

# Exploring barriers and stepping stones for system based monitoring: insights from global supply chains

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**Abstract:** Across the world, businesses and governments are attracted to narratives of self-regulation and system based monitoring, particularly the ones in which government agencies reuse business data and risks assessment for supervision purposes. These types of innovations are attractive because theoretically, ‘good’ businesses can benefit from fewer inspections by authorities and authorities can focus their scarce resources on the ‘risky’ businesses that are not in control of their processes. However, there are few academic accounts of such innovations. To this end, this article explores the barriers and stepping-stones for the cultivation of system based monitoring in a public-private setting. We employ a reflexive interactive design approach and show its application in an on-going international project with businesses and government authorities. Findings indicate that a collaborative reflection on the structure of the current issues contributes to opening up both the problem and solution space, and how this opening up is funnelled down to stepping stones for system based monitoring. Our research extends and complements existing literature on public-private collaboration and contributes new knowledge about an alternative form of cultivating innovations through business-government interactions.

## 1 Introduction

Government agencies such as customs fulfil important tasks in international supply chains. Amongst the many tasks, society expects that such ‘supervision authorities’ keep dangerous goods outside the borders, monitor that business are compliant with existing laws and collect taxes accordingly. These agencies are however subject to conflicting developments. On the one hand they are confronted with increasing trade and information volumes that need to be compliant with stricter laws and regulations (e.g. SOX, European regulations). On the other hand, the current economic conditions force such agencies to cut back on cost (e.g. on staff and equipment) and operate more efficiently. Looking for ways to ‘do more tasks with fewer resources’, policy makers are attracted to innovative concepts such as system based monitoring and piggybacking [Ta01]. Piggybacking refers to the notion that government agencies can optimally re-use supply chain

data for governmental purposes [Ba02]. In general, these concepts aim to use the quality provided through self-regulation of large-scale businesses with high-risk processes for the purpose of customizing supervision and improving compliance by assessing their (regulatory) compliance management system.

While there is a steadily growing body of research that examines the concept of system based monitoring [e.g., Ta01, Hu03, YB04], barriers and stepping stones for the cultivation of system based monitoring in an international public-private setting are yet to be identified. An on-going international research project called CASSANDRA provided an opportunity to investigate this. The aim of the paper is to contribute with experiences and accumulated knowledge to the area of cultivating system based monitoring in a public-private setting. First, we introduce key concepts in section two. In section three, we describe CASSANDRA experiences in cultivating system-based monitoring. In section four we describe our business-government interaction (BGI) approach and the results from a first workshop in which this approach was applied. The final section discusses implications and conclusions of the research.

## **2 Background: public and private perspectives on system assessments**

In many traditional regulatory regimes, the inspection authority verifies whether or not output (for example actual contents of a container) meets the corresponding declaration and is compliant to legal standards. This way of supervision is aimed at assessing the output and only results into actions of the company to end the violation. Contemporary supervision/inspection regimes are typically characterised by the use of a broader repertoire of instruments incorporating voluntary agreements, trading schemes, environmental management systems and taxes used in place of, or in concert with, the traditional regulatory model (authorise, check, enforce) (see, for example [HRB05]). Such regimes are characterised by aligning business risk approaches to societal risks. Since risks assessment play a pivotal role, contemporary approaches are often classified as risk-based regulation approaches [Ro06].

At its simplest, risk-based regulation can be considered as distributing resources in proportion to risks to a specific community/industry (such as international trade, safety or environmental risks), considering both the impacts themselves and the likelihood that they happen, in order to establish appropriate levels of control [Ro06]. Specific activities include objective and standard-setting, compliance assessment and, where appropriate, enforcement. Such strategies are argued to offer a rational method for improving regulatory efficiency by offering ‘targeted’ and ‘proportionate’ interventions that maximise the benefits of regulation, whilst ensuring that the burden on the regulated community is commensurate with the risks posed.

Within the class of risk based regulation approaches, system based supervision has gained much attention, particularly in global supply chains [Ta01, Ru06, Ba08]. This is considered as a modern approach of the way that government authorities (i.e., customs, tax and other inspection agencies) conduct supervision by inspecting internal control mechanisms of a company rather than physically inspecting the goods that are imported

or exported by the company. Audit methodologies can be used to assess a company's level of internal control regarding regulatory compliance and risk management. This inspection approach is expected to be less burdensome for businesses and more effective and efficient for inspection agencies. System based supervision in global supply chains rests upon the piggybacking concept [K109], of which we identify two types. In '*data piggybacking*', business data are re-used for government control purposes [Ta01]. For example, commercial data (e.g. invoice, purchase) from businesses can be re-used by governmental actors for government control purposes like risk assessment, customs clearance, and other inspection agencies. As these data come are vital to the operations of businesses themselves, they are typically more accurate than data that is filed in customs declaration by intermediaries. In '*system piggy-backing*', existing internal control systems of companies are re-used for government control purposes, both as implemented in the business information systems themselves, and in a broader sense, the control mechanisms that companies already apply for their own risk management and compliance purposes [Ve10].

## **2.1 The government perspective**

Government agencies frequently find that they have more to do, and more issues to respond to, than time or resources allow [BB11]. Consequently, many governments and regulators are now developing risk-based regulatory strategies as frameworks for the management of their resources and their reputations [Wi12, Oe13, Ma14]. Often, these include sets of strategies that involve the targeting of enforcement resources on the basis of assessments of the risks that a regulated businesses poses to the regulator's objectives. In the context of regulating international trade, government authorities such as customs and tax have explicitly shown interest in system based monitoring for conducting supervision by inspecting internal control mechanisms of a company rather than physically inspecting the goods that are imported or exported by the company [Ta01, K109]. The reuse of internal control mechanisms for government control purposes in system piggybacking means that government inspection agencies (e.g. customs, product and food safety) assess the internal control systems that businesses have in place for controlling their supply chains, and can reduce the physical inspection of the goods. Typically, these internal controls systems are implemented in enterprise information systems of the company. Similar to data piggy-backing, this system piggy backing re-uses the control mechanisms used for business purposes. From government, this requires that the assessor needs to identify which internal controls companies actually have, and assess to what extent these fulfil the requirements of the inspection agencies. Such an approach may support a reduction of the administrative burden of companies involved in international trade.

## **2.2 The business perspective**

Outsourcing, consolidating cargo and multi-modal transport chains have complicated the organization and optimization of logistics and have put additional challenges to managing information and data in these logistics chains. In addition, the information system in international logistics is much influenced by its own legacy. Results of these complica-

tions can easily be found: carriers and importers are being asked to make legal declarations about goods they have never seen, documents containing crucial information can lag days behind the goods, and these documents contain information that obscure the true values, such as the identity of the real seller or buyer [He15].

Businesses are generally aware of the increased need for higher efficiency, compliance and security in the global supply chain. This is often reflected in the management control systems installed by companies that focus on optimizing operational aspects of business like performance, quality, safety and the environment. These leading businesses have the potential to ensure compliance with legal requirements in their own organization and contacts (the so-called compliance management). This potential is seldom or not used by authorities, in part because the existing standards for management control systems are not specifically aimed at securing compliance with regulatory requirements but rather at reaching better quality or environmental goals (e.g. ISO 9001 and ISO 14001). A key question then is why businesses have not aligned or coupled up their systems and data sets are not being reused to reduce administrative burdens and to prevent mistakes caused by re-keying the same information over and over again? This can be partly due to that electronic linkages between businesses add (perceived) vulnerabilities and potentially change the relationship structure of the network of parties involved in a specific chain [K116]. Lack of transparency can thus be caused because of commercial protectionism or the fear of increased liability risks.

At the same time, international regulations such as the Sarbanes-Oxley Act of 2002 and the call for greater corporate compliance and accountability require companies to demonstrate that risk is managed in a way which effectively supports the delivery of business objectives. Those companies need to explain that the relevant processes are “in control” and that their financial statements are reliable. Many companies with “in control statements” make use of the COSO Enterprise Risk Management methodology. Responsible companies have implemented extensive mechanisms to control their own supply chains for commercial goods as well as aligning their compliance procedures with those required by government, including customs and tax. Companies translate and adopt the general COSO framework into a specific risk and compliance framework. They monitor the system of internal control to ensure that all components continue to operate effectively and that weaknesses are communicated in a timely fashion to those responsible and that corrective action is taken.

### **2.3 Aligning the perspectives**

When considering the aforementioned perspectives of government authorities and businesses, it becomes clear that they are not entirely congruent – alignment is necessary. Alignment refers to the identification of the overlapping risks, controls and data sharing. An important prerequisite for system based monitoring is a shared understanding of risks, controls and data sharing. This means that all dimensions of business operations should be based on a transparent and reliable assessment and treatment of risks. The assessment of risks depends to a large extent on the availability of timely, reliable and complete information. In order to cultivate system based monitoring in practice, busi-

nesses and government agencies need to interact in a guided setting. However, path dependencies and lock-ins will favour incremental changes rather than system innovations. Stakeholders are also cautious, as the deployment of solutions will likely extend beyond the confines of a single organization, influencing trading relationships, networks of organizations in a value chain, and even whole industries. Moreover, initiating informal meetings between government and businesses is difficult as they easily end up in a ‘negotiation’ mode that hampers in-depth exploration of barriers and stepping-stones. In-depth explorations are necessary for the further substantiation and realization of innovations in a public-private context, especially internationally.

### **3 Experiences from an innovation project**

Co-funded by the European Union, the CASSANDRA project ([www.cassandra-project.eu](http://www.cassandra-project.eu)) mirrors the characteristics of a public-private setting in which businesses and government agencies work together on developing and testing innovations for mutual problems. Improving supply chain visibility is one of the top priorities. For this purpose, several building blocks (innovations) require substantiation. Building blocks include information infrastructures dubbed data pipelines and piggybacking. For the piggybacking principle to work it is also important to have interactions between businesses and government on a strategic and tactical level.

An important assumption in the project is that the use of data by companies for risk assessment and operational efficiency in their supply chain is an important signal for the quality of that data. This quality is a prerequisite for government agencies to (re-)use this data for their own risk assessment and inspection purposes. As part of the project, the organizational arrangements and consequences of this assumption developed and tested through a business-government interaction approach. Key to this approach is an alignment of the common acquisition of data by business and government and how this data may be used for risk and control purposes by businesses and government. Business and government need to find common ground in which data elements, control systems and certifications are useable for piggy-backing as part of a system based approach. Furthermore, they need to establish what the consequences are for being in-control, at either the level of an individual organization, or of the entire supply chain. Therefore, our approach focused on facilitating interactions between key businesses and government representatives: a business government interaction (BGI) approach.

### **4 Findings from a Business Government Interaction workshop**

As discussed in the previous section, we needed an approach that helps increase the chance of structural change in existing systems, necessary to solve a number of data sharing issues at the same time. For this purpose, we considered system-engineering literature on reflexive interactive design (RID) [GS17, FY18]. RID is an approach aimed at the collective realisation of system innovations in complex and value-laden contexts. The approach is rooted in various sources in innovation and political science [Sc19,

KLR20]. The interaction between business and government (supervision) perspectives helps circumventing substantive value bias (i.e., specific values implicitly transform to technological instruments, which blocks structural reorientation). Following the reflexive design philosophy, we planned multiple workshops. Through moderation each workshop aims at redesign, in order to reduce the number of trade-offs between seemingly conflicting needs, of the number of system failures that have been built up during years.

The steps in the workshop include: 1) identifying which data is important from the perspective of each of the key stakeholders (government and businesses), 2) establishing requirements on how these data elements can be improved and made better fit-for-purpose (e.g. better sources, digitization), 3) finding overlap in business and supervision requirements, 4) assessing the degree of business control, and 5) identifying benefits of enhanced data and interactions (e.g. data sharing benefits, supervision benefits).

The intended outcome should be understood neither as value consensus nor as a mere 'tit-for-tat' compromise, but rather as congruency: a course of action on the way supply chain visibility in a specific trade lane should proceed, that makes sense for each of the actors involved. A first workshop was organized in March 2013. This workshop was focused on a trade lane from Asia to Europe. The workshop included a full day (approximately 8 hours) of discussions between representatives the Customs, Tax and a large freight forwarder. The discussions were facilitated by a moderator (researcher) and were transcribed. Table 1 outlines the key findings from this workshop.

Table 1: Overview of workshop findings

<i>Aspect</i>	<i>Barrier</i>	<i>Solution space and stepping stones</i>	<i>Agreement level</i>
Compliance	Unclear relation between business compliance and supervision regime	Business aim: we are compliant to law and regulation  Customs aim: maximum support to help businesses demonstrate compliance and explore options to adapt inspections/interactions to level of control of organizations	High
	Many authorities still hold on to the principle: "trust is good, control is better." This principle, however, does not do justice to companies that are doing their best to achieve compliance.	Showcases are needed that demonstrate that a shift to the principle: "confidence whenever possible" delivers promising results.	High
Risks management	Businesses and government agencies are struggling to find efficient and effective means to ensure full supply chain control and security, minimizing supply chain risk.	Co-development and adoption of a common risks management framework (e.g., based on COSO ERM), including risk-based regulations and risk-based supervision procedures.	High

Data integrity in the supply chain	Individual businesses work with low quality data	Implementation of IT controls such as segregation of duties and flagging	Medium
Supervision regime	Interference by customs in supply chains with high risks products is perceived as 'too high' by businesses. European law however restricts possibilities for fewer inspections	Policy paper, lobbying, demonstration through living labs	Low
Internal control	Authorities do not provide direct incentives for businesses to invest in their internal control	Businesses need to explore internal/supply chain benefits more thoroughly. Examples include better data quality (e.g. avoid re-entry of information in different systems)	Medium

## 5 Conclusions and future research

The workshop helped participants to understand that various disciplines, ranging from supply chain operations and strategic risks management to supervisions and monitoring, have inadvertently erected domain-specific boundaries while employing similar underlying practices. Furthermore, the workshop revealed that institutionally and technologically embedded assumptions, norms, knowledge claims, distinctions, roles and processes that are normally taken for granted must now be critically scrutinised.

This research shows that the cultivation of system based monitoring in an international public-private collaboration setting requires a systematic exploration of how the companies assure measures for handling risks (e.g., detecting dangerous goods, protecting the environment). For this purpose, a more professional relationship between the supervising authority and the regulated company needs to be nurtured. With the BGI approach, researchers can independently stimulate this relationship, allowing companies to 'open up' and authorities (acting as experts) to inspire companies to improve their risk management and compliance. As a result, several barriers and stepping-stones were identified. In the context of the project, the barriers and stepping-stones will be the foundation for a policy paper that will be presented to the European Commission. In the context of EGOV research, the paper paves a road for research focusing on the cultivation and innovations in an international public-private arena. One of the eminent avenues for further research is the identification of preconditions for system based monitoring in specific sectors. Since more BGI workshops are planned in April 2013, we anticipate that we can share some concept preconditions during the conference.

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