package.

As a secondary package we will use a polystyrene box, made from a lightweight, non-toxic and 100% recyclable material. This box has outstanding insulating and protective properties and a very low rate of thermal conductivity which will allow the samples to maintain a stable temperature. Furthermore, the material of the box functions as a good cushioning layer, and combined with additional cushion and absorbent materials placed between the primary and secondary container, it will protect the samples from vibrations.

It is recommended to use 2.5 - 5 kg of dry ice per 24 hours. Considering that the transit time of our shipment should be 48 hours or less, we will therefore require 5 - 7.5 kg of dry ice. To account for uncertainties because of delays due to weather conditions, customs inspections, etc., we will use 15 kg of dry ice. This dry ice will be placed between the secondary and outer packaging in a manner such that it will not shift when the dry ice dissipates.

The overpack (or outer packaging) must be rigid and with at least one surface of a minimum dimension of 100mm x 100mm, and it must be marked with the word OVERPACK. As a concrete example for the outer
packaging layer consider the Medi-Freez Insulated Overpack. For more details, see appendix B.

34 MARKING AND LABELLING

Appropriate marking of the package is vital as it provides information about the package’s contents, the nature of the hazard and the relevant packaging regulations.

All packages containing infectious substances must be marked durably and legibly on the outside of the package with the name and telephone of a person responsible for the package. Handwritten marks are not allowed.

The outer container of our shipment must display the following on two opposite sides:

- Sender’s and recipient’s names and addresses.

- Category B, infectious substance label, UN 3373.

- Proper shipping name: “Infectious substance, Category B” in letters at least 6mm high adjacent to UN 3373 label and net quantity of infectious substance, in this case 4g.

- Name and phone number of person responsible for shipment.

- Requirements of temperature control (optional).

- Orientation arrows on both ends (recommended).

- Class 9 label for Dry Ice, including UN 1845, and net weight.

See appendix C.1.
As previously mentioned, to keep our sample at its required temperature (−70°C) we will use dry ice which the US DOT and IATA classify as a “miscellaneous” hazard, class 9. It is considered hazardous during transportation for three reasons:

- **Explosion hazard:** dry ice releases carbon dioxide gas as it sublimes. If packaged in a container that does not allow for release of the gas, it may explode, causing personal injury or property damage.

- **Suffocation hazard:** a large volume of carbon dioxide gas emitted in a confined space may create an oxygen deficient atmosphere.

- **Contact hazard:** dry ice is a cryogenic material that causes severe frostbite upon contact with skin.

Packaging dry ice properly will minimize these risks; the IATA packing instructions 954 must be applied.

The dry ice must be placed around the secondary packaging and interior support must be provided to secure the secondary packaging in the original position after the dry ice has dissipated.

The primary receptacle and the secondary packaging must maintain their integrity at the temperature of the dry ice, −70°C. The outer packaging must be designed to permit the release of carbon-dioxide gas in order to eliminate the explosion hazard.

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5 for more information see [11].
Suffocation and contact hazards will be reduced by labelling the package correctly so that those who come in contact with it will be aware of the contents.

The outside packaging must be marked with the following additional information:

- The words “Dry Ice” or “Carbon Dioxide Solid”.
- The UN number for Carbon Dioxide Solid (UN 1845).
- The net weight of the dry ice.
- A Class 9 Miscellaneous Dangerous Goods, UN 1845 label affixed on the same surface of the package near the proper shipping name and adjacent to the shipper’s or consignee’s address. The net weight of dry ice has to be indicated in kilograms.

In order to make sure that the carriage of dry ice complies with the pertinent regulations we can use a check-list provided by the IATA.

Because of the dangerous nature of these goods, the completed package (triple packaging) must be capable of successfully passing the “drop test” from a height of 1.2m without leakage from the primary receptacle.

In the case of a damaged package resulting in leakage, the carrier must immediately contact the person responsible for the shipment and the pertinent health authorities. This information should be found on the outer

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6 see appendix C.2
7 see appendix D
packaging. He should then examine adjacent packages for possible contamination and separate packages with suspected contamination from the rest. In the event of contact between infected samples and non-intact skin it is advisable to wash the affected area with soap and water or with an antiseptic solution.

Dry ice is extremely cold and should not be handled with bare hands. Carriers will be trained in handling dangerous goods and use protective gloves and equipment.

In order to prepare the packaging container for reuse or storage, the dry ice needs to evaporate from the package. This should be done in a well-ventilated area such that no build-up of carbon dioxide vapor can occur.

3.7 DOCUMENTATION

For infectious substances, category B, dangerous goods documentation such as the shipper’s declaration of dangerous goods is not required. The following documentation, however, is required:

- Packing list

- Proforma invoice, including the shipper’s and consignee’s addresses, number of packages, details regarding the contents, weight and value. In our case, the samples are transferred free of charge, so the invoice should state “no commercial value”.

- Export licence, provided by the sender, Lab-US.
• A rabies specimen history form from the exporter, Lab-US, should be placed between the secondary and outer packaging, as well as an itemized list of the package’s contents.8

• Import licence, provided by the importer.

• Air waybill: the air waybill is the most important document for transport and is evidence of the contract of carriage. As it is not the title of the goods, it is a non-negotiable document.

Since this shipment involves both dry ice and an infectious substance, we must include specific information on the air waybill in the “Nature and Quantity of Goods” or “Content” section (in this order):

– The proper shipping name of the content being cooled: Biological Substance, Category B.

– The proper shipping name of dry ice: Dry Ice or Carbon Dioxide, Solid

– The UN number (UN 1845).

– The net weight of dry ice per piece.

In our case, the air waybill must therefore include the statement “Biological Substance Category B, Dry Ice, 9, UN1845, 1 piece at 15 Kg”. FedEx has a check box on their airbill to satisfy this requirement.

• Single Administrative Document (SAD): it will state the type of the imported goods, detail their movement and give the commodity code (or Tariff heading) as well as the customs procedure code (CPC). Since this shipment consists of biological samples for laboratory re-

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8 see appendix E
search, it is exempted of duty and VAT. To make sure that customs treats this shipment properly, I will insert the code C33 in box 37b.

- BTI Form: for customs clearance upon importation I will provide a copy of the BTI document attached to the hard copy of the SAD and I will insert the code D22 and the BTI reference number in Box 44.

- Customs Clearance Note.

3.8 Insurance

Insurance is often required in order to safeguard the goods against possible loss, damage, theft, etc. during transportation. The limits of liability of the Irish Road Haulage Association are EUR 1800 per tonne of the gross weight of the goods in case of loss or damage. In the case of airfreight, the limits of liability according to the Warsaw/Montreal Convention are SDR 19 (Standard Drawing Rights) per kilo of the gross weight of the goods lost or damaged. Since this liability is higher than the value of the goods I recommend to not take out insurance.

3.9 Costs

The costs of this shipment can be broken down as follows:

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9 according to article 100 of the Customs Code, see also [15]
10 the SDR rate on 30/03/2011 according to the International Monetary Fund [13] was 1 SDR = 1.121150EUR.
<table>
<thead>
<tr>
<th>Service</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air courier (this includes collection of the parcel from Lab-US)</td>
<td>EUR 149.83</td>
</tr>
<tr>
<td>Customs clearance</td>
<td>EUR 55</td>
</tr>
<tr>
<td>Road courier from airport to Lab-IE</td>
<td>EUR 30 + VAT</td>
</tr>
<tr>
<td>Duties and VAT</td>
<td>exempt</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>EUR 241.13</strong></td>
</tr>
</tbody>
</table>
Part II

Exporting a CT scanner
Moshi is a town in Tanzania with a population of roughly 150000 (and 400000 in the surrounding rural areas). Only one of Moshi’s three hospitals is equipped with a CT scanner. More CT scanners are required in order to provide an adequate supply of medical services to the town’s population, and to improve its reputation as a base for expeditions to Mt Kilimanjaro: in order to properly diagnose the extent of acute altitude sickness, CT scans may be required.

When handing out donations involving high-tech equipment, NGOs are typically looking for regions where such equipment is of direct benefit to the local population, where it strengthens the local economy and where a self-sustainable, continued use of it is possible. Moshi fulfils all three of these requirements, and for this reason the NGO “Health for Tanzania” has decided to donate a CT scanner to the city of Moshi.

A CT scanner is an extremely delicate piece of equipment and proper care must be taken when handling, packing and shipping it. It is very heavy and of great dimensions, and therefore requires specialized vehicles for its handling and transport. It is also important that the scanner has been decontaminated before transport and that it is lifted using the correct rigging points.

“Health for Tanzania” has nominated Hawthorn Logistics as the designated freight forwarder for this shipment. I decide to carry out this shipment by means of seafreight in a dedicated container in order to make sure the machine arrives safely and without any damage. I will be responsible
for arranging transport with the shipping line and export customs clearance as well as for advising the shipper regarding export documentation. Furthermore, I will be in contact with our local partner in Africa who will organize import clearance, advise local charges and arrange road freight to Moshi.
5 | SHIPMENT DETAILS

5.1 DESCRIPTION

This shipment consists of a CT Scanner (Siemens Somatom Sensation 16 slices) which, for easier movement, has been disassembled and crated into two main pieces with the following weights and dimensions:

- Gantry: 252 x 119 x 229cm (L x W x H), 2250kg
- Patient table: 250 x 90 x 100cm (L x W x H), 117kg

While this type of machinery would cost between EUR 500k and EUR 1000k if bought factory-new, “Health for Tanzania” has managed to buy a second-hand, refurbished CT scanner for EUR 80k. The NGO’s prime interest is to ship the scanner in a way that is both economical and secure. Time considerations are only of subordinate interest.

Delivery terms are Delivered Duty Paid (DDP), i.e., the shipper is responsible for making the goods available at the named place in the country of importation, in this case Mawenzi Hospital, Moshi. The NGO will bear the risks and costs including customs duties, taxes and other costs incurred to carry out the delivery.

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1 see appendix F
2 see Incoterms 2010 [5]
3 see [16]
5.2 METHOD OF TRANSPORT

Because of the humanitarian nature of this shipment, there is no pressure regarding an arrival deadline, and the shipper is looking for the cheapest option; for this reason, I decide that the best option is seafreight.

The CT scanner will be picked up from refurbishment company “Old-As-New” in Carlow and delivered to Dublin port. For this purpose, I will ask the shipping line to release the container to us and arrange a truck that will take the empty container to “Old-As-New”. The two pieces will then be loaded onto the container using a gantry crane that the refurbishment company has in their premises. The container will then be brought to Dublin Ferryport Terminal from where it will be shipped to Mombasa Port, Kenya.

Initially, I considered to ship the CT scanner to Tanzania’s main port Dar es Salaam. However, there are several reasons that suggest otherwise: the closest port to Moshi is actually in Mombasa, Kenya, and the road conditions in Kenya are better suited for transportation involving heavy trucks; choosing Mombasa over Dar es Salaam should therefore reduce the road freight costs. Since Mombasa is situated roughly 500km north of Dar es Salaam, also the sea-bound part of the transport will be shorter and thus cheaper. In addition, Mombasa is considered to be the gateway to East Africa as it has been the hub for international trade in the region since the late 19th Century. It has, therefore, the necessary experience and equipment for servicing a wide variety of cargos and for handling machinery and containerized cargo.

Once in Mombasa port the container will be offloaded and the two pieces will be transported by road to Moshi.

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4 for more information see [14]
5.3 RELEVANT REGULATIONS

This shipment will be subject to several road transport regulations from different countries such as those issued by the Irish Road Haulage Association, the Ministry of Transport of Kenya and the Surface and Marine Transport Regulatory Authority of Tanzania.

Likewise, it will have to comply with the regulations for the international carriage of goods by sea, governed by a series of international conventions which set out the minimum terms and conditions for international carriage. These conventions are the Hague Rules, the Hague-Visby Rules and the Hamburg Rules.5

5.4 PARTICIPATING AGENTS

Shipping a CT scanner from Ireland to Tanzania will involve the coordinated cooperation of several parties who all play an important role in ensuring that the shipment is carried out in a timely, safe and economical manner.

As the shipping agent, it is my responsibility to organize the transport, to arrange exports customs clearance, to advise the shipper on any required export documentation, and to liaise with a local partner in Africa. I will also arrange a fitting marine insurance policy.

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5 for more information see [7].
The other involved parties are:

- **THE SHIPPER (NGO “HEALTH FOR TANZANIA”):** the shipper is liable for arranging the availability of the donated good, and will provide a commercial invoice and relevant export documentation for it.

- **THE CONSIGNEE (MAWENZI HOSPITAL, MOSHI):** the shipping terms are DDP, i.e., the consignee or receiver is not responsible for any charges, risks or similar problems that occur during transport. The consignee needs to appoint a date for the delivery of the CT scanner, and make sure that a qualified team for offloading and for installing the scanner is present in the hospital at said date.

- **THE SHIPPING LINE:** the shipping line will advise me, the shipping agent, about available vessels and about the estimated transit time. It will furthermore provide the bill of lading.

- **THE LOCAL PARTNER:** our local partner in Mombasa will give me advice regarding local charges (such as terminal handling charges, charges for import customs clearance, ISPS) and about preferred routes for road transport, and will organize the road transport to the shipment’s final destination.
6 PLANNING AND PRE-SHIPMENT CONSIDERATIONS

6.1 PACKAGING

Although the patient table does not require special instructions for packaging, both pieces will be packed in an individual crate, in order to avoid damage caused but shifting, chafing, sweating, vibration and jolts during the transport in the container.

The gantry on the other hand contains very delicate material that needs extra attention when packaging. Because this machine is going to be shipped from Ireland’s cold to mild climate to Tanzania’s warm climate, it is very likely that moisture will build up inside the container. To avoid damage to the gantry’s internal elements caused by rust and moisture, the gantry will be placed in a bag which will be vacuumized. Desiccant will be used to further absorb moisture.

Each of the two crates will consist of a skeleton crate mounted on skids in order to facilitate the handling and loading/offloading of the crates.
6.2 CHOOSING AND STUFFING THE CONTAINER

When shipping the CT scanner to Mombasa, we can either designate a full container to our shipment or consolidate it with other shipments. Although a consolidated shipment might be slightly cheaper, the integrity of our shipment can be assured with higher probability if it is shipped in its very own container. This will also reduce potential insurance costs.

A 20’ container appears to be a good option, but the dimensional constraints of our shipment need to be satisfied. A particular problem is posed by the height of the gantry: the door of a standard 20’ dry container is not big enough as the door’s height is only 220cm while our crated gantry is 229cm high. The internal height of the container on the other hand would suffice: it can accommodate shipments up to a height of 238cm. The best option then would be to use a 20’ open top container that would allow us to insert the gantry through the roof. Length and width do not pose any inconvenience as the container is 520cm long and 230cm wide; in other words, when inserting gantry through the container’s roof, we have more than one meter of freedom in either direction; this should be generous enough to allow the crane to position the gantry inside the container without running the risk of damaging the sensitive equipment by hitting one of the container’s walls.

Loading a container through its roof is more expensive than rolling the shipment into the container through either its door. For the gantry we have no other choice but to use the container’s top, but the patient table is low enough so that it fits through either door. For this reason, we will arrange a fork lift and push the table into the container through its front door.

When handling the gantry with the crane, special attention should be paid to the rigging points of the crate and its centre of gravity. This assures
that the equipment does not unintentionally flip over when being lifted and loaded into the container. Once gantry and table have been placed into the container, proper strapping will be applied to affix the shipment to the container walls.

6.3 MARKING AND LABELLING

Appropriate marking and labelling for the shipment is vital for its identification and safe handling. The marks must bear the name of the inland place of destination and the port of entry to the country, in this case, Moshi via Mombasa. These marks must be made with large clear letters and on three faces of each package (preferably side, end and top).

It is important that handling marks such as “this way up” and “sling here” are dealt with by using the appropriate international symbols; the two crates shall be marked indicating the centre of gravity and sling points to facilitate handling. See appendix C.3 for such marks.

For international shipments, the handling instructions should be written in the language of the destination country. Official languages in Tanzania are Kiswahili and English. For this reason, all instructions will be expressed in English.

Although the shipping mark is the principal identification for the international movement of goods, we will need a label for the delivery of the crates to the correct loading station to the order of the correct carrier.
6.3.1 UN 2911

One of the components of the gantry is an X-ray tube which is emitting a low level of radioactivity. According to the World Nuclear Transport Institute, the gantry, containing the X-ray tube, is an excepted package in terms of radioactivity; this means that its radioactive content is of such low level that no testing or special packaging are required. Therefore the crate containing the gantry will only need to bear the UN 2911 Radioactive material, Excepted package (see appendix C.5).

6.3.2 ISPM-15

According to the International Standards for Phytosanitary Measures No. 15 (ISPM-15), all solid wood packing material for international shipments are required to be heat treated and stamped with an official mark. The two crates will bear the IPPC (International Plant Protection Convention) mark.¹ This label shall be legible, permanent, not transferable and placed in a visible location, preferably on at least two opposite sides of each crate.

6.4 KENYAN TRANSIT CUSTOMS PROCEDURE

The procedures for importing to Mombasa are usually time consuming, bureaucratic and strictly enforced; provided all correct documentation is sent within four or five days prior to arrival of the container, customs clearance will, according to our agent, take up to three working days.

¹ see in appendix C.4.
Besides the usual documentation needed for customs clearance, these are the documents that will be required:

- Certificate of Origin
- Phytosanitary Certificate
- Non-Radioactivity Certificates
- Cargo Manifest
- Waiver of Northern Corridor Transit Transport Authority.

In order to make sure that our documentation complies with Kenyan and Tanzanian customs procedures, I will send a pre-alert with a draft of all relevant documents to our agent in Mombasa.

Among other formalities for customs procedure, the truck used for the transport of the container will have to pass through a designated transit point and report for verification/stamping of documents at every transit monitoring office along its route until the border crossing.

Goods passing through Kenya on transit to other countries are subject to a VAT charge which will be refunded once the proof of export is provided.²

6.5 ROAD TRANSPORT TO MOSHI

Once our shipment has been customs-cleared in Mombasa, it needs to be prepared for the overland transport to Moshi. Road transport in Africa can be tricky: many roads do not measure up to Western standards, potholes are a major occurrence, even major roads are often frequented by pedestri-

² for more information see [9]
ans and cyclists, and African drivers are usually unwilling to drive after dark.

The number of axles for trucks and trailers for road transport in Kenya is 3 with a maximum weight of 28 tons. Our agent will take this into account when arranging the road transport from Mombasa to Moshi.

Overall, the net travel time from Mombasa to Moshi should not exceed 5 hours. Possible delays on the Kenyan-Tanzanian border aside, it should therefore be possible to drive from Mombasa to Moshi in a single day (given that the shipment is cleared and collected from Mombasa Port early in the morning), thus avoiding the dangers and problems of driving after dark in Africa.

6.6 TANZANIAN CUSTOMS CLEARANCE

Once the goods arrive in Tanzania, customs clearance can be arranged. As in Kenya, this process may take up to three or four working days. In order to avoid any additional delay, I will provide our agent with the necessary documentation for customs a few days before arrival.

According to Section A of the Fifth Schedule of Section 114 (Exemptions Regime) of the East African Community Customs Management Act Supplement, imported goods are exempted from duties and taxes in Tanzania if they are intended for use in aid funded projects. “Health for Africa” has made sure that its donation qualifies for this exemption.

---

3 for more information on the routing see appendix G.2.
4 see [1] and [2]; also see [10]
In order to carry out this shipment the following documentation will be needed:

- Commercial invoice including the shipper’s and consignee’s addresses, the number of packages, commodity code, commercial value and date.

- Packing list, stating the number of packages, weight, dimensions and handling specifications (slinging points, gravity centre, etc.).


- Bill of lading: this is the main ocean freight document; it acknowledges that the goods have been received on board, it is evidence of the contract of carriage and it functions as the title of the goods. It will bear the following information:

  - Name of the shipping company
  - Flag of nationality
  - Shipper’s name
  - Order and notify party
  - Description of goods
  - Gross/net/tare weight
  - Freight rate
  - Ocean and feeder vessel
Notice that the goods will only be released once the original BOL has been surrendered to the carrier at destination.

- Valuation Form DV1: since this shipment’s invoice value exceeds EUR 10000, this form will be required. In order to declare it, I will insert the code N934 in box 44.

6.8 INSURANCE

The limits of liability of the IRHA\(^5\) are EUR 1800 per tonne of the gross weight of the goods in case of loss or damage. For sea freight, the Hague Visby Rules define the limit of liability as SDR 666.67 per package or unit, or SDR 2 per kilo, whichever is higher.

Because of the high value of this shipment, I recommend to arrange extra insurance. It is not my responsibility as a freight forwarder to arrange insurance unless I receive written instructions to do so; after receiving confirmation from the shipper, I contact our marine insurance company which quotes me USD 153.10.

\(^5\) see page 18.
The costs of this shipment can be broken down as follows:\(^6\)

<table>
<thead>
<tr>
<th>Description</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Delivery of the empty container to Old-As-New</td>
<td>EUR 80</td>
</tr>
<tr>
<td>Loading the container and delivery from Old-As-New to Dublin Ferryport Terminal</td>
<td>EUR 395 + VAT</td>
</tr>
<tr>
<td>Export Customs Clearance</td>
<td>EUR 55</td>
</tr>
<tr>
<td>Sea freight Dublin Port to Mombasa Port</td>
<td>USD 2750</td>
</tr>
<tr>
<td>Dublin Local charges:</td>
<td></td>
</tr>
<tr>
<td>Terminal Handling Charges</td>
<td>EUR 160</td>
</tr>
<tr>
<td>Agency</td>
<td>EUR 75 + VAT</td>
</tr>
<tr>
<td>Documentation Fee (Bill of Lading)</td>
<td>EUR 25</td>
</tr>
<tr>
<td>Seafreight surcharges:</td>
<td></td>
</tr>
<tr>
<td>CAF</td>
<td>11% of the seafreight</td>
</tr>
<tr>
<td>BAF</td>
<td>USD 350</td>
</tr>
<tr>
<td>War risk</td>
<td>USD 35</td>
</tr>
<tr>
<td>ISPS</td>
<td>USD 25</td>
</tr>
<tr>
<td>Kenya Transit Procedure</td>
<td>USD 75</td>
</tr>
<tr>
<td>Import Customs Clearance Tanzania</td>
<td>USD 125</td>
</tr>
<tr>
<td>Duties and VAT</td>
<td>exempt</td>
</tr>
<tr>
<td>Total</td>
<td>EUR 3479.60</td>
</tr>
</tbody>
</table>

---

\(^6\) based on an exchange rate of EUR 1 = USD 1.4136.
CONCLUSION

In his day-to-day work, a freight forwarder often deals with the same clients for which he repeatedly arranges similar shipments. It is however not unusual that new clients inquire about shipments with rather peculiar requirements, and it is crucial that the freight forwarder is able to respond to such needs in a fast and effective manner.

Writing this dissertation has allowed me to increase and refresh my knowledge about the freight forwarding industry. I have tried to give as much detail as possible for the two shipments, and I have come across a wide number of regulations and specifications that I do not usually need for my daily shipments. While some documentation (e.g., commercial invoice, bill of lading, air waybill) is similar for most shipments, shipment-specific regulations can vary wildly. It is fascinating to see the amount of work and attention to detail that can be required when shipping even the tiniest possible item (such as a brain sample).

In this dissertation I described two very different shipments: while the difficulty of importing a brain sample from Ireland to the US lies mainly in compliance with packaging regulations (ADR, IATA) and the use of dry ice, the shipping of a CT scanner poses challenges regarding the proper handling of its large, heavy and delicate components and regarding the organization of a low cost, but effective transport to an exotic destination. Comparing the nature of these two shipments shows how rich in variety, how challenging and how rewarding the freight forwarding profession can be.
Appendix
## BTI Application Form

**EUROPEAN COMMUNITY**

<table>
<thead>
<tr>
<th>1. Applicant (full name and address)</th>
<th>2. Holder (full name and address)</th>
<th>3. Agent or Representative (full name and address)</th>
<th>4. Reissue of a BTI</th>
<th>5. Customs Nomenclature</th>
<th>6. Type of Transaction</th>
<th>7. Classification Envisaged</th>
</tr>
</thead>
<tbody>
<tr>
<td>Registration Number:</td>
<td>Telephone Number:</td>
<td>Telephone Number:</td>
<td>BTI Reference Number:</td>
<td>Please indicate in which nomenclature the goods are to be classified:</td>
<td>Please indicate where in your view the goods are classified:</td>
<td></td>
</tr>
<tr>
<td>Place of Receipt:</td>
<td>Fax Number:</td>
<td>Fax Number:</td>
<td>Valid from:</td>
<td>Harmonized System (HS)</td>
<td>Nomenclature Code:</td>
<td></td>
</tr>
<tr>
<td>Date of Receipt: Year Month Day</td>
<td>Customs ID:</td>
<td>Customs ID:</td>
<td>Year Month Day</td>
<td>Combined Nomenclature (CN)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BTI Application Language:</td>
<td></td>
<td></td>
<td>Nomenclature Code:</td>
<td>TARIC</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Images to be scanned: Yes No</td>
<td></td>
<td></td>
<td></td>
<td>Refund Nomenclature</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Date of Issue: Year Month Day</td>
<td></td>
<td></td>
<td></td>
<td>Other (Specify):</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Issuing Officer:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>All Samples returned: Yes No</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Important note**

By signing the declaration, the applicant accepts responsibility for the accuracy and completeness of the particulars given on the form and on any continuation sheet(s) attached to it. The applicant accepts that this information and any's photograph(s), sketch(es), brochure(s) etc., can be stored on a database of the European Commission and that the data or any photograph(s), sketch(es), brochure(s) etc., submitted with the application or obtained (or obtainable) by the administration, and which have not been marked in boxes 2 and 6 of the application being confidential, can be disclosed to the public via the Internet.

**4. Reissue of a BTI**

If you are applying for the reissue of a BTI, please complete this box.

<table>
<thead>
<tr>
<th>BTI Reference Number:</th>
<th>Valid from: Year Month Day</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nomenclature Code:</td>
<td></td>
</tr>
</tbody>
</table>

**5. Customs Nomenclature**

- Harmonized System (HS)
- Combined Nomenclature (CN)
- TARIC
- Refund Nomenclature
- Other (Specify): ________________

**6. Type of Transaction**

Does this application relate to an import or export actually envisaged?

- Yes [ ]
- No [ ]

**7. Classification Envisaged**

Please indicate where in your view the goods are classified.

<table>
<thead>
<tr>
<th>Nomenclature Code:</th>
<th></th>
</tr>
</thead>
</table>

**8. Description of the Goods**

Indicate where necessary the precise composition of the goods, the method of analysis used, the type and quantity of manufacturing process undergone, the value of the goods, the usual trade name and where appropriate, the packaging for retail sale in the case of sets of goods.

(These are additional sheets if more space is required.)

---

**Figure 1: BTI Application Form**
9. Commercial denomination and additional information* (Confidential)

Please indicate which of the information, provided in accordance with box 10 of this application or obtained (or obtainable) by the administration is to be treated as confidential.

10. Samples etc.

Please indicate which if any of the following are enclosed with your application.

<table>
<thead>
<tr>
<th>Description</th>
<th>Brochures</th>
<th>Photographs</th>
<th>Sample</th>
<th>Other</th>
</tr>
</thead>
</table>

Do you wish your samples to be returned: Yes ☐ No ☐

Special costs incurred by the Customs authorities as a result of analysis, expert reports or the return of the samples, may be charged to the applicant.

11. Other BTI Applications* and other BTI held?

Please indicate if you have applied for, or been issued with, BTI for identical or similar goods at other Customs offices or in other Member States.

Yes ☐ No ☐ If yes, please give details and enclose a photocopy of the BTI:

Country of Application: ____________________________
Place of Application: ____________________________
Date of Application: _______ / _______ / _______
BTI Reference: ____________________________
Date of Start of Validity: _______ / _______ / _______
Nomenclature Code: ____________________________

12. BTI issued to other Holders*

Please indicate if you are aware of BTI for identical or similar products already issued to other holders.

Yes ☐ No ☐ If yes, please give details:

Issuing Country: ____________________________
BTI Reference: ____________________________
Date of Start of Validity: _______ / _______ / _______
Nomenclature Code: ____________________________

13. Date and Signature

Your Reference:
Date: _______ / _______ / _______
Signature: ____________________________

*Please use a separate sheet of paper if more space is required.
An example for the outer packaging layer of such a triple packaging arrangement, consider the Medi-Freez Insulated Overpack. Its components are:

- an outer box: 15.375" x 13.75" x 12.5" (39.05 cm x 34.93 cm x 31.75 cm)
- an insulated chest: 12.25" x 10" x 8" (31.12 cm x 25.4 cm x 20.32 cm)
- labels and markings: Class 6 Infectious label, Class 9 Miscellaneous label, Dry Ice mark, Overpack mark
C | LABELS AND MARKS

C.1 INFECTIOUS SUBSTANCE LABEL (UN 3373)

This is an example of the packaging mark UN 3373 for infectious substances, Category B and it consists of:

- Packaging symbol of the UN
- Type of packaging (4G)
- Indication that the packaging has been tested to proof it complies with the requirements corresponding to infectious substances, Category A (Class 6.2)
- Last two digits of the year of fabrication (09)
- Authority responsible for assigning the code (USA)
- Code of producer of the packaging (+AA4447)
C.2 DANGEROUS GOODS LABEL (UN 1845)

Figure 4: Class 9 Miscellaneous Dangerous Goods label, UN 1845

- Name of the label: Dry Ice, UN 1845
- Minimum dimensions: 100 x 100mm, 50 x 50 mm for small packages.
- Number of labels per package: 1
- Colour: Black and white

C.3 HANDLING MARKS

Figure 5: Handling marks
The mark should at minimum include the:

- IPPC symbol

- ISO two letter country code followed by a unique number assigned by the NPPO (National Plant Protection Organization) to the producer of the wood packaging material who is responsible for ensuring appropriate wood is used and properly marked.

C.5 RADIOACTIVE MATERIAL, EXCEPTED PACKAGE LABEL (UN 2911)

Figure 7: Radioactive material, excepted package label, UN 2911
The term “Radioactivity” needs to be mentioned in order to clearly mark the radioactive nature of the shipment.

- The label must have red diagonal hatchings.
- The label may be printed in black and red on white paper or it may be printed in red only on white paper.
- Minimum Dimensions: 74 x 105 mm.
- The label shall be shown in two opposite sides of the crate.
## Acceptance Checklist for Dry Ice (Carbon Dioxide, solid)

(For use when a Shipper’s Declaration for Dangerous Goods is not required)

A checklist is required for all shipments of dangerous goods (9.1.4) to enable proper acceptance checks to be made. The following example checklist is provided to assist shippers and carriers with the acceptance of dry ice when packaged on its own or with non-dangerous goods.

Is the following information correct for each entry?

<table>
<thead>
<tr>
<th>YES</th>
<th>NO</th>
<th>N/A</th>
</tr>
</thead>
</table>

### The Air Waybill contains the following information in the “Nature and Quantity of Goods” box (8.2.3)
1. The UN Number “1845”, preceded by the prefix “UN”
2. The words “Carbon dioxide, solid” or “Dry ice”
3. The number of packages of dry ice
4. The net quantity of dry ice in kilograms

**Note:** The packing instruction “954” is optional.

### Quantity
5. The quantity of dry ice per package is 200 kg or less [4.2]

### Packages and Overpacks
6. The number of packages containing dry ice delivered as shown on the Air Waybill
7. Packages are free from damage and in a proper condition for carriage
8. The packaging conforms with Packing Instruction 954 and the package is vented to permit the release of gas

### Markings & Labels
9. The words “Carbon dioxide, solid” or “Dry ice” [7.1.5.1(a)]
10. The UN number “1845” preceded by prefix “UN” [7.1.5.1(a)]]
11. Full name and address of the shipper and consignee [7.1.5.1(b)]
12. The net quantity of dry ice within each package [7.1.5.1(d)]
13. Class 9 label affixed [7.2.3.9]
14. Inerting materials and labels removed [7.1.1(b); 7.2.1(a)]

**Note:** The marking and labelling requirements do not apply to ULDs containing dry ice

### State and Operator Variations
15. State and operator variations compiled with [2.8]

### Comments

Checked by: __________________________
Signature: __________________________
Date: __________ Signature: __________
Time: __________ Signature: __________

*If any box is checked “NO”, do not accept the shipment and give a duplicate copy of this completed form to the shipper.*

Figure 8: IATA acceptance checklist for dry ice
### RABIES SPECIMEN HISTORY FORM

#### NEW YORK STATE DEPARTMENT OF HEALTH

**Rabies Specimen History**

[Address information]

**FOR LABORATORY USE ONLY**

---

**Animal being submitted for testing:**

1. **Species:**
   - [ ] Owned
   - [ ] Wild (feral) or stray

2. **Age:**
   - [ ] Adult
   - [ ] Juvenile
   - [ ] Unknown

3. **Sex:**
   - [ ] Male
   - [ ] Female
   - [ ] Unknown

4. **Rabies vaccination status:**
   - [ ] Current
   - [ ] Not current
   - [ ] Unvaccinated
   - [ ] Unknown

5. **Was the animal sick or acting strangely?**
   - [ ] Yes
   - [ ] No
   - [ ] Unknown

   **Signs of rabies (check all that apply):**
   - [ ] Neurologic disorder
   - [ ] Paralysis
   - [ ] Difficulty swallowing
   - [ ] Unusual aggression
   - [ ] Other (describe): __________________________

6. **Date of death:__________________________

7. **If killed, how?______________________________

8. **Owner or complainant (REQUIRED):**
   - [ ] Name ____________________________
   - [ ] Daytime phone number ____________________________

   **Location where the submitted animal was found or the exposure occurred:**

   - [ ] House number and street ____________________________
   - [ ] City ____________________________
   - [ ] State ____________________________
   - [ ] ZIP ____________________________
   - [ ] Nearest cross street ____________________________
   - [ ] If public place (e.g., school, church), provide name ____________________________
   - [ ] County ____________________________
   - [ ] Town ____________________________
   - [ ] Latitude (North-South) ____________________________
   - [ ] Longitude (East-West) ____________________________

9. **Was any person bitten by the animal?**
   - [ ] Yes
   - [ ] No
   - [ ] Unknown

10. **Was any person scratched by the animal or had contact with its saliva or nervous tissue?**
    - [ ] Yes
    - [ ] No
    - [ ] Unknown

11. **If the animal is a bat, is there a reasonable probability that any person was exposed?**
    - [ ] Yes
    - [ ] No
    - [ ] Unknown
    
    **Example:** a bat was found near an unattended child or a person who was asleep and unable to tell if they were bitten.

12. **Did any domestic animal have contact with the submitted animal?**
    - [ ] Yes
    - [ ] No
    - [ ] Unknown

   **Species of exposed domestic animal(s):**

   - [ ] ______________
   
   **Specimen prepared by (for drop-off specimens, the submitter):**

   - [ ] Agency ____________________________
   - [ ] Daytime phone number ____________________________

   **Comments:**

   __________________________________________

---

**THE COUNTY HEALTH DEPARTMENT MUST BE NOTIFIED OF ALL HUMAN AND DOMESTIC ANIMAL EXPOSURES**

---

*FOR LABORATORY USE ONLY*

This is a FINAL report. Results of virus isolation tests will be reported only if they contradict the fluorescent antibody test.

- [ ] The fluorescent antibody test was negative for evidence of rabies.
- [ ] The specimen was unsatisfactory for examination due to: decomposition
- [ ] Inappropriate tissue
- [ ] Mutilation
- [ ] Other

**EVIDENCE OF RABIES WAS FOUND BY THE FLUORESCENT ANTIBODY TEST.**

---

**DOH-487 (03/07)**

---

**Figure 9: Rabies specimen history form**
Figure 10: Example of a Siemens Somatom CT scanner
G.1 ALBANY TO DUBLIN

Figure 11: FedEx routing network

FedEx will initially transport the shipment from Albany (NY) to Newark Airport (NJ) by road (on I-87 S); this part of the transport will cover a distance of 255 km and take roughly 3 hours. From Newark, the package will then be flown to Dublin via Memphis (TN) and Stansted (UK). The net flight time for this journey is approximately 12 hours. Factoring in possible delays for loading/unloading, layovers or customs clearance, it should be feasible to comfortably deliver the package to Dublin within less than 48 hours of pickup.
Figure 12: Route from Mombasa to Moshi

Our transport will leave Mombasa and follow road A109 for 150km until it reaches the road junction with A23. A109 has recently been renovated as part of a cooperation agreement between Kenya and China, and is, for African standards, in very good condition. Once the truck has followed A23 for 30km, we are facing the choice between continuing further on A23 or of turning onto road C104. Despite being initially suggested by Google Maps, C104 should best be avoided as taking it would result in a detour of roughly 80km on a road that can best be described as an unsafe dirt road. Instead, our local partner will decide to stay on A23 for a further 80km until we reach the Kenyan-Tanzanian border at Taveta. From here, it will be a mere 35km on decent road conditions to Moshi.


