

# Enabling trusted trade through secure track and trace technology

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## Abstract

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There is wide consensus on the need to address illicit trade and, in the face of ever-increasing threats to government and society at large, comprehensive, collaborative and technically advanced track and trace solutions have an important role to play in strengthening and unifying regulatory control, fiscal sustainability and ensuring secure supply chains. This technology can also be a critically important trade facilitation tool to enable trusted traders to work collaboratively with regulatory agencies to establish a level playing field of competitiveness for industry, as well as improving governments' ability to fight the scourge of illicit trade and those who profit from this activity. However, we lack a clear global vision for enabling trusted trade through secure track and trace technology. Currently, systems are being developed and deployed in a far too organic way, limiting potential gains. If governments worldwide are to fully leverage the potential benefits to be had from a secure track and trace framework and solution, they need to act now.

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## Context

Government regulatory agencies have a vital role to play in terms of promoting industry competitiveness, fiscal sustainability and public health protection. The recent World Trade Organization (WTO) Bali Ministerial Conference concluded with an agreement on a package of issues designed to streamline trade, allow developing countries more options for providing food security, boost least developed countries' trade and help development more generally.<sup>1</sup> This agreement heralds a new momentum in the trade facilitation arena and increases global awareness of the important contribution that improved regulatory procedures can make to economic development and poverty reduction. The purpose of this paper is to highlight the value and principles of secure track and trace technology and examine how governments can take advantage of this technology to better enable trust-based trade facilitation. 'Tracking' in the context of trade means monitoring the movement of finished goods through the supply chain which is also a means to ensure that all regulatory requirements are met such as the payment of taxes. 'Tracing' which looks backward down the supply chain is a powerful aid to determining the point at which any out-of-normal event occurred, for example, to establish where a product was diverted out of the legitimate supply chain. Secure track and trace on the other hand covers the authentication and traceability of products through a secure supply chain so that governments, industry and manufacturers, and the population at large can be confident that the product they are using is genuine and has had the correct tax collected and legitimate industry can be more competitive.

## The emergence of track and trace

The emergence of the latest track and trace technology has been the result of a range of factors, some of which are coming from the public sector via regulation whilst others emanate from the private sector for market-driven reasons:

***International commitments with respect to legislation and standards, which impose compliance obligations on manufacturers, and which require a global track and trace system.*** These include the Protocol of the World Trade Organization (WTO) Framework Convention on Tobacco Control<sup>2</sup> (FCTC) to Eliminate Illicit Trade in Tobacco Products as well as the revision of the European Union Tobacco Product Directive<sup>3</sup> (EUTPD).

***Increased pressure on governments to ensure compliance,*** at a time when the increased complexity of supply chains means the task is ever more difficult and the opportunities for non-compliance are growing. The increased involvement of organised crime groups in illicit trade only adds to the challenge.

***Industry itself sees the potential value to be had from track and trace.*** Companies are increasingly concerned about not only their financial losses but also the potentially existential damage to their reputations which would result from harm to unsuspecting consumers. Estimates for the market value of counterfeit drugs in circulation range from between 1% of sales in developed countries to over 10% in developing countries.<sup>4</sup> The food industry faces similar threats from contamination and supplier quality control.

***The general public is increasingly demanding accessible assurance about the quality*** of the goods they consume. To illustrate the point, an estimated 100,000 people die every year from ingesting fake medicines. The ability to track and trace genuine products and assure authenticity is very much a public interest, consumer safety and brand protection issue.<sup>5</sup>

Track and trace solutions are emerging in different industries, geographies and for seemingly different reasons but most have similar core objectives:

- ***capturing the undeclared market,*** (including through under-declaration and diversion) leading to an immediate proportional increase in tax collection. Illegal, untaxed products on the market represent unfair competition for legitimate producers – reducing this type of tax fraud levels the playing field for honest manufacturers and is also a means to combat organised crime
- ***cleaning up the supply chain*** by contributing to identifying and removing illegitimate actors and their products from the supply chain
- ***preventing the introduction of counterfeit, sub-potent, adulterated, misbranded or expired goods into a market,*** protecting the interests of legitimate manufacturers as well as those of the public at large who are the victims of dangerous or ineffective goods
- ***ensuring accountability for the movement of goods*** by supply chain participants, offering recourse to both brand holders and government
- ***improving the efficiency and effectiveness of product recalls,*** offering protection to brand holders as well as the public.

## The potential value of secure track and trace for trade facilitation

‘Track and trace’ could provide significant benefits to consumers, business and the economy at large. The use of ‘track and trace’ technology is an innovation for the international customs environment. A paradigm shift from control to trust-based regulation and shared responsibility will be required and may be applicable to all import streams.<sup>6</sup>

Secure track and trace technology has a crucial role to play in strengthening and unifying regulatory control, fiscal sustainability and ensuring secure supply chains. Not only can it play a critical role in

safeguarding revenues (in particular excise revenues) but it also levels the playing field for compliant, legitimate manufacturers by enabling the identification and removal of illegal operators. This technology can also be a critically important trade facilitation tool to enable trusted traders to work collaboratively with regulatory agencies so as to establish a level playing field of competitiveness for industry, as well as improving governments' ability to fight the scourge of illicit trade and those who profit from this activity.

It is critical for governments to better understand the benefits to be gained by securing supply chains through implementation of track and trace solutions. Perhaps more importantly there is an imperative to agree the foundation for globally-aligned solutions that can benefit multiple stakeholders. There is wide consensus on the need to address illicit trade and in the face of ever-increasing threats to government and society at large, comprehensive, collaborative and technically advanced track and trace solutions have an important role to play. The bottom line is that the technology must keep ahead of the game and adapt constantly to the evolving and dynamic threat environment. All trading partners and participants in the supply chain who have any interaction with government agencies need to understand the benefits to them from the implementation of secure supply chains enabled by track and trace technology. These benefits include improved and more accurate predictability of the supply chain as well as reduced costs of compliance.

One can hardly do anything these days without being asked or indeed required to provide, additional data. Cloud computing, communication and e-commerce applications routinely require the supply of additional data to 'enhance' one's experience or complete transactions. Big data, social media behaviour and harvesting of consumer data are being touted as 'the next big thing'. Why should regulatory controls related to secure supply chains be immune from this trend?

The more reliable data provided by 'track and trace' systems and the intelligent manipulation of it, ideally in real-time, can bring many benefits including new actionable leads to enforcers and otherwise unavailable evidence which can be used in prosecutions. And it reveals the 'in-between zones' through which illicit traders' profit. Perpetrators of illicit trade count on remaining invisible. Creation of secure supply chains via track and trace allows government to have the data which enables it to 'reveal the invisible'. It gains a clear view of the licit trade that flows within secure supply chains by a process of elimination throwing the spotlight on the 'grey' areas. One might say it provides government with the data required to 'shrink the haystack'.

The potential benefits of secure supply chains via track and trace can be summarised thus:

***Increased tax revenues and improved tax policy*** by reducing under-reporting of production by domestic manufacturers and the potential for re-routing goods intended for export, as well as helping make illegally imported or counterfeit goods more easily identifiable.

***Improved consumer protection*** for government departments responsible for product safety standards, by providing a range of benefits: it ensures that manufacturers meet new product standards in a timely fashion, or provides a mechanism for accountability if they do not. It thus reduces the threat of non-compliance with product and safety standards.

***Improved competitiveness and trade facilitation*** by reducing the compliance burden on trusted traders which is known to have a positive impact on attitudes and behaviours related to compliance. Compliant, legitimate manufacturers benefit from the more ready identification and removal of illegitimate actors from the supply chain. This is, in turn, important as part of a strategy to enable trusted traders.

***Enhanced intelligence, risk and enforcement management capability*** by substantially improving the quantity and quality of data to which governments have access, making it easier to analyse and assess trends and anomalies. Data mining capabilities can be deployed with better results. Detecting patterns and trends is fundamental to understanding and addressing the root causes of non-compliance and is the key to continual improvements.

*Enhanced compliance management capability* by being able to identify the point(s) in the distribution chain at which a product or consignment became adulterated or was diverted, facilitating investigative controls and interventions and making it easier to establish accountability for supply chain ‘leaks’ and ‘losses’. It provides the ability to monitor the effectiveness of regulatory actions and makes it easier to adjust interventions to counter unanticipated problems, and provides the basis for enhancing tax structure policy.

## Current trends and developments in track and trace

Most of the current developments around track and trace technology are happening organically; in other words, in the absence of a blueprint of an ideal collaborative future state. There is little discussion about the advantages and potential synergies of an integrated and standard approach to global traceability solutions. The current disparate set of developments results in a lack of alignment between the different solutions and, perhaps more importantly, to a lost opportunity to use track and trace technology as a tool to enable global trusted trade. The industries affected have to put substantial effort into harmonising and aligning the various available marking solutions – they are increasingly seeing the value to be had from shifting towards globally recognised standards.

There are a number of different market participants offering track and trace solutions:

- **Industry.** There are industry-specific solutions designed and developed and without government security solution requirements in mind. They tend to be relatively low-cost, low-function, tailor-made solutions which by not being designed with government security requirements in mind are often less secure and are susceptible to being replicated. Additionally, they typically fall short of providing interoperability functions and benefits for government regulators and are not sufficiently independent (for example, they may have been designed by those who could potentially benefit directly from mis-declaration<sup>7</sup>).
- **Independent solution providers.** Specialist organisations that offer commercial single platform secure track and trace solutions. Focusing almost exclusively on secure track and trace and related brand protection/product authentication, these independent providers may offer commercial solutions for industry, and in specific cases, platforms provided to government to support the track and trace requirement for high-risk and/or sensitive goods. In the latter case, independence from the industry being regulated removes possible conflicts of interest – proprietary components where offered provide additional security. However, they may face additional resistance from industry, particularly where the industry objects to the absorption of the necessary operating costs or where the industry needs to be persuaded that the solution will not have an impact on their business continuity.
- **Standards organisations.** Providers such as GS1 with EPC Global that offer certain components of a track and trace solution. They may have advantage over industry-derived solutions because of the lower likelihood of conflicts of interest but these typically non-profit organisations traditionally promote guidelines and methods only, and have limited implementation capability or experience in real industrial environments.
- **Consulting firms and system integrators.** Providers that have not necessarily developed a track and trace solution of their own but offer implementation services. These services come with strong implementation capacity and solution adaptability, but the problem domain is seldom an area of specialisation for these companies. Credible understanding of the specialist domain of secure track and trace is limited, with the degree of company experience and expertise often being oversold.

## Future customer requirements informing the blueprint of secure track and trace

Agreement on an internationally recognised secure track and trace framework would provide a ‘win-win’ situation for governments, their citizens and industry at large. Agreed standards are a prerequisite for collaboration along the supply chain. They would improve security and communication and help to reduce transaction costs, reduce errors, and dramatically reduce the risk of systems incompatibility. Track and trace systems are likely to continue to grow in popularity with both regulators and the private sector. However, the absence of agreed standards and a global blueprint to guide research and investment will result in the organic development of track and trace systems, which are neither aligned nor interoperable, and which do not capture the value to be had from an integrated, aligned global tracking system.

If we take a longer term more strategic view, the requirements to be addressed through a track and trace solution that enables ‘trusted trade’ include the following:

***The marking of all legitimate production***, through secure marking with multiple levels of security features (visible, semi-covert, covert and forensic), direct marking by printing a unique code on each product with visible and/or invisible inks, and/or RFID technology. Scale and scope are likely to increase the variety and types of goods marked, traced and tracked resulting as it does from the need to reinforce consumer and brand protection, and better manage logistics, and from government control requirements.

***Material-based security*** will remain core to product authentication and in addition to information-based security is fundamental to any secure track and trace solution. Without this, illicit operators are able to manipulate product markings to feign legitimacy and infiltrate supply chains with their illicit products, often with a very low risk of detection. Both material- and information-based security give some assurance against manipulation in the supply chain by manufacturers, distributors or retailers – not just to government but, ultimately, also to the citizens trusting and using the products.

***Moving away from agency-specific track and trace solutions to a standard global track and trace platform supporting multiple stakeholders and uses***. Key would be the establishment of compatible data and process standards to enable system participants to be able to share data through an integrated system, worldwide. To be compatible with a global international track and trace regime, existing track and trace systems would need to move from local proprietary coding systems to a global harmonised standard.

***Data exchange enabled at three discrete levels***. Firstly, manufacturers, downstream supply-chain partners and their trading partners need a corporate query capability; secondly, national authorities require data at different points along the supply chain, either in a national database or query engine; and thirdly, there is international data exchange, probably through a query engine.

***Real-time auditing and authentication tools*** that need to reliably, quickly and decisively meet the needs of multiple stakeholders: Customs acting at the border may need to verify and detect the legitimacy of the product within its alleged supply chain; distributors and retailers need a mechanism to authenticate an item – a quick ‘good versus fake’ assessment; and the general public needs to easily, intuitively and simply check the authenticity of the product before consumption.

***Integration with other regulatory investments and systems***. For a secure track and trace solution to provide optimal return on investment it needs to be integrated with other regulatory agency systems. This also provides a rich data source to improve the targeting and detection of illicit activity. Therefore, secure track and trace solutions should support the consolidation of trade data to provide meaningful business intelligence, risk profiling and powerful reporting tools.

Many of the technology components to enable this future blueprint are already available today:

- **Interoperability and standardisation** have made substantial strides, with data exchange formats such as XML enabling systems in the track and trace supply chain and data network to communicate.
- **Agreed standards (serialisation, data recording and exchange)**. Organisations such as GS1 and EPC Global have made substantial progress reaching cross-industry agreement on generation, application of unique identification numbers to items and the exchange of data as an item moves through the supply chain. Recently, the World Health Organization (WHO) achieved an incredible feat in establishing track and trace requirements and defining minimum prescribed data requirements for the control of tobacco products, in the first protocol emanating from its FCTC.<sup>8</sup>
- **Advances in technology architectures and data exchange mechanisms**. Technology solutions in terms of application architecture, data exchange and storage have overcome many of the obstacles that in previous decades constrained what was technically feasible. This has opened up a realm of new possibilities in terms of scale and nature of items that can now be individually tracked.

## Conclusions

Modern track and trace systems have a great deal to offer, including as a means of securing supply chains, enhancing compliance, levelling the competitive playing field, increasing fiscal revenues and facilitating global trade. There are multiple benefits for all stakeholders. Secure track and trace systems are crucial to enabling a trust-based environment which is good for legitimate manufacturers and traders. But, currently, systems are being developed and deployed in a far too organic way, limiting potential gains. We lack a clear global vision for enabling trusted trade through secure track and trace technology.

A vision needs to be developed jointly with all stakeholders so that there is a sense of ownership and collaboration by all. It needs to be simple and easily understood but contain sufficient detail to provide clear direction. When it comes to implementing a track and trace program, leadership commitment to the vision by all stakeholder groups is required to deliver the agreed business outcomes. Critically, a government mandate is essential to ensure a coherent framework and to drive the required change in a collaborative way<sup>9</sup> across the various stakeholder groups (from both the public and private sectors). Last, but by no means least, success requires a true partnership of shared risk and reward between governments and the technology providers.

Only a well-designed combination of technologies and related business processes will make the entire track and trace solution robust and secure enough to deliver expected results. Essential components include a system of unique secure serial coding, allied with material-based security features which are the only true, proven and secure basis for product marking. Supply chain event data for tracing and mobile enforcement tools for authorities are required to enable interventions at various points in the supply chain.

Business intelligence and analytic tools are key for solution efficiency and to keep pace with the ever-changing *modus operandi* of the perpetrators of frauds. A single standard government track and trace platform with interoperable features and which can be applied in a modular way across a range of products and requirements will ensure coherence and value-for-money.

Many of the solution components for an integrated track and trace solution are already available today. However, the absence of a longer-term blueprint for an integrated system is resulting in a lack of alignment between the various stand-alone applications now being developed.

If governments worldwide are to fully leverage the potential benefits to be had from a secure track and trace framework and solution, they need to act now. Step one is to adopt a longer term strategy and vision. This has to include an agreement to develop a blueprint and standards but is also an opportunity to work on best practice for innovative procurement<sup>10</sup> and implementation. With a common vision which

goes across borders and continents we can define in detail the capabilities required, the essential building blocks to defeat the scourge of illicit trade. The potential upside is too important to ignore – at the same time protecting the welfare of our nations’ citizens and improving governments’ compliance management capability, we can without any need for ‘trade off’ stimulate the growth of legitimate industries. If we are up to the challenge this really can be a win-win.

## Notes

- 1 [www.wto.org/english/news\\_e/news13\\_e/mc9sum\\_07dec13\\_e.htm](http://www.wto.org/english/news_e/news13_e/mc9sum_07dec13_e.htm).
- 2 [www.who.int/fctc/en/](http://www.who.int/fctc/en/).
- 3 [ec.europa.eu/health/tobacco/products/revision/](http://ec.europa.eu/health/tobacco/products/revision/).
- 4 World Health Organization (WHO) 2006, ‘Counterfeit medicines’, Fact Sheet No. 275, revised February, WHO, Geneva.
- 5 US Food and Drug Administration (FDA) 2013, ‘Citizen petition to FDA – Track and trace system to monitor tobacco products’, US FDA, Maryland US, viewed 15 January 2014, <http://publichealthlawcenter.org/sites/default/files/resources/telc-citizen-petition-track&trace-2013.pdf>.
- 6 Mike Pezzullo, CEO, Australian Customs and Border Protection Service, ‘Border management and its role in supporting national economic competitiveness’, speech to the Lowy Institute for International Policy, Sydney, NSW, 16 October 2013.
- 7 L Joossens & AB Gilmore 2013, ‘The transnational tobacco companies’ strategy to promote Codentify, their inadequate tracking and tracing standard’, BMJ Group, 12 March, viewed 15 January 2014, <http://tobaccocontrol.bmj.com/content/early/2013/03/11/tobaccocontrol-2012-050796.full>.
- 8 World Health Organization (WHO) Framework Convention on Tobacco Control (FCTC) 2010, ‘Analysis of the available technology for unique markings in view of the global track-and-trace regime proposed in the negotiating text for a protocol to eliminate illicit trade in tobacco products’, FCTC/COP/INB-IT/4/INF.DOC./1, 22 February, WHO, Geneva.
- 9 T Doyle 2010, ‘Collaborative border management’, *World Customs Journal*, vol. 4, no. 1, pp. 15-21.
- 10 T Doyle 2012, ‘Rethinking Customs’ procurement practices to deliver improved business outcomes’, *World Customs Journal*, vol. 6, no. 2, pp. 95-9.

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