NIXT Conference #81

Explosives Traceability

"Global Implementation of Track & Trace Solutions and Challenges for Manufacturers "

Rob Penney

Programme Manager

Synertech (Pty) Ltd

TTE Europe GmbH

Living Technology Synertech
Authorized TTE Partner

- Introduction
- Summary of Traceability Regulations
- Supply Chain Transparency
- Track & Trace for Manufactures
- Track & Trace for end users
- Challenges for industry
- Solutions
- How can we help

This presentation makes reference to the 2024 draft regulations issued in October 2024 (South African Department of Police, Explosives Act, 2003 (Act No 15 of 2003)) with associated annexures.

Introduction

Firstly, thank-you for this invitation and opportunity to share our knowledge with the forum.

- **Synertech (Pty) Ltd:**
  - Rob Penney - Programme Manager.

“Global Implementation of Track & Trace Solutions and Challenges for Manufacturers ”

Previous presentations addressed:

NIXT #79: “Explosives Track and Trace System Implementation – Lessons Learnt”

NIXT #80: "Traceability - and the importance of information interoperability between manufacturers/importers, distributors and end consumers“

This presentation makes reference to the 2024 draft regulations issued in October 2024 (South African Department of Police, Explosives Act, 2003 (Act No 15 of 2003)) with associated annexures.

Introduction – who is Synertech?

2003: Synertech (Pty) Ltd (Synertech) was founded and has evolved into digital transformation systems and solutions specialist.

Digital transformation is about rethinking and reshaping business models and operations through the strategic use of digital technology:

Connect → Collect → Store → Analyse → Visualise

A few examples of Synertech solutions:

- Inventory Management
- Asset Management
- Automated Maintenance Records
- Firearm and Weapons Control
- Document Management
- Inspections Management
- Lifting Equipment Control
- PPE Control and Auditing
- Hazardous Material Management
- Pharmaceuticals Control
- Smart Shelf Solutions
- Temperature Sensitive Item Management
- Track & Trace Solutions

Based in Riversands, Gauteng, South Africa.

This presentation makes reference to the 2024 draft regulations issued in October 2024 (South African Department of Police, Explosives Act, 2003 (Act No 15 of 2003)) with associated annexures.

Introduction – who is TTE?

1990: Dresden Informatik founded, with a focus on intralogistics* solutions.

2012: TTE-Europe GmbH (TTE) was founded.

- Worldwide useable tracking and tracing solution for all explosives fields.
- The modular structure means that used explosives can be tracked individually and according to your industrial requirements at any time.
- Solution in complete packages consisting of software, matching techniques and continuous services.
- Globally efficient Partner Network.

2022: TTE-Europe GmbH acquired by Canadian CSI Group

2019: Partnership established between TTE-Europe GmbH, and Synertech (Pty) Ltd.

*In modern warehousing, intralogistics is often referred to as internal or warehouse logistics

Global Activities

This presentation makes reference to the 2024 draft regulations issued in October 2024 (South African Department of Police, Explosives Act, 2003 (Act No 15 of 2003)) with associated annexures.

Summary of Traceability Regulations

This presentation makes reference to the 2024 draft regulations issued in October 2024 (South African Department of Police, Explosives Act, 2003 (Act No 15 of 2003)) with associated annexures.

Traceability Regulations in RSA

- South African Department of Police, Explosives Act, 2003 (Act No 15 of 2003).
  - Issued for comment 2005, 2007 and 2024.
  - Traceability is emphasized in the 2024 draft.
  - Important to note that this presentation refers to the 2024 draft regulations issued in October 2024 (South African Department of Police, Explosives Act, 2003 (Act No 15 of 2003)) with associated annexures. As such the audience is reminded that both of those documents were subject to public comment and could be amended before final publication.

- The objective of the traceability regulations is to establish a system for the traceability of explosives used for civil purposes to prevent their misuse and illegal trafficking by being able to monitor and control the movement of explosives, ensuring their proper handling, storage, and disposal.

- RSA Regulations for traceability are similar to European Union (EU) Regulations.

This presentation makes reference to the 2024 draft regulations issued in October 2024 (South African Department of Police, Explosives Act, 2003 (Act No 15 of 2003)) with associated annexures.

RSA Traceability Regulations

- South African Department of Police, Explosives Act, 2003 (Act No 15 of 2003) – draft of 2024.
  - Regulation 19 (6), Marking and labelling of packaging
  - Regulation 122(6), (7) & (8), Security of Explosives
  - Regulation 127 (2) (c), Offences
  - Regulation 128(2), Penalties
  - Annexure Z, Part 1, Compulsory identification and marking of blasting explosives

(Note: select respective link in presentation mode to view detailed explanation of regulations)

Summarized, this means:

- Record all identifications of explosives, together with all pertinent information, including the type of explosive, the company person to the custody of whom it was given
- Recording the location of each explosive while the explosive is in their possession
- Keeping and maintaining collected data
- Providing the competent authorities, upon their request, with the information concerning the origin and location of any explosive
- Transmission to the competent authorities the name and contact details of a person who can provide the requested information also outside normal business hours

This presentation makes reference to the 2024 draft regulations issued in October 2024 (South African Department of Police, Explosives Act, 2003 (Act No 15 of 2003)) with associated annexures.

So how did the EU tackle it ?

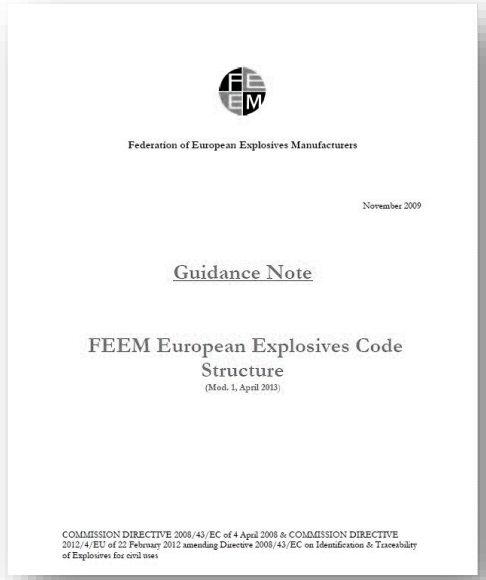
EU Action Plan on Enhancing the Security of Explosives (2008)

- The European Parliament and the Council of the European Union adopted the directive in April 2008.
- The main objective was to establish a system for the traceability of explosives used for civil purposes, in order to prevent their misuse and illegal trafficking.
- Ensuring traceability from cradle to grave.
- Amendment in 2012. The launch had to be postponed from 2012 to
  - 2013 for manufacturers (marking only) = 1 year to implement and demonstrate compliance.
  - 2015 all other (full traceability) = 2 years to implement and demonstrate compliance.
- Today ~350 Million items in EU tracked and traced, compliant with traceability directives and adopted as part of daily business by manufacturers, importers, distributors and users of explosives.
- Many countries globally followed with similar regulations, including RSA.

This presentation makes reference to the 2024 draft regulations issued in October 2024 (South African Department of Police, Explosives Act, 2003 (Act No 15 of 2003)) with associated annexures.

Background – FEEM* Guidance Note

- Development of the FEEM Guidance Note in cooperation with TTE-Europe GmbH.
- The harmonized code structure allows the usage within the European Union, independent from the different software systems.
- Document serves as a model for similar legislation around the world.



Federation of European Explosives Manufacturers

November 2009

Guidance Note

FEEM European Explosives Code Structure

(Mod. 1, April 2013)

COMMISSION DIRECTIVE 2008/43/EC of 4 April 2008 & COMMISSION DIRECTIVE 2012/4/EU of 22 February 2012 amending Directive 2008/43/EC on Identification & Traceability of Explosives for civil uses

3. TABLE OF CODE STRUCTURE ELEMENTS

Field	Digits	Format	Application Identifier	AI Description	Length	Notes
Country & Production Site No.	5	Alpha-Numeric	(90)	Mutually agreed between trading partners	Variable but used as a fixed number to 5 digits	Mandatory to comply with Directive e.g. FR002 – France, 2nd site
Unique Item No. OR Logistical Unit No.	30	Alpha-Numeric	(250)	Secondary Serial No.	Variable up to 30 characters	Mandatory to comply with Directive
Determination of items and logistical units	2	Numeric	(20)	Product Variant	Fixed	Optional
Production Date	6	Numeric	(11)	Product Date (YYMMDD)	Fixed	Optional
Product Code	30	Alpha-Numeric	(240)	Additional Product Identification Assigned by Manufacturer	Variable up to 30 characters	Optional

*FEEM = Federation of European Explosives Manufacturers

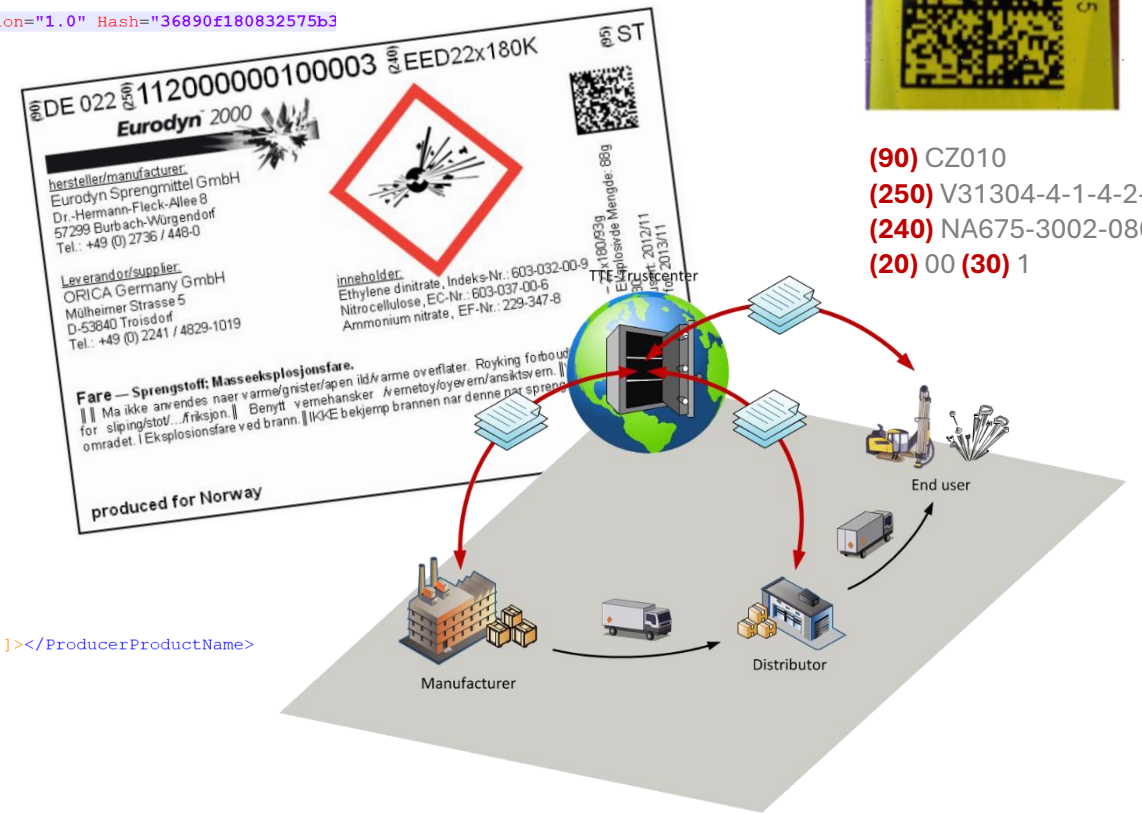
This presentation makes reference to the 2024 draft regulations issued in October 2024 (South African Department of Police, Explosives Act, 2003 (Act No 15 of 2003)) with associated annexures.

FEEM and TTE developed the FEEM Guidance Note

(http://www.feem-europe.org/uploads/ckeditor/files/Guidance-Note-FEEM-European-Code-Structure-Mod_1-April-2013(1).pdf)

(90) CZ010
(250) V31304-4-1-4-2-5
(240) NA675-3002-0800-1E3X
(20) 00 **(30)** 1

```
<?xml version="1.0" encoding="UTF-8"?>
<Shipment FileCreator="TTE-Online" FileType="FEEM-Std" FileVersion="1.0" Hash="36890f180832575b3
   <MessageID>DE037-20142409081546</MessageID>
   <MessageTime>2014-09-24T08:15:46+01:00</MessageTime>
   <MessageType>Shipment</MessageType>
   <ShipmentNumber>90026</ShipmentNumber>
   <DeliveryNoteNumber>90026</DeliveryNoteNumber>
   <Sender>
      <Code>DE037</Code>
      <Name><![CDATA[xxxxxxxx]]></Name>
      <Name2><![CDATA[xxxxxxxxx]]></Name2>
      <AddressCode>34620</AddressCode>
      <Address><![CDATA[xxxxxxxxxx]]></Address>
      <Zipcode>99102</Zipcode>
      <City><![CDATA[xxxxxxxxx]]></City>
      <Country>DE</Country>
   </Sender>
   <Shipper>
      <Code>409708</Code>
      <Name><![CDATA[DEU-GENERIC TRANSPORTER]]></Name>
   </Shipper>
   <Receiver>
      <Code>2996</Code>
      <Name><![CDATA[xxxxxxxxxxx]]></Name>
      <AddressCode>132197</AddressCode>
      <Address><![CDATA[xxxxxxxxxx]]></Address>
      <City><![CDATA[xxxxxxxxxx]]></City>
      <Country>DE</Country>
   </Receiver>
   <SummaryItems>
      <SummaryItem PSN="IT004" SID = "U04-0001">
         <ProducerProductCode>IEED0656000</ProducerProductCode>
         <ProducerProductName><![CDATA[RIOHIT AL 65x600 (2500g)]]></ProducerProductName>
         <ItemQuantity>200</ItemQuantity>
         <CountOfTradeUnits>20</CountOfTradeUnits>
         <PackagingLevel>04</PackagingLevel>
         <ProductionDate>2014-08-21</ProductionDate>
         <NEW>500.0</NEW>
         <UnitOfMeasure>KGM</UnitOfMeasure>
      </SummaryItem>
      <SummaryItem PSN="IT004" SID = "U04-0002">
      <SummaryItem PSN="IT004" SID = "U03-0003">
      <SummaryItem PSN="IT004" SID = "U03-0004">
      <SummaryItem PSN="IT004" SID = "I00-0001">
```



TTE Europe GmbH

Living Technology Synertech
Authorized TTE Partner

How

FEEM Guidelines

FEEM Guidelines – small articles

What

EU 2008/12 Directives

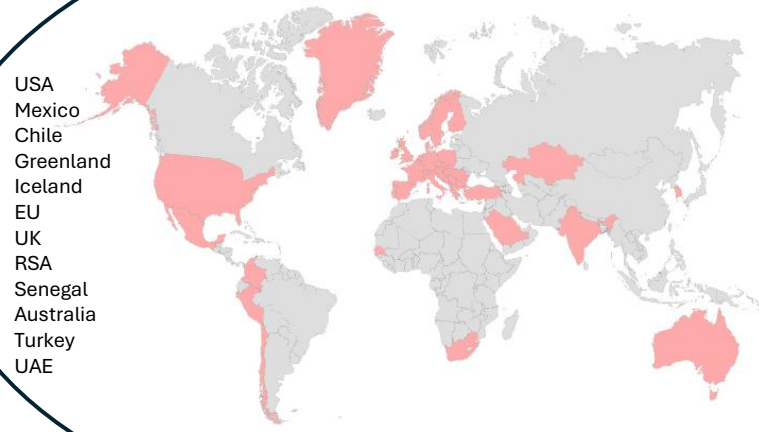
RSA Explosives Act 2003

Legislation regulates "WHAT TO DO"

but not "HOW TO"

TTE Europe GmbH

Adoption



USA
Mexico
Chile
Greenland
Iceland
EU
UK
RSA
Senegal
Australia
Turkey
UAE

This presentation makes reference to the 2024 draft regulations issued in October 2024 (South African Department of Police, Explosives Act, 2003 (Act No 15 of 2003)) with associated annexures.

RSA Traceability Regulations–foundation elements

Three main aspects

Serialization, marking & equipment:

- Explosives must be clearly and permanently marked with a unique identifier.
- Serialization must ensure enduring and global uniqueness -> production site code.
- Marking of all single 'Items' and packaging units.
- Some exceptions for items too small to mark.
- Ensure that equipment and associated technology are available, used and maintained to enhance the tracking and tracing of blasting explosives.

Record-keeping:

- Record keeping 3 years, Regulation 6, unless specified elsewhere in the Act, for example:
  - Storage of data for 10 years by manufacturers and importers (Annexure Z, 6(3)).
- Secure prevention of loss or tampering of records.

Reporting:

- Ensure 24/7 Reachability.
- On request: provide information about individual units.

This presentation makes reference to the 2024 draft regulations issued in October 2024 (South African Department of Police, Explosives Act, 2003 (Act No 15 of 2003)) with associated annexures.

Solutions – HOW to comply

- **Examples of considerations:**
  - Budget cycles, change management, staff attrition, training, system implementation and maintenance.
  - Data interoperability (i.e. a convention to make sure all marking and identification conforms to a common standard)
- **Lessons learnt from EU :**
  - Legislator(s), manufacturers, importers, distributors and users all need to work together to define and agree HOW to comply.
  - Federation of European Explosives Manufacturers (FEEM) worked together to create the FEEM Guidance Note.
  - Marked explosives but without data
  - Wrong / missing / late data
  - Incompatible data exchange formats
  - Unreadable Codes → label vs direct ink
  - Additional labor time
  - Less Throughput
  - Expenses …

This presentation makes reference to the 2024 draft regulations issued in October 2024 (South African Department of Police, Explosives Act, 2003 (Act No 15 of 2003)) with associated annexures.

Supply Chain Transparency

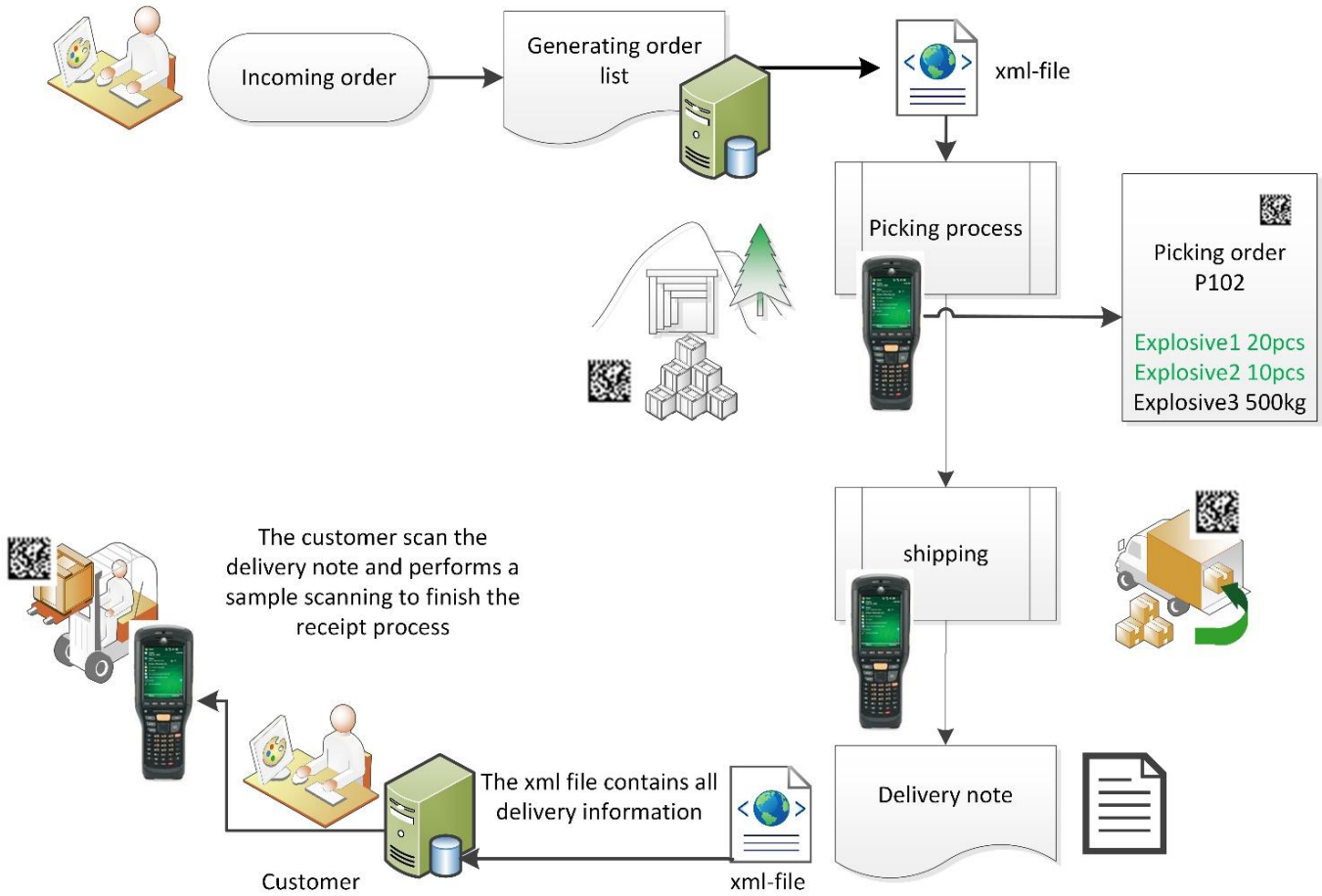
This presentation makes reference to the 2024 draft regulations issued in October 2024 (South African Department of Police, Explosives Act, 2003 (Act No 15 of 2003)) with associated annexures.

Supply Chain Transparency

- **Assists to increase security:**
  - Tracing of the life cycle of explosives from production to consumption at the level of individual items.
  - Prerequisite: labelling each item and transmitting information about its manufacturer and the unique serial number along the entire supply chain.
  - XML-file creation for each shipping operation to ensure the completeness of all information.

Supply Chain Transparency

- **Track & Trace from order to delivery:**



This presentation makes reference to the 2024 draft regulations issued in October 2024 (South African Department of Police, Explosives Act, 2003 (Act No 15 of 2003)) with associated annexures.

Track & Trace for Manufacturers

This presentation makes reference to the 2024 draft regulations issued in October 2024 (South African Department of Police, Explosives Act, 2003 (Act No 15 of 2003)) with associated annexures.

Track & Trace for Manufacturers

- **Cost trepidations:**
  - Only marginally increase cost per item.
  - No reduction in productivity.
  - No increase in personnel costs.
- **This HAS been proven and operational for:**
  - All types of explosives.
  - No reduction in productivity.
  - No increased personnel costs.
  - For the mainly manual production, or
  - for partially automated production processes, or
  - for fully automated production processes.

This presentation makes reference to the 2024 draft regulations issued in October 2024 (South African Department of Police, Explosives Act, 2003 (Act No 15 of 2003)) with associated annexures.

Track & Trace for Manufacturers

- **Industry Leader or Laggard?**
  - Track & Trace is no longer used exclusively by manufacturers to meet legal requirements – it is used to be a responsible industry role player.
- **Track & Trace software is also:**
  - An explosives warehouse management solution.
  - A software system for optimizing selected work processes and operational performance related to explosives.
  - For production control and scrap products control.
- **Data Exchange:**
  - Data exchange with ERP (Enterprise-Resource-Planning) programs and Blast Designed Software Solutions enables the integration of Track & Trace software into selected accounting and evaluation processes
- **Competitive Edge:**
  - End-users adoption of track & trace is simpler and cost effective if manufacturer is compliant – end user therefore can opt to apply pressure on suppliers to provide legally and interoperable compliant marked articles.
  - Retention or Expansion of the customer base in countries with the corresponding legal regulations.

This presentation makes reference to the 2024 draft regulations issued in October 2024 (South African Department of Police, Explosives Act, 2003 (Act No 15 of 2003)) with associated annexures.

Track & Trace for End-Users

This presentation makes reference to the 2024 draft regulations issued in October 2024 (South African Department of Police, Explosives Act, 2003 (Act No 15 of 2003)) with associated annexures.

Track & Trace for End-Users

- **Cost trepidations:**
  - Implementation cost and adjustment of operating procedures.
  - Increased productivity.
  - No increase in personnel costs.
  - By knowing exact consumption, reduce unnecessary explosives stock holding (reduce risks and costs).

- **Improved Warehouse Management:**
  - Faster inventory cycle counting.
  - Precise control of incoming and outgoing explosives.
  - Electronic maintenance of an explosives stock ledger, including logging of all activities.
  - Overview of all executed processes including receipt of explosives, relocation, destruction, and shipment.
  - Comprehensive documentation at the push of a button.

This presentation makes reference to the 2024 draft regulations issued in October 2024 (South African Department of Police, Explosives Act, 2003 (Act No 15 of 2003)) with associated annexures.

Track & Trace for End-Users

- **Blasting preparation and post-processing:**
  - transfer of data from simulation software for blasting preparation / compilation of the required material based on the current stocks in the warehouse.
  - evaluation of blasting based on exact consumption data.

- **Consumption Control:**
  - proof of the individuals who used the explosives (i.e. the performers of the blasting).
  - proof of unused explosives up to the return to the warehouses.

This presentation makes reference to the 2024 draft regulations issued in October 2024 (South African Department of Police, Explosives Act, 2003 (Act No 15 of 2003)) with associated annexures.

Challenges for Industry

This presentation makes reference to the 2024 draft regulations issued in October 2024 (South African Department of Police, Explosives Act, 2003 (Act No 15 of 2003)) with associated annexures.

Challenges for industry -obligations

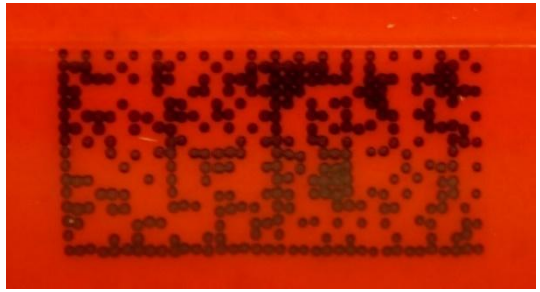
- Manufacturers
  - Serialization
  - Marking
  - Scanning (Production + Packaging)
  - Record-keeping
  - Data provision to customers
- Distributors
  - (When re-packing):
    - Serialization
    - Marking
  - Scanning
  - Record-keeping
  - Data provision to customers
- End-Users
  - Scanning
  - Record-keeping

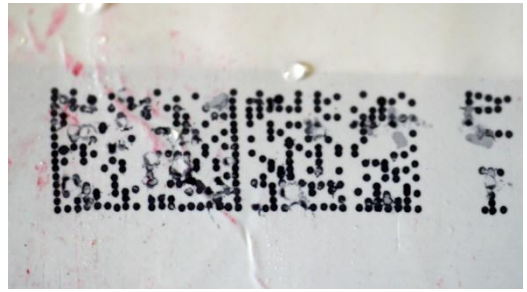
This presentation makes reference to the 2024 draft regulations issued in October 2024 (South African Department of Police, Explosives Act, 2003 (Act No 15 of 2003)) with associated annexures.

Challenges for industry – marking

Direct Inkjet printing versus adhesive labels or stickers

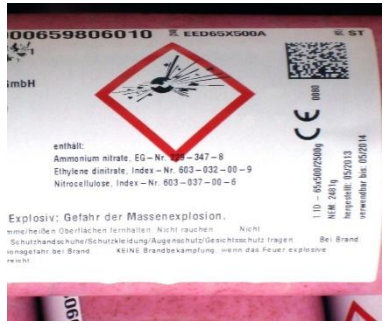
Direct inkjet printing





often not readable, cells without sharp contours and not aligned columns and rows

(Pre-) printed labels and stickers

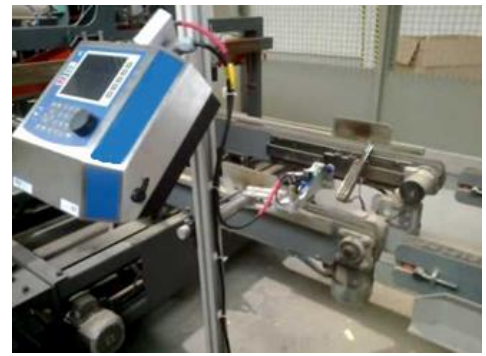


Printed labels usually create less problems …

This presentation makes reference to the 2024 draft regulations issued in October 2024 (South African Department of Police, Explosives Act, 2003 (Act No 15 of 2003)) with associated annexures.

Challenges for industry – legacy matters

- **Just some examples:**
  - unmarked explosives, still on stock
  - Marked explosives but without data
  - Wrong / missing / late data
  - Incompatible data exchange formats
  - Unreadable Codes → label vs direct ink
  - Additional labour time
  - Less Throughput
  - Expenses …



Legislation regulates
WHAT but not HOW to do it!

This presentation makes reference to the 2024 draft regulations issued in October 2024 (South African Department of Police, Explosives Act, 2003 (Act No 15 of 2003)) with associated annexures.

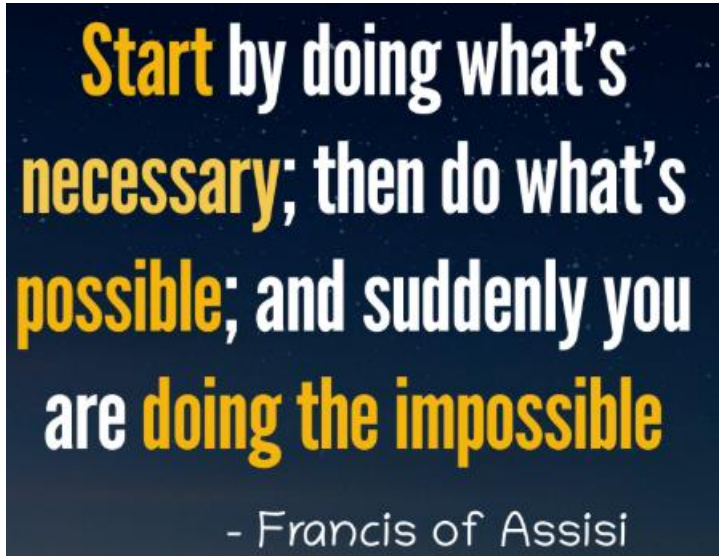
Challenges for industry – pro's & con's

- **Con's:**
  - Possible reduction in productivity, especially during implementation.
  - Required adaptation of work processes.
  - Significant investment in consulting, hardware, and software.
  - Training of employees.
  - Possible dispute with employee representatives (trade unions).
  - New software system to keep operational.

- **Pro's:**
  - Considering the interests of companies and governments, the implementation of such systems is a big step towards increasing safety and security.
  - Track & Trace systems enable total transparency of the supply chain.
  - By tracking each individual item, its whereabouts can be proven at any time.
  - Warehouse management is taken to a new level.
  - Through data exchange with ERP systems, invoicing can be created based on real delivery values.
  - The TTE Explosives Track & Trace System (and services) has been used successfully by manufacturers and end-users for many years now and is an extremely mature and completely reliable SOLUTION.

This presentation makes reference to the 2024 draft regulations issued in October 2024 (South African Department of Police, Explosives Act, 2003 (Act No 15 of 2003)) with associated annexures.

Solutions

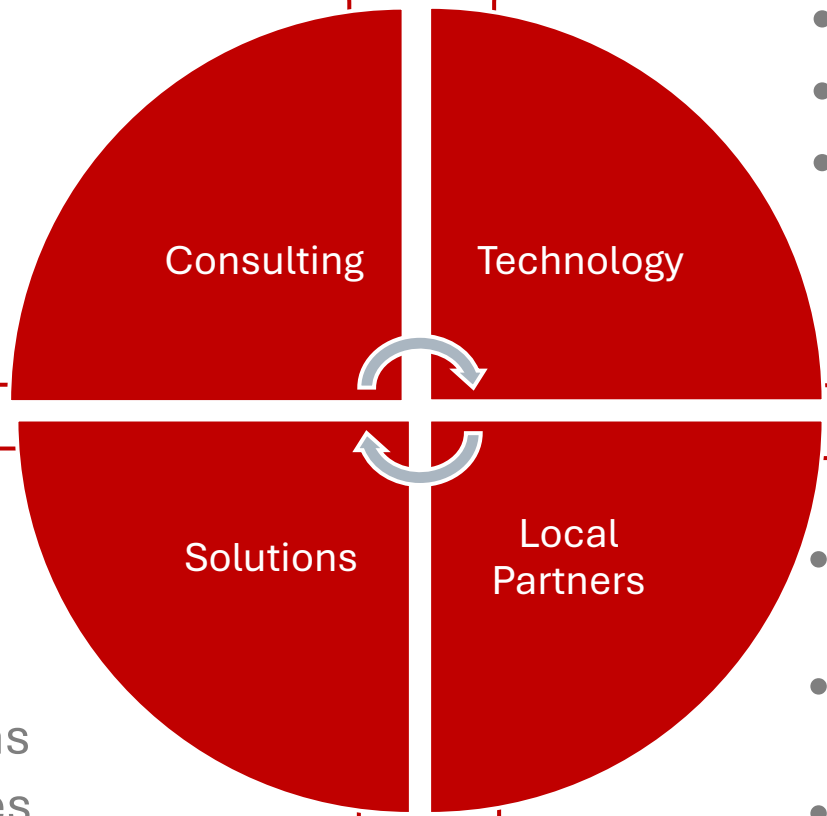


This presentation makes reference to the 2024 draft regulations issued in October 2024 (South African Department of Police, Explosives Act, 2003 (Act No 15 of 2003)) with associated annexures.

How can we help you?

- Associations
- Authorities
- Companies

- Printing
- Scanning
- Data exchange



- Single modules
- Turn-key Solutions
- Custom interfaces

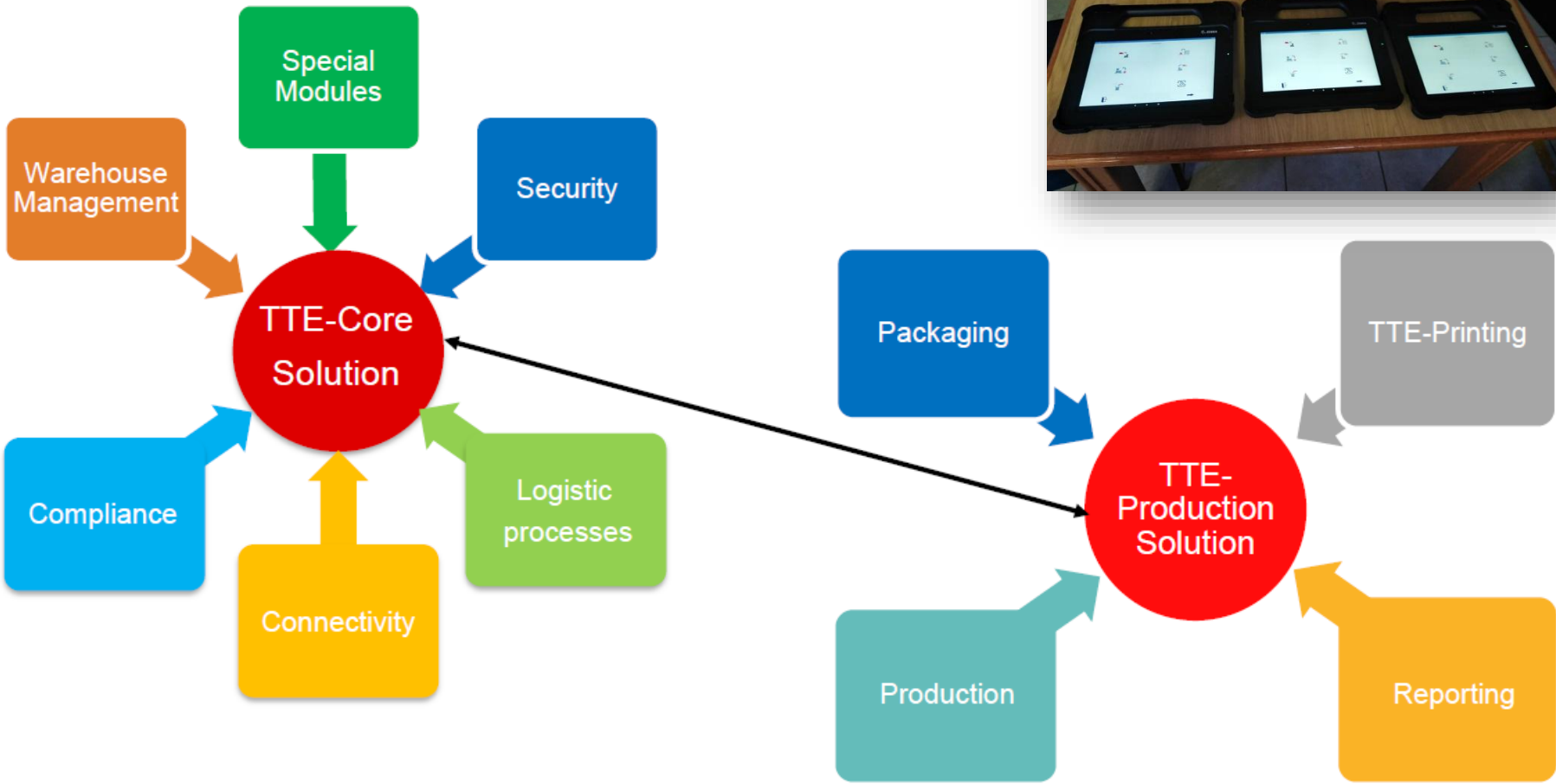
- Adaption to local requirements
- Installation / On-Boarding
- Local Support

This presentation makes reference to the 2024 draft regulations issued in October 2024 (South African Department of Police, Explosives Act, 2003 (Act No 15 of 2003)) with associated annexures.

TTE Europe GmbH

Living Technology Synertech
Authorized TTE Partner

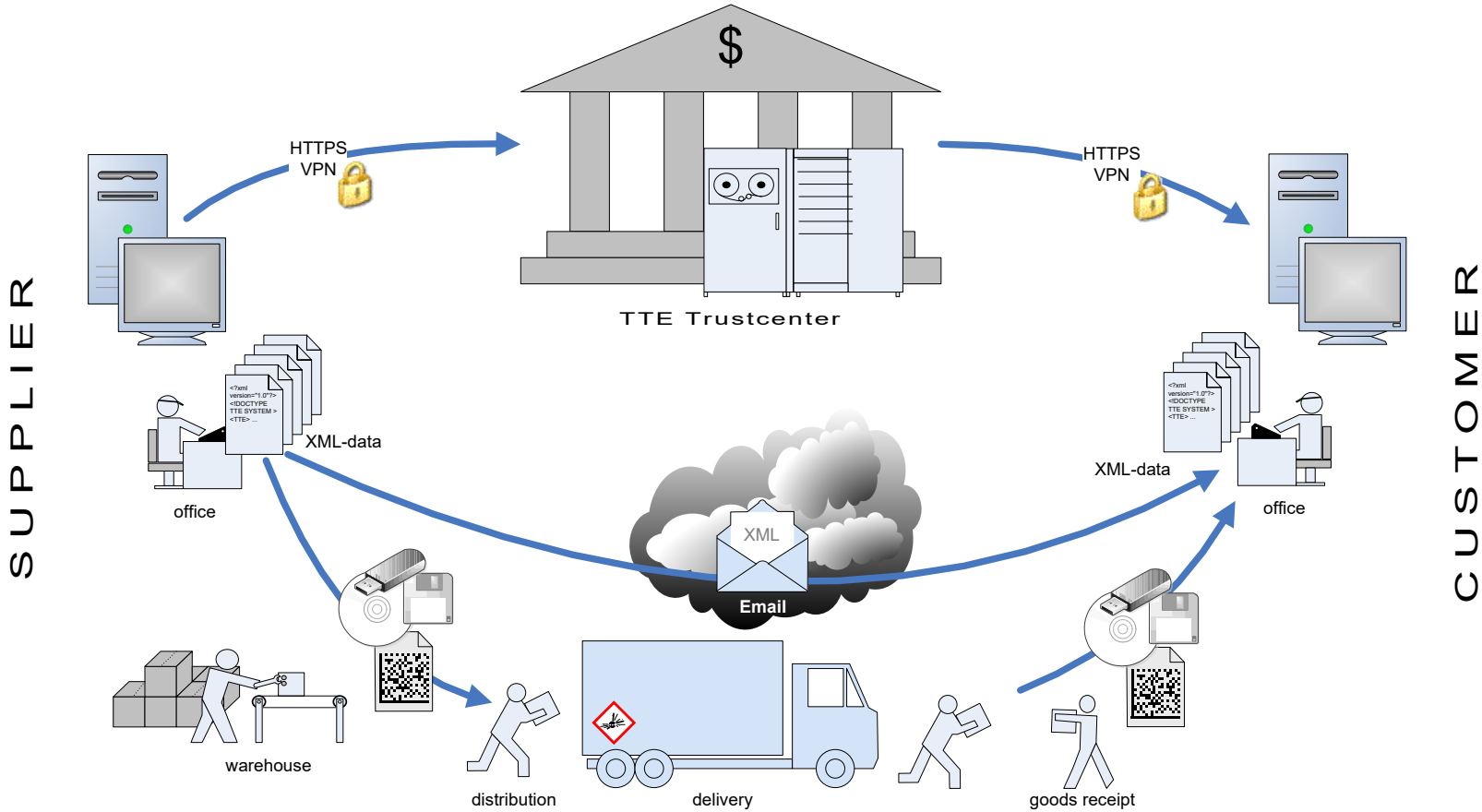
TTE System



This presentation makes reference to the 2024 draft regulations issued in October 2024 (South African Department of Police, Explosives Act, 2003 (Act No 15 of 2003)) with associated annexures.

Trust Centre

Transfer of correlation between packaging ID code and package content

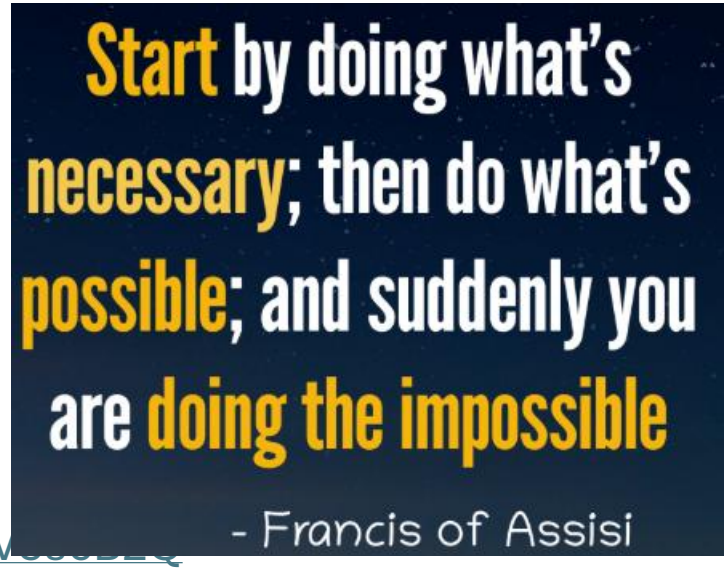


This presentation makes reference to the 2024 draft regulations issued in October 2024 (South African Department of Police, Explosives Act, 2003 (Act No 15 of 2003)) with associated annexures.

Q & A

Thank-you to Mr. Marc Olbort of TTE Europe for certain content used in this presentation.

Thank-you to NIXT for this opportunity to present.



Direct contact details:
rpenney@rfid.co.za
sales@rfid.co.za
marc.olbort@tt-e.eu

Online contact details:
www.rfid.co.za
https://www.youtube.com/channel/UCLuM4EnjLLjJGueyV
https://www.facebook.com/SynertechRFID/

Remember....the ultimate goal is to create a "smart" business that can adapt and respond to changes dynamically.