

Trust Fund for Trade Facilitation Negotiations Technical Note No. 20

Trade transaction modelling

The measure in the WTO context

The purpose of trade transaction modelling (TTM) is to provide a practical overview of the various interactions and information exchanged among different partners in a trade transaction. It can be helpful to governments and traders in detecting opportunities for simplifying and standardising regulations and procedures as part of the clarification and improvement of Article VIII (Fees and Charges) of GATT 1994. Equally, it can be a useful tool for enhancing transparency in the spirit of Article X, which requires that all trade regulations be clearly published and fairly administered.

Background

Modelling and the use of flow charts to graphically represent processes have many antecedents. This technical note takes as the starting point the work of the UN Economic Commission for Europe (UNECE) on 'international trade transaction modelling' undertaken by its Working Party on the Facilitation of International Trade Procedures, predecessor to the UN Centre for Trade Facilitation and Electronic Business (UN/CEFACT). Visual representation can help grasp complicated processes, promote the exchange of ideas, and identify opportunities for simplification. A challenge to the trade transaction modelling is to strike a balance with an approach that is at once manageable, understandable, and affordable.

The sheer number of steps in a typical international transaction and the number of participating parties make for large diagrams. The more detail desired, the larger the graphic representation. Unless there is some computer-assisted tool to manipulate the diagrams, maintaining the graphic representation to reflect changes in business processes or government controls can become overwhelming. For example, in the late 1980s ROMPRO, the Romanian national trade facilitation body, prepared one of the first comprehensive flow charts of a trade transaction in Romania. The diagrams were drawn manually. As the steps in the trade transaction changed over time due to streamlined government procedures, introduction of new transport technologies, or other innovation, the flow charts were not updated owing to lack of manpower and motivation.

The UNECE Working Party benefited in the first half of the 1990s from access to a computer-assisted software engineering tool that was provided at no cost by a multinational engineering corporation. When that company divested its software business, the smaller independent software firm was willing to make the product available, but at a price of about EUR 4,500 (about USD 4,300 at the time) per license. This effectively ended the ITT Modelling effort.

Some experimentation was continued with hypertext techniques that were becoming available through the development of the web, browsers, etc.. While this showed promise in being able to hyperlink different representations of flow charts, documents, procedure descriptions and data sets, developing and maintaining the diagrams was the major obstacle.

The ITT Modelling effort was also an ‘idealised’ representation of the trade transaction in that it tried to illustrate steps in both the exporting and the importing country. The export side was based largely upon procedures in the United Kingdom whereas the import side was a generic presentation of what should happen, not what actually took place in any particular country. A country can map its own trade procedures anyway it wants but if it wants to engage in a collaborative effort with one or more countries to examine in some detail inefficiencies in their trade interactions, it would be helpful if they developed their models through a common approach. Country W would then be able to compare differences in how it has to trade with Country X as compared to Countries Y and Z.

This more objective, documented comparison may become more important if trade facilitation norms and recommendations become binding rules within the WTO framework.

Modelling techniques

During the 1990s, advances were made in the development of object-oriented modelling approaches for computer software development, leading to development of the Unified Modelling Language (UML) by the Object Management Group. UML was adopted by UN/CEFACT in its UN/CEFACT Modelling Methodology (UMM) for modelling business processes in the further development of the international standard for electronic data interchange, UN/EDIFACT, and the newer framework for utilising Extensible Markup Language for exchanging business information, ebXML.

While UML defines rules and notations for specifying, modelling, and communicating business and software systems, it is flexible enough for all kinds of systems. The same level of precision and detail that is required for software development, however, is not necessary for developing a flow chart or map that reasonably represents the trade transaction in a way that most people can understand, regardless of their technical background.

TTM uses UML activity diagrams to represent the steps in a trade transaction, over time, related to the agent or organization responsible for the action. At its most basic level it is a deployment flowchart that identifies the people or organizations involved in each step of the export or import process. TTM can also provide a view of the rules, policies, regulations and other constraints imposed on traders. Trade volumes can also be considered in terms of the available resources and structures, focusing on throughput and utilization. UML provides additional rules and notations that can be used to represent more sophisticated aspects of the trade transaction. It is generally advisable to start simply and ensure that everyone understands and accepts the diagram as a fair representation before adding more complex details.

Figure 1: Example of an activity diagram

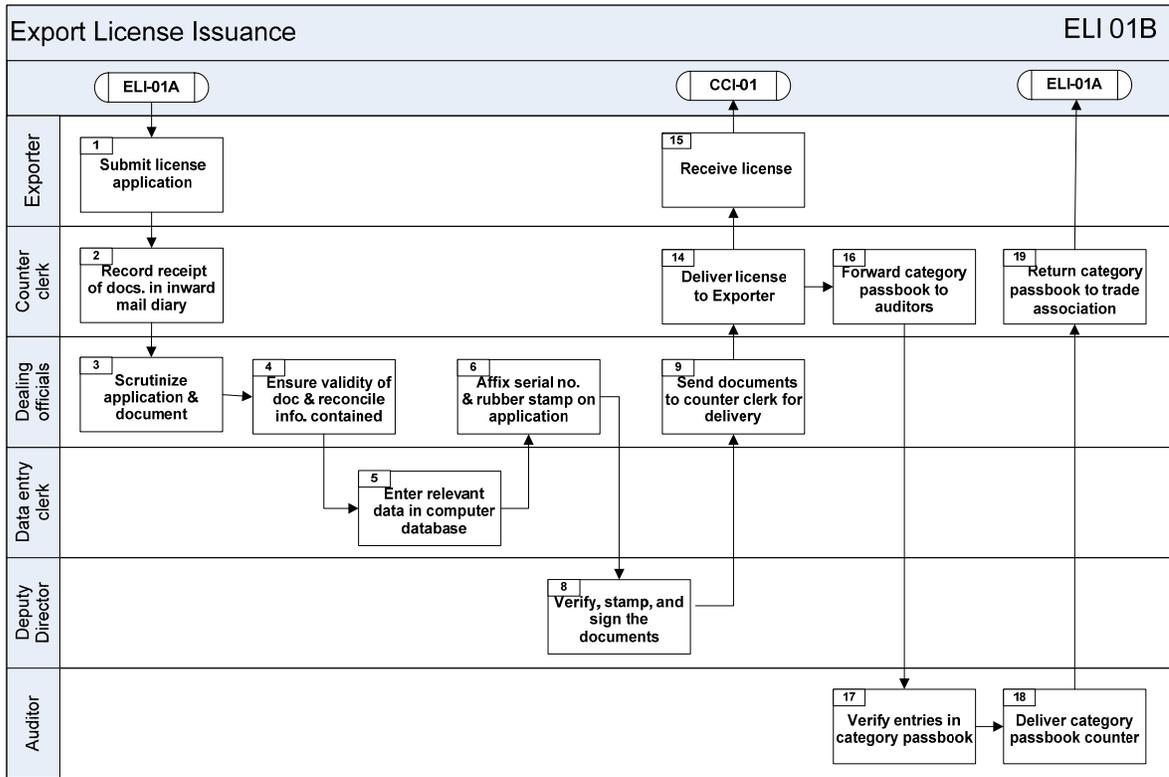


Figure 1 illustrates the steps carried out within an organization that issues an export licence, which in turn is one step in the entire trade transaction. Boxes representing the steps are placed in horizontal transaction bands (or ‘swim lanes’) that correspond to the individuals or functional units responsible for these steps. At a higher level of aggregation, the individuals in one organization are replaced by the different organizations that are engaged in the process.

To keep the diagramming manageable, the transaction is broken down into segments, with each segment corresponding to the number of steps that can be included on an A4 / letter-sized sheet of paper, and each segment is coded. This example, ELI-01B, indicates that earlier steps in the export license issuance process are described in segment ELI-01A. The steps are numbered sequentially and follow the flow indicated by the arrows. This segment ends with a return to further steps in ELI-01A and leads to steps carried out with the chamber of commerce and industry (CCI-01).

This modelling is more an art than a science. The challenge is to provide enough detail without overwhelming the reader, in particular someone who may not be familiar with the activities under review. Text descriptions in the boxes should be brief. Additional explanatory text can be provided in separate pages. Time and cost information can also be included. If the software permits overlays, the additional information can be displayed as required.

The selection of a software tool for developing the diagrams is a key decision. Some analysts make their diagrams with whatever drawing software they have available, such as presentation graphics software. While this is possible, it is not preferable because modifying the diagrams over time is more tedious. Dedicated packages for deployment flowcharts, such as *TeamFlow*, automate the layout and provide additional features. Much of the functionality of Microsoft's *Visio* can be found in the open source program *Dia*.

The introduction of any software package implies an acceptable set of trade-offs. A more advanced computer user may be able to develop excellent diagrams with a software tool that is too complicated for his or her successor. An organisation that wants to initiate a modelling exercise should view it as a long-term activity and plan accordingly.

Benefits and costs

Trade transaction modelling with activity diagrams is a better way of communicating the logical paths of a trade transaction to all concerned.

Benefits - Problems and inefficiencies can be analysed in more effective way:

The use of visual representation of the trade transaction can be helpful during group discussions involving trade stakeholders with differing interests. For example, while traders want their goods to pass through Customs without delay or additional cost, Customs officials are worried about the effectiveness of control.

Activity diagrams also serve as good documentation for various purposes, like enhancing international security against terrorist threats.

Customs and other control agencies have official responsibilities that must be fulfilled and individual personalities can get in the way of constructive exchange of ideas and problem-solving. Working with activity diagrams helps discussants to focus on the system and minimise the distraction that might be caused by historical frictions or personality conflicts.

Costs - The cost of TTM depends on the individuals participating in the analysis and the tools employed:

It is necessary to become familiar with the principles of activity diagrams, but this typically takes less time than becoming familiar with the steps involved in an international trade transaction. If there is cooperation from experts in the various sectors (e.g. Customs, transport, banking, insurance), an analyst can complete a reasonable set of activity diagrams covering the major types of import and export transactions within two months. That said, it will be possible to go into more descriptive detail for the various steps, or highlight product-specific variations, depending upon how much precision is required.

Different computer software can be used, varying in cost from free, open-source software to expensive proprietary applications. The choice will depend on the available budget and individual preference. When evaluating alternatives it is important to consider not only the cost of preparing the initial diagrams but also how they will be maintained over time. One tool that is very efficient in the hands of an experienced expert may be too complicated for those responsible for subsequent maintenance. Similarly there may be added value from a tool that permits easy revision of diagram, supporting alternative 'what if' scenarios and outcomes.

Implementation requirements and sustainability

Implementation requirements will vary, depending on local circumstances. As suggested above, preparing the trade transaction diagrams manually is discouraged because it becomes difficult to maintain them. The basic requirements are a personal computer and software capable of supporting UML elements. There are many different products available in the marketplace, including open-source software for the principal operating systems.

One analyst capable of preparing the activity diagrams is sufficient, but reasonable efforts should be made to ensure that more than one person understands how the diagrams were developed so that they can be maintained in the absence of the inception team. Assigning the task to a national trade facilitation secretariat or chamber of commerce is a preferred institutional approach to trade transaction modelling.

A mechanism should be set up so that the various partners in the trade transaction are able to confirm that the representation of tasks carried out by them is accurate and complete. Again, this is more easily handled under the auspices of an established trade facilitation focal point.

TTM will benefit from continued advances in affordable computer hardware and software in future. Support for the activity will only continue if the resulting activity diagrams are used and make an effective contribution to an ongoing trade facilitation process. Once the initial diagrams are completed for activities that take place within a country, they can take on additional value by supporting cross-border comparison of trade procedures and efforts to harmonise regulations and information requirements for global trading.

References and tools available

UNECE and UN/CEFACT

For details on the various electronic modelling languages, methodologies and rules developed by UNECE and UN/CEFACT, please refer to documents available at <http://www.unece.org/etrades/> and <http://www.unece.org/cefact/>. A description of the work of the UN/CEFACT work on TTM http://www.unece.org/cefact/trafix/wp4_tor.htm; ITT, http://www.unece.org/trade/itt/itt_home.htm.

Also see the "Formal modelling for electronic commerce" in *Decision Support System, Vol. 33 Issue 3 (2002), Elsevier* and "Emerging Issues in Collaborative Commerce" in *Decision Support Systems, Vol. 43, Issue 2 (2007), Elsevier*.

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