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THE FIRST REAL-TIME BLOCKCHAIN VAT -
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Following years of study the Gulf Cooperation Council (GCC)[1] appears ready to adopt the recommendations[2] of the International Monetary Fund (IMF) and put in place a tax system that will stabilize revenue.[3] A value added tax (VAT) and corporate income tax (CIT) are considered.[4] As of the date of this paper country laws have not been released. A VAT Framework Agreement, that functions like the VAT Directive in the EU, has been agreed. The GCC VAT is largely modeled on the EU VAT. A GCC CIT however, does not appear to be under active consideration at the moment.

Although new, the GCC VAT is very worthy of attention. From a tax policy perspective, it is making notable improvements to EU VAT design. The GCC VAT is (potentially) the world's first real-time, blockchain-secured, multi-jurisdictional VAT. This is a remarkable accomplishment, and it indicates that the GCC has learned and applied a number of global VAT and technology lessons.

This paper is the first in a series of papers that will consider flaws in the European VAT, which the GCC has corrected *ab initio*. Because the GCC is "starting from scratch" it is uniquely placed as a developed and technologically advanced economic community to apply the best in modern analytical and policy tools to resolve the inherent (and seemingly intractable) design flaws in the EU VAT. The GCC has learned from past mistakes and is improving VAT design and VAT administration. With a clear-

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[1] The GCC is a regional intergovernmental political and economic alliance of six Middle Eastern countries – Bahrain, Kuwait, Oman, Qatar, Saudi Arabia and he United Arab Emirates. It was formed in 1981.

[2] The IMF consulted with five of the six GCC countries in the early 2000's (Oman was later) and generally recommended the adoption of a VAT and CIT. *IMF Concludes Article IV Consultation with Kuwait*, Public Information Notice (PIN) No. 01/60, 29 June 2001, International Monetary Fund, Washington D.C.; *IMF Concludes 2001 Article IV Consultation with Saudi Arabia*, Public Information Notice (PIN) No. 01/119, 7 November 2001, International Monetary Fund, Washington D.C.; *IMF Concludes 2002 Article IV Consultation with Qatar*, Public Information Notice (PIN) No. 02/99, 10 September 2002, International Monetary Fund, Washington D.C.; *IMF Concludes 2002 Article IV Consultation with the United Arab Emirates*, Public Information Notice (PIN) No. 03/30, 11 March 2003, International Monetary Fund, Washington D.C.; *IMF Concludes 2004 Article IV Consultation with the Kingdom of Bahrain*, Public Information Notice (PIN) No. 04/96, 24 August 2004, International Monetary Fund, Washington D.C.; *IMF Executive Board Concludes 2009 Article IV Consultation with Oman*, Public Information Notice (PIN) No. 10/21, 17 February 2010, Washington D.C.

[3] The IMF recommendations have been widely supported by academics, but open to criticism from business and cultural representatives. See: Martin Harrison, *Taxation and the GCC States,* GPLCER (Gulf One Lancaster Center for Economic Research) Lancaster University Management School (October 2010) available at: http://www.lancaster.ac.uk/media/lancaster-university/content-assets/documents/lums/golcer/i5.pdf

[4] In the 1990's the GCC first began to consider adoption of a VAT and a corporate income tax (CIT), but recently it is the VAT that has been advancing.

sighted, forward-looking VAT the GCC is bringing the EU-style VAT to a new level of efficiency and excellence.[5]

One of the most visible flaws in the EU VAT is its openness to cross-border frauds – both intra-community and extra-community frauds. Missing traders are the problem. These frauds are known as missing trader intra-community (MTIC) fraud, and missing trader extra-community (MTEC) fraud. These frauds arise in both the sale of goods and the sale of services.[6] They commonly occur in a community setting, but have been replicated in a single country context, notably with tradable services.[7] Thieves range from small-time operators to organized criminals and terrorists.[8] Importantly, it is not the specific product or the particular service selected to carryout the fraud that is critical; it is the structural design of the tax and its administration that allows and facilitates these frauds that is the problem. This is what the GCC has corrected.

Missing trader frauds take advantage of cross-border trading rules that are common to most VATs. Adjustments are needed when rates differ between jurisdictions, and when the VAT withheld in one jurisdiction is attributed to consumption that will occur in another. Goods or services leaving the first jurisdiction are zero-rated (the tax collected up to that point is refunded to the exporter) and then re-imposed through a reverse-charge in the second jurisdiction at the new applicable rate. A missing trader is a business that is obligated to perform this reverse charge, but which does not do so, even though it sells on after importation and collects VAT.

We need to be careful when we look at tax frauds. The perpetrators of tax fraud are not at all concerned about the specific tax law that they are abusing; they are looking solely at revenue streams, and the probability that they will get caught. As a result, when a fraudster finds a single activity that attacks multiple tax systems, it becomes a favored vector, and we find a *nexus of frauds* clustered around a unitary fraud operation.

The government's perspective is just the opposite of the fraudster's. It endeavors to correct tax law flaws and broadly increase the probability of detection. A focus on one kind of tax fraud may well resolve many more kinds of fraud than the one initially focused on because of changes in the probability of detection, and because of the tendency of fraudster to gravitate toward *fraud nexuses*. This appears to be what will

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[5] Alan Schenk, Victor Thuronyi & Wei Cui, *European Union: A Mature VAT Resistant to Change*, in VALUE ADDED TAX – A COMPARATIVE APPROACH, 2nd ed. (2015) at 48-54 (explaining how the EU VAT matured and with that maturity became resistant to change).

[6] Richard T. Ainsworth, *Tackling VAT Fraud: 13 Ways Forward*, 45 TAX NOTES INTERNATIONAL 1069 (March 26, 2007) (considering a list of proposals to solve VAT Fraud from many individuals inside and outside the EU, with very little resolution);

[7] Richard T. Ainsworth, *VAT Fraud: The Tradable Services Problem*, 61 TAX NOTES INTERNATIONAL 217 (January 17, 2011) (discussing the overlooked problem brought on by modern commerce in services where technology services, like a ring tone for a cell phone, are commonly sold and re-sold in much the same manner as goods are traditionally sold, and coining the term MTEC); Richard T. Ainsworth, *VoIP MTIC – VT Fraud in Voice Over Internet Protocol*, 57 TAX NOTES INTERNATIONAL 1979 (March 22, 2010) (considering one of the most lucrative tradable service for fraudsters short of the CO2 frauds).

[8] Europol, *SOCTA 2013 (Public Version)* at 27 (indicating without distinguishing between MTIC and MTEC that, "The EU is yearly loosing an estimated 100 billion Euros of MTIC income."

happen as the GCC VAT is rolled out after January 1, 2018. The example considered in this paper involves the illicit cigarette trade. By resolving missing trader frauds, the GCC may (unintentionally) make a serious dent in the illicit cigarette trade and the theft of cigarette tax revenues (a manufacturer's tax), precisely because the operation of the GCC VAT will increase the cigarette fraudster's probability of detection.

A "tax fraud nexus" that could easily be replicated in the GCC (if an *unmodified EU-style VAT* were to be adopted) can be seen in the Danish chocolate frauds. These frauds were examined in the first program of the three part Danish documentary, *How Fraudulent Denmark* (*Sådan Svindles Danmark*). The documentary appeared on DR TV January 12 and 25, and February 1, 2016. The fraud vehicle was candy that was re-sold by traders who purchased expired chocolate from the Mars Denmark Company. The primary fraud, re-packaging and then re-selling expired chocolate was carried out in a manner that attacked two tax regimes – the chocolate tax (a manufacturer's tax) and the VAT (a consumption tax). This scheme funded organized crime; a different scheme examined in the second program of the documentary funded Islamic terrorists.

The GCC seems to be very aware of the missing trader fraud discussed in the documentary. Technology innovations that will suppress it are set out in Article 71 of the GCC Framework Agreement. No other VAT Framework or VAT Directive has such a provision. The workability of Article 71 to meet the challenges of missing trader fraud has been a topic of considerable interest in the VAT course at NYU's Graduate Tax Program this term. The final assessment of the tax professionals in attendance was that if the GCC succeeds in preventing missing trader fraud with technology (and it looks like it will), then the EU and other VAT jurisdictions should consider following suit.

One of the tax-related side benefits from resolving missing trader fraud in the GCC VAT will likely be the suppression of cigarette smuggling, and the recovery of important revenues from the cigarette tax, which has been raised to a 200% levy. If Denmark had a VAT provision similar to Article 71 it would likely solve the VAT and Chocolate Tax frauds considered in the documentary.

<div align="center">

Danish Fact Pattern:
Public Health, Candy Tax & VAT Fraud
Mars Denmark – January 12, 2016 Documentary Program

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The Mars Denmark/ David Yüksel fraud is a classic example of a fraudster exploiting as many fraud opportunities as possible in a single set of transactions. In this case the public health fraud of selling out-of date chocolate (re-wrapped by Romanian migrants) is coupled with the tax fraud of avoiding the Danish Chocolate Tax (imposed on manufacturers), which is then further married to a complicated intra-community missing trader VAT fraud that involved moving the candy in a circle (Denmark-to-Germany-to-Sweden-back-to-Denmark). Lax enforcement (public health and tax), complex commercial transactions, and multiple "profit-points" are what attracted the Danish fraudsters.

<div align="center">3</div>

The first program in the Danish documentary begins with an undercover-investigation of individuals (frequently Romanian migrants) engaged in unsanitary re-wrapping of expired candy for resale to the Danish public. This opening portion of the documentary comes from filming done in the summer of 2015. The warehouse that the investigators are visiting is in Sweden. The immediate concern is a health risk. The Danish Food and Drug Administration (Fødevarestyrelsen, or FST) uncovered the fraud. However, we are told that this active investigation is part of "… a network of cases where the [Danish] Treasury has been cheated out of millions, and when the [tax] authorities first discover it … it is too late."[9]

As the story unfolds, we are told that it is not immediately clear how the workers acquire the expired candy. This is an FST investigation, not a tax investigation, so the source of the candy is not as much of a concern as are the health considerations. The documentary makes it clear, however that two taxes – the Chocolate Tax (*Chokoladeafgift*)[10] and the Value Added Tax (VAT) – are being manipulated by the fraudsters in a manner that allows them to reap huge "profits" not only from the sale of expired chocolate, but by collecting and not remitting tax payments.

The mastermind of this fraud appears to be David Yüksel. He owns House of Candy, and allegedly controls most of the other entities involved in the fraud: (a) Haga Invest, GmbH, (b) Jakobsen Trade, and (c) the Swedish warehouse (Letica Cleaning) where candy is re-wrapped. The fraud chain – sales of expired chocolate – begins with apparently legitimate sales from Mars Denmark. The end of the chain – sales to the Danish consumer – occurs at a price that includes charges for the Chocolate Tax and the 25% Danish VAT, although neither of these tax amounts are remitted to the Treasury.

Mars Denmark is the Nordic marketer of Snickers, M&Ms, Twix, Mars, and a long list of other popular candy products. Mars Denmark must register under the Danish Chocolate Tax Act, because it both (a) manufactures chocolate products in Denmark and (b) imports chocolate products for resale from overseas.[11] The Chocolate Tax is a single stage manufacturer's tax. In this case the tax is determined by the added sugar per 100 grams of net weight of the product. Rates range from 23 DKK ($3.45) to 38 DKK ($5.84) per kg.[12]

The Chocolate Tax exempts (and provides a tax refund for) taxable chocolate that is exported, or unsellable.[13] For this reason Mars Denmark stores chocolate intended for delivery outside of Denmark (as well as its inventory of expired chocolate) in a German warehouse. Physical removal of the chocolate from Denmark assures a chocolate tax refund. Onward sales from this warehouse, if made to another Nordic state, are zero-rated intra-community sales for VAT purposes.[14]

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[9] See page 2 of translation.

[10] An Act on a Tax on Chocolate and Sugar Confectionary (*Bekendtgørelse af lov om afgift af chokolade-og sukkervarer m.m.*) *available at*: https://www.retsinformation.dk/Forms/R0710.aspx?id=146531

[11] Chocolate Tax (Chokoladeafgift) at §§1-5.

[12] Chocolate Tax (Chokoladeafgift) at §2.

[13] Chocolate Tax (Chokoladeafgift) at §9.

[14] Cite to VAT Directive.

The documentary indicates that Mars Denmark sells out of this warehouse to Haga Invest GmbH (a German firm), and delivers the chocolate to the Swedish warehouse. David Yüksel controls both the entity that purchases the chocolate, and the entity that warehouses it.[15]

The documentary has now come full circle. The Swedish warehouse is where the FST first found Romanian migrants re-wrapping out-of-date chocolate destined for the Danish market. David Yüksel's House of Candy distributed this candy throughout Denmark.

The documentary observes that the candy and the money in this fraud pattern travel in different circles. This is one of many elements that make it difficult for the authorities to uncover the frauds. While Mars Denmark contracts with Haga Invest GmbH, and fulfills its contract through its German warehouse, a different Danish company, Jakobsen Trade, pays the Mars Denmark/ Haga Invest invoice. The fraud trail is even more difficult to trace because Jakobsen Trade has no VAT ID number, and it never receives the candy it pays for.

Mars Denmark told the investigation team that "... David Yüksel has been their main contact within [Jakobsen Trade and Haga Invest] even though he [David Yüksel] officially has nothing to do with these companies."[16] The documentary then references a Danish court decision of November 20, 2015 where "… the official owner and director of Jakobsen Trade is sentenced to 2.5 years' imprisonment with a fine of DKK 8.7m … and who explains to the court that … he was merely a front for someone else. He would not disclose who."[17] The thrust of evidence in the documentary is that this undisclosed person is David Yüksel.
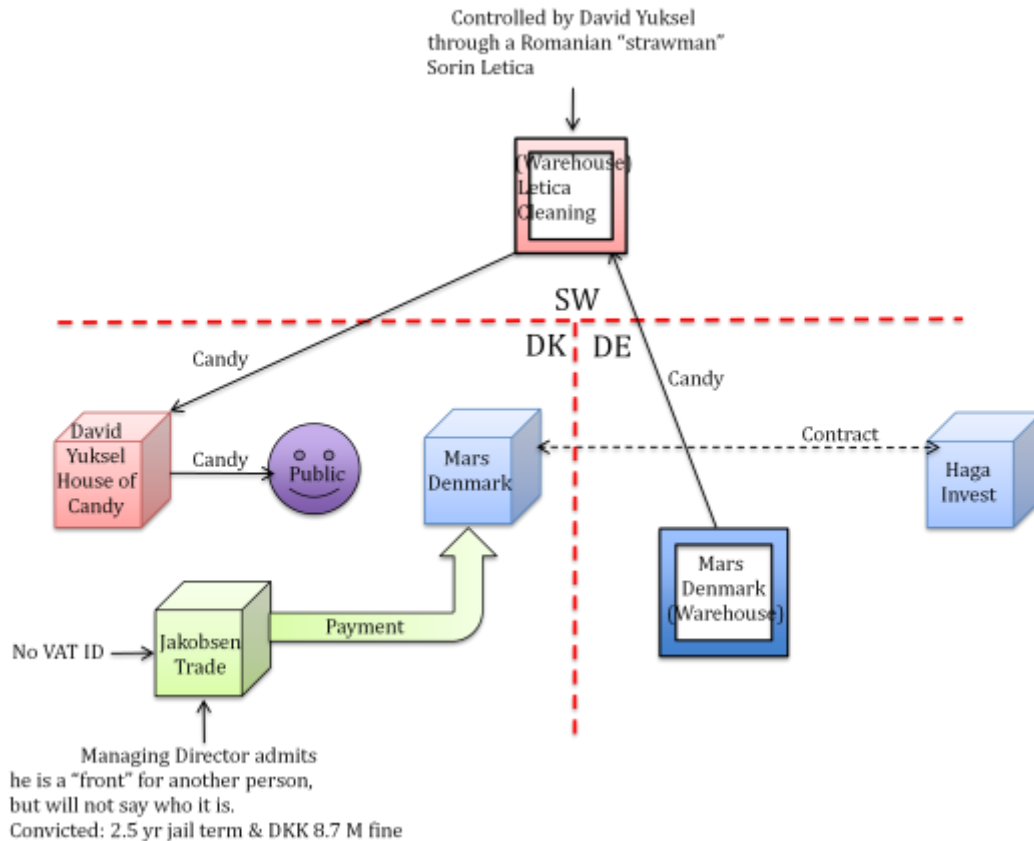
It is reasonably clear that there are at least two missing traders in the Mars Denmark fact pattern – the House of Candy and Letica Cleaning (the company that owns the Swedish warehouse). David Yüksel controls both. The bankruptcy of Letica Cleaning in 2013 left a VAT and Chocolate tax debt of DKK 30m and at the indictment of David Yükseli in 2015 the government asserts that an additional DKK 60m is due from the House of Candy. Figure 1 sets out the companies and the transactions involved in this fraud below.

Figure 1: Intra-community candy sales

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[15] To qualify for a zero-rate the chocolate must physically move across an EU border. *Teleos* case. The Director of Letica Cleaning is an illiterate Romanian who began working for David Yüksel in his candy kiosks in Denmark in 2010. David Yüksel had him sign papers to be the Director of the company that he allegedly new nothing about.

[16] P. 19

[17] P. 19

Controlled by David Yuksel
through a Romanian "strawman"
Sorin Letica

(Warehouse)
Letica
Cleaning

SW
DK | DE

Candy

Candy

David Yuksel House of Candy

Candy

Public

Mars Denmark

Contract

Haga Invest

Mars Denmark (Warehouse)

No VAT ID → Jakobsen Trade

Payment

Managing Director admits
he is a "front" for another person,
but will not say who it is.
Convicted: 2.5 yr jail term & DKK 8.7 M fine

The VAT fraud in this fact pattern relies upon the exemption in Article 138 of the VAT Directive. This provision requires Member States to exempt the supply of goods dispatched or transported to a destination outside that state's territory (Germany), but within the community (Sweden), by or on behalf of the vendor (Mars Denmark) or the person acquiring the goods for another taxable person (Haga Invest) in a Member State other than that in which dispatch or transport of the goods began (Germany). The three conditions, which need to be satisfied for the zero-rating of an intra-community supply are:

- The right to dispose of the goods as owner must be transferred to the purchaser.
- The vendor must establish that the goods have been dispatched or transported to another member State.
- As a result of that dispatch or transport, the goods must physically leave the territory of the Member State of supply.

The VAT Directive does not require that the goods must be dispatched from the jurisdiction of the vendor (Mars is established in Denmark). The VAT Directive looks to the place where the goods are at the time of the sale (Germany), and requires that they be dispatched to another Member State (Sweden). Thus, by moving the chocolate from Denmark to the German warehouse Mars Denmark secures a refund of the Chocolate Tax, and then by selling the chocolate in a contract that required delivery to Sweden it secures the right to zero-rated the sale and with it the right to deduct all input credits on the Danish (and German) returns related to the chocolate.

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The structure that David Yüksel set up to make purchases from Mars Denmark (buying with a German entity, taking delivery in Sweden) is precisely what Mars Denmark is looking for. There is a considerable tax benefit to Mars Denmark in this structure.[18] Trading with David Yüksel solves potential cash flow and compliance problems for Mars Denmark under both the Chocolate Tax and the Danish VAT.

It is not clear from the documentary and from available public documents in Denmark what happens after the sale to Haga Invest and the delivery of the chocolates to Sweden. It is likely that the following sales occur:

- Haga Invest sells the chocolate to Letica Cleaning in a taxable Swedish sale,
- Letica Cleaning sells the chocolate (in a zero-rated intra-community sale) to House of Candy, and then
- House of Candy sells the chocolate to various retailers (kiosks and other outlets) at a price that is under-market, but which reflects collection of the Danish VAT and Chocolate Tax.

The House of Candy becomes a missing trader by under-reporting purchases and sales. The FST indicates that its audit of the kiosks and candy stores regularly shows that that 75% of them "… cannot prove where the candy they sold came from."[19]

The Chocolate Tax is a noble effort at social engineering through the tax system. Raising the price of chocolate is calculated to discourage consumption. However, the economics of this incentive-system only works if tax enforcement is robust. If it is not, then these incentives produce just the opposite result – they encourage tax avoidance schemes that dangerously blend with other tax and food safety frauds to produce very unwanted results.

<center>Comparable Saudi Fact Pattern -
Public Health, Cigarette Excise Tax & VAT Fraud</center>

Saudi Arabia does not have a Chocolate Tax, but like Denmark, it is embarking on a tax-based social engineering experiment – in this instance, the effort is to curtail smoking.[20] The question for this comparative study is – will the operation of the GCC VAT in conjunction with an increased tobacco excise tax accelerate smuggling frauds or will the design of the GCC VAT help to restrain fraudsters seeking to profit from manipulation of the tax system? It is reasonably clear that the EU VAT accelerated frauds already occurring in the Danish Chocolate Tax; will the GCC VAT do the same

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[18] Mars Denmark could not zero-rate its sales out of the German warehouse if it sold to a Danish buyer – that would be a fully taxed domestic sale. Neither could Mars Denmark zero-rate its sales out of the German warehouse, if the delivery was made in Germany – there would be no physical removal of the goods to another Member State. In addition, if the delivery of the goods is made to Denmark, then Denmark Mars would be subject to the Chocolate Tax as a manufacturer selling into the Danish market.

[19] The standard default rate for an FST audit is 15%.

[20] Nasser Saidi, Taxing Question of Curbs on Tobacco Smuggling, The National (August 18, 2015) available at: http://www.thenational.ae/business/economy/taxing-question-of-curbs-on-tobacco-smuggling#full (indicating that in July 2015 the GCC health ministers agreed that a 100% increase in the taxes on tobacco was needed).

<center>7</center>

for tobacco smuggling activities, or are there differences between the EU and GCC VAT that will produce a different result?

The short answer is that it depends on how thoroughly the GCC intends to use technology for VAT compliance. Like the EU VAT it is modeled on, the GCC VAT, is vulnerable to missing trader frauds. However, Article 71 of the GCC Framework is designed to allow for the real-time collection of tax data from traders, as well as the real-time exchange of transaction-level data among GCC tax authorities. This design could very well reduce opportunities for MTIC frauds, as well as help to curtail the already sizeable cigarette fraud in the GCC.

Then again, if this design is not effectively implemented, the GCC's 5% VAT could make cigarette smuggling all the more rewarding, if fraudsters are allowed to replicate the EU's MTIC fraud patterns. The real answer to cigarette smuggling in the context of the GCC VAT is to place transactional VAT data on a multi-jurisdictional blockchain, and employ artificial intelligence (AI) to scan the database for fraud. This appears to be the direction that the GCC VAT is moving in, but many of the blockchain and AI elements appear to be relegated to the Member State laws, and the consolidated regulations (neither of which have been released at the present time).

On April 1, 2017 Saudi Arabia (and all the other members of the GCC) will double the excise tax on all tobacco products.[21] Pubic health concerns are the reason for the 100% tax increase. The intent is to discourage smoking in the Kingdom.

> Saudi people smoke 15 billion cigarettes annually, which makes the Kingdom the fourth [largest] importer all over the world. … The average daily consumption ranges from 15.4 to 16.8 cigarettes per day between 1995 and 1999. The annual number of cigarettes consumed (in millions) ranges from 8,646-20,000. The retail price of 20 cigarettes in USD, including taxes ranges from 0.27 to 1.32.[22]

35% to 45% of adult Saudi males smoke. But more striking is the fact that 24% of Saudi males in preparatory schools also smoke. The societal trend is clear and needs to be reversed. The social, health and economic burden of tobacco use cost the Kingdom 5 billion Riyals yearly ($1.3 billion USD). In the period between 2005-2010 this economic burden amounted to 25 billion Riyals ($6.7 billion USD).[23]

Although the price of a 20-cigarette pack is a small fraction of the retail price in the US, aggregate sales figures are still significant. The official income statistics from the sale of tobacco products in the Kingdom is estimated to be 13 billion Riyals ($3.5 billion USD). Smugglers make an additional 3 billion Riyal ($800 million USD)

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[21] Trefis Team, *Oil Price Swings Spark Cigarette Taxes in Saudi Arabia*, FORBES (February 10, 2017) *available at*: http://www.forbes.com/sites/greatspeculations/2017/02/10/oil-prices-have-to-do-with-cigarette-prices-in-saudi-arabia/#43dc3dd16457 (indicating that Saudi Arabia is the first Gulf State to announce a specific timeline for the tobacco excise tax.)

[22] Medhat M. Bassiony, *Smoking in Saudi Arabia*, 30 SAUDI MEDICAL JOURNAL 876, 880 (2009).

[23] Maged Abdullah Al-Munif, *Report on Tobacco Control Program of Ministry of Health in Saudi Arabia* (2009) at 3.

annually in the tobacco trade.[24] It has long been the position of the Saudi Finance Ministry that increasing taxes on cigarettes would act to encourage smuggling, not decrease consumption.[25]

> According to a study commissioned by cigarette manufacturer British American Tobacco, around 30 per cent of the total cigarette market in the Middle East is illegal. Around 64 per cent of this illicit trade occurs in the Levant and Yemen while the remaining 36 per cent occurs in the GCC and Iran. This equals $940m in lost taxes.[26]

Illegal tobacco sales surround Saudi Arabia. The British American Tobacco study indicates that 32% of the cigarette trade in the UAE is illegal. Mountainous terrain in the UAE and Oman make it hard to stop smugglers who are known to operate complex networks of land and sea routes.

Smuggling cigarettes in the GCC can be very profitable. A single container of cigarettes can be purchased for $772,000 USD in Yemen. It has a street value of $1,381,333 USD immediately across the border in Saudi Arabia. If a smuggler successfully avoids Saudi customs his profits will be $609,333 USD.[27] After the 100% increase in Excise Tax this container will be worth $1,933,867 USD, and the Saudi re-sale profits will surge to $1,161,867 USD.

If the smuggler (as a missing trader) circumvents both the VAT (on resale of the cigarettes to a VAT registered business) as well as the Excise Tax (on the importation of the cigarettes), then the smuggler's profits will be increased by $96,693. If the missing

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[24] *Id*., at 8; Staff, *Tobacco in Saudi Arabia,* EUROMONITOR INTERNATIONAL, (August 2016) (indicating that even though the cost per pack of cigarettes in Saudi Arabia was the lowest in the world the expected tax increase was expected to significantly increase smuggling and counterfeiting of cigarettes).

[25] Ritesh G. Menezes, Syed Ather Hussain & Mohammed Madadin, Tackling Tobacco Smoking in Saudi Arabia, The Lancet (June 3, 2015) available at: http://www.thelancet.com/pdfs/journals/langlo/PIIS2214-109X(15)00010-8.pdf.   On January 2, 2017 Salwa Customs reportedly foiled an attempt to smuggle 1,300 kilos of tobacco hidden in 50 baskets inside a commercial truck. Saudi Press Agency, *Salwa Customs Thwart attempt to Smuggle more than One Ton of Tobacco,* MESSAGE FROM THE CHAIRMAN (January 2, 2017) *available at*: http://www.spa.gov.sa/viewfullstory.php?lang=en&newsid=1576607; Staff, *Saudis Seize 10m smuggled Cigarettes – about 1.5 m tobacco bags also seized*, EMIRATES 24/7 (May 12, 2016) *available at*: http://www.emirates247.com/crime/saudis-seize-10m-smuggled-cigarettes-2016-05-12-1.629830; Staff writers, *Dh140m ($38.12 m USD) Cigarette Smuggling Operation Busted*, EMIRATES 24/7 (May 31, 2012) available at: http://www.emirates247.com/news/emirates/dh140m-cigarette-smuggling-operation-busted-2012-05-31-1.461056 (the bust involved 237 smuggling transactions run through the port of Dubai over two years undetected by customs); Nasser Saidi, *Taxing Question of Curbs on Tobacco Smuggling*, THE NATIONAL (August 31, 2015) *available at*: http://www.thenational.ae/business/economy/taxing-question-of-curbs-on-tobacco-smuggling#full (indicting that the relative penetration level of illegal cigarettes is low compared with the countries surrounding the GCC where rates are in excess of 20% and often 30%).

[26] Mary Sophia, *GCC governments Look to Tobacco Tax as Low Oil Prices Bite: A Regional proposal to raise tobacco tariffs is being much welcomed by health experts but will it be effective in curbing smoking and earning much-needed revenue?* GULF BUSINESS (January 30, 2016) available at: http://gulfbusiness.com/gcc-governments-look-to-tobacco-tax-as-low-oil-prices-bite/

[27] Nasser H. Saidim *The Illicit Tobacco Trade is now Funding Organized Crime*, BQ MAGAZINE (September 1, 2015).

Electronic copy available at: https://ssrn.com/abstract=3007753

trader/ smuggler had stolen the cigarettes in Yemen, rather than purchased them, his profit on one container would be a staggering $2,030,560 USD.

The problem presented by cigarette fraud is not just tax revenue lost. Cigarette smuggling is a well-known organized crime and terrorist funding mechanism.[28] This puts the GCC in a difficult position. Wanting to improve public health with a significant tax increase it may also be boosting terrorists revenue.

> Illicit tobacco trade: The production, smuggling, and sale of tobacco products, including genuine and counterfeit cigarettes, is a lucrative form of financing for organized crime as well as terrorist groups, such as Hezbollah, Hamas, the Kurdistan Worker's Party (PKK), and the Real Irish Republican Army (RIRA). [US Dist Ct., W.D. N.C. *USA v. Mohamad Yousef Hammond et. al* indictment, March 28, 2001] Cigarette smuggling schemes as a means for financing terrorists have been discovered in a range of countries and regions, including the United States, Europe, Turkey, the Middle East and North Africa, and Iraq. Criminals and terrorists may be drawn to the illicit tobacco trade to take advantage of price differentials across jurisdictions, bootlegging small consignments from low-tax or duty-free outlet and re-selling the products elsewhere at a higher price. If sufficiently resources, some groups may conduct larger scale operations that divert and smuggle commercial-size d volumes, those in excess of 1 million cigarettes per consignment, for subsequent distribution and sale.[29]

A common, comparative example is helpful. The difference in treatment of (intra-community) cross-border transactions in the EU and the GCC needs to be clearly set out.

Common example. Assume that container-size lots of cigarettes are imported from outside the community (EU or GCC) into one Member State. The Importer of Record is the buyer, and the importer immediately re-sells the full containers to a local Distributor. The Distributor, who has purchased several different containers from different manufacturers re-sells the contents to various Wholesales, one of whom is in another Member State. This Wholesaler then breaks up the container he purchased in

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[28] Tracy A. Basler, *Cigarettes, Smuggling, and Terror: The European Community v. RJ Reynolds*, 4 CHICAGO-KENT JOURNAL OF INTERNATIONAL AND COMPARATIVE LAW 3 (2004) (discussing the EU law suit against RJ Reynolds for allegedly allowing their product to be used for money laundering by organized criminal organizations from the Russian and Italian mob to terrorist groups world wide); Frank Green, *Yemeni's WTC Pass Mystifies*, RICHMOND TIMES – DISPATCH (November 5, 2012) available at: http://www.richmond.com/news/article_235d12e3-9565-5820-a413-ef401439b711.html (connecting the 9-11 World Trade Center Terrorists to cigarette smuggler profits in the USA); Razmig Bedirian, *How Tobacco Tax Spikes Could Trigger Smuggling – Introducing tax on tobacco products will stimulate illicit and counterfeit brands trade, conference hears*, GULF NEWS (February 25, 2015) *available at*: http://m.gulfnews.com/search?siteMode=mobile&searchref=http://m.gulfnews.com/cmlink/how-tobacco-tax-spikes-could-trigger-smuggling-1.1462895

[29] John Rollins & Liana Sun Wyler, *Terrorism and Transnational Crime: Foreign Policy Issues for Congress*, CONGRESSIONAL RESEARCH SERVICE 7-7500; R41004 (October 19, 2012) at 10-11

response to demand and sells small lots of assorted brands to various local Retailers. The retailers sell individual packs to final consumers.

EU application under the common example. Figure 2, below, diagrams the common example under EU VAT rules. It specifies that the manufacturer in the USA, sells to an importer in the UK. The UK importer sells on to a UK distributor, who makes an intra-community supply to a wholesaler in France. We are particularly concerned about the Wholesaler in France. This is the entity that can purchase and then re-sell a container of cigarettes and "go missing" keeping the VAT it has collected on re-sale. The EU endeavors to stop this fraud with enhanced audit enforcement that relies on cooperation and information exchange among the Member States. There is no interaction with EU governing structures in areas of enforcement, data-collection, data retention, or data-exchange.

The EU's information exchange mechanism is called the VAT Information Exchange System (VIES). The VIES is a request-based, sales-side-only information exchange. In the common example, the Distributor (in the UK) is required to file a quarterly VIES Report. It is filed along with the VAT return in the UK. The VIES specifies cross-border transactions in aggregate, and per customer.   It will be provide to the French tax administration upon request, and that request is normally prompted by a French audit.[30]

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[30] The EU's VIES developed out of an income tax model of information sharing. The guiding principal under this model is that a jurisdiction should *request* the information that it needs, and the *request* should be rooted in an investigation. Thus, VIES is a request-based, sales-side-only information exchange. It is digitally handicapped because it uses technology to replicate a manual process, rather than employing technology revise and replace its traditional approach to information sharing. The VIES developed in three stages: the initial goods-based phase (1993 through 2003); the consolidation phase (2003 through 2010); and the expansion into services phase (2010 through the present). Even though the VIES is computerized, it does not maintain a match-able cross-border transactional database. See: [phase one] Council Regulation 218/92 of 27 January 1992 on administrative cooperation in the field of indirect taxation (VAT) O.J. (L 024) 1-5 (1992); [phase two] Council Regulation (EC) No. 1798/2003 replacing Regulation (EEC) No. 218/92; [phase three] the third set of VIES revisions came in 2008, effective January 1, 2010 in Council Directive 2008/8/EC adding language to Article 262 of the VAT Directive including *services* in recapitulative statements.

   The data collected on VIES recapitulative statements remained relatively high-level after all of these changes. It is still not the invoice-specific, granular data that is needed for effective VAT enforcement. The VIES collects the following six types of data:
   - The VAT identification number of the taxable person submitting the recapitulative statement, and who has made a zero-rated supply under Article 138(1) for goods, and under which he has made a taxable supply of services under Article 44.
   - The VAT identification number of the person acquiring the goods or services.
   - The VAT identification number of the taxable person who must submit a recapitulative statement under Article 138(2)(c) [triangulations], and the number by which he is identified where the dispatch or transportation ended.
   - The total value of goods, and total value of services per recipient.
   - The total value of goods transferred per recipient under Article 138(2)(c) [triangulation].
   - All adjustments made pursuant to Article 90 [cancellations, refusals, total or partial non-payment].

The diagram also shows that each taxpayer files a VAT return. The returns are more comprehensive than the VIES Report. If a Member State requests a copy of the VIES report, it may take another one to three months for the report to be delivered. Recent changes allow the VIES to be delivered spontaneously (without request) on the initiative of the resident tax administration if it suspects that there is something that would be of interest to the other tax authority.

In the EU the VAT rate is commonly between 20% and 25%, and the VAT itself creates a considerable incentive to be a missing trader. When this incentive is coupled with avoiding the Danish chocolate tax, then the sale of out-of-date candy becomes a highly profitable venture.

In the GCC the dynamics of cigarette fraud are similar, but the tax incentives are different. In the GCC the cigarette smuggling (and the profits from the sale of illegal cigarettes) is the primary incentive for fraud. This incentive is sweetened by the additional "profits" that can be gained from collecting (and not remitting) the 200% cigarette tax and the 5% VAT.

Although popular belief is that by increasing the cigarette tax the government is increasing the incentive to engage in cigarette smuggling, this assessment does not factor in the impact of the new GCC VAT. The technology infrastructure of the GCC VAT should act to restrain cigarette fraud, because the fraud will be more easily identified in real-time, and in some cases the identity of the fraudsters will be very easy to discern.

The figure below sets out how the EU VAT would respond to a missing trader fraud in cigarettes. The sections that follow after this figure consider the technology changes that the GCC makes to the flawed EU VAT, and how those changes will not only benefit operation of the VAT, but will enhance enforcement efforts to curtail the illegal cigarette trade.

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Figure 2: Importing Cigarettes into the EU
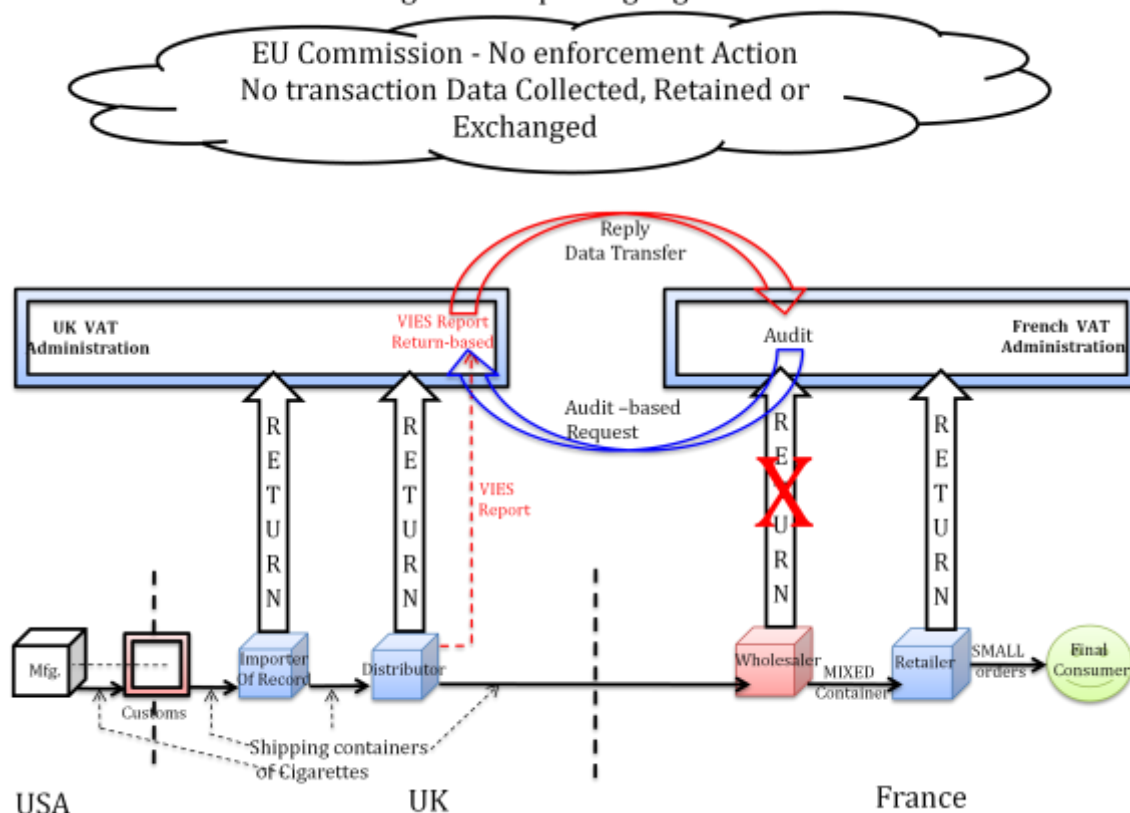
In this Figure, the Wholesaler in France has an obligation to file a return but does not do so. The VAT received from the Retailer is collected but not remitted. An audit of the Retailer may alert the French tax authorities that something is amiss, and when the Wholesaler is examined a VIES report will be solicited from the UK authorities. There is no involvement of the EU Commission at any point in the audit/investigation. The VIES report which may have useful aggregate data will probably arrive up to 9 months after the transactions in question occurred.

GCC application under the common example. The GCC treatment of the same transactions (importation of cigarettes from a third country, followed by domestic and then intra-community resale) is very different. The law is new, and the critical provision, Article 71, is unique among the world's VATs. Thus, Article 71 needs to be considered in some detail first, before we can return to the common example and compare the EU treatment (Figure 2, above) with the GCC treatment (Figure 8, below).

Article 71

Article 71 has five subsections. Each is important in this discussion. When considered together, the five parts of Article 71 strongly suggest that the GCC is looking at adopting a private (permissive) blockchain, but the roll-out of the full blockchain awaits the national VAT legislation in each Member State.

Article 71(1)

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Article 71(1) of the *Unified VAT Agreement for the Cooperation Council for the Arab States of the Gulf* requires each Member State to create an "Electronic Services System" for VAT compliance, and then further directs the GCC Secretary General to establish a central "Tax Information Center" to coordinate, confirm, and exchange data related to cross-border transactions (Internal Supplies).

> Each Member State shall create an Electronic Services System for the purposes of complying with requirements related to Tax. The GCC Secretary General shall take the necessary measures to establish a Tax Information Center, operate a central website or electronic system to follow up the information related to Internal Supplies and exchange this information with the concerned Tax authorities in the Member States; provided the website or electronic system of the tax information center must include the following information at least:
>   a. The TIN for the Supplier and the Customer;
>   b. Number and date of the Tax Invoice;
>   c. Description of the transaction;
>   d. Consideration of the transaction.[31]

Article 71(1) is mandatory. It requires six independent data centers, one in each Member State as part of an Electronic Services System. In addition, the GCC Secretary General is mandated to create a seventh data center, the Tax Information Center, that is required to "follow up" with data it collects from intra-community cross-boarder supplies. Although not clearly stated, it is reasonable to assume that the Tax Information Center will receive its data in encrypted form from each Member State's Electronic Services System, and not directly from the taxpayers in each Member State.

Roughly speaking, this is the framework of both the GCC version of the EU's Invoice Directive and the VIES. Detailed regulations are expected. Even at this early stage however, there are significant differences, and promises of considerable improvements in the GCC version. To fulfill the Article 71(1) mandate fully digital invoices will need to be required (eventually), and the GCC will need to require full invoice data to be transmitted in real-time and collected centrally. That is not the case in the EU even after years of study and consultation,[32] and it is not the case (yet) in the GCC.

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[31] *GCC VAT Agreement*, Art. 71(1). Translations from the Arabic are sometime rendered in awkward English, but the intent has been to retain the legal substance without necessarily providing the most prosaic English.

[32] Richard T. Ainsworth, *Stopping EU VAT Fraud with a Third Invoicing Directive*, 71 TAX NOTES INTERNATIONAL 545 (August 5, 2013). The current Invoicing Directive has generally been seen to be a "missed opportunity" to correct flaws in this aspect of the EU VAT. It followed a study [PriecwaterhouseCoopers, *A Study on the invoicing Directive (2001/115/EC) now incorporated into the VAT Directive (2006/112/EC)* of November 3, 2008] and a public consultation on invoicing [launched by the Commission on July 24, 2008 and summarized in the report of November 2008 (TAXUD/DI/GW/mve D(2008) 25115] the EU Commission Proposed a Second VAT Directive on January 28, 2009 [COM(2009) 21]. On March 16, 2010 the Council of the European Union reached agreement on the Commission's proposal and formally adopted the Second Invoicing Directive on July 13, 2010 [Council Directive 2010/45/EU 2010 O.J. (L 189) 1].

Invoices in the GCC *Agreement* can (for the moment) be issued either "on paper or electronically."[33] The notifications under Article 71 (which are less than a full invoice) are implicitly digital, largely because conducting the necessary information exchange (taxpayer-to-Member State Electronic Services System-to-GCC Secretary General's Tax Information Center followed by a match, and then retransmission of the match from the GCC Secretary General's Tax Information Center-to-the Member State Electronic Services System-to-the taxpayer) is far too cumbersome to occur on paper. In addition, the designation of a Member State *Electronic* Services System implies that this will be a digital exchange. Again, we await national laws and regulations to be sure of the intention.

In terms of the actual information exchange, unlike the request-based, sales-side-only VIES information exchange of the EU, the GCC's central Tax Information Center will immediately exchange buyer and seller data in real-time among the tax authorities. This will be an exchange of transaction-level data, not aggregate data per taxpayer as in the EU.

Article 71(2)

In Article 71(2) the GCC becomes the first tax administration to require a digital match of buyer and seller documentation for each cross-border transaction. For all Internal Supplies the match of a "bare bones" purchase order and "bare bones" invoice will be confirmed with a digital signature by the GCC's Tax Information Center.[34] This digital signature will confirm the match, and must be available for audit at the buyer and seller's location. Ainsworth and Alwohaibi first proposed this system for the GCC.[35] It is the natural extension of the Digital Invoice Customs Exchange (DICE) developed by

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But see: Gorka Echevarria Zubeldia, *The Second EU Invoicing Directive: A Missed Opportunity*, Nov./Dec. INT. VAT MONITOR 417 (2010) (itemizing how the Second Invoicing Directive has fallen short on its promise of simpler and more harmonized rules in invoicing); Patrick Wille, *New EU Rules on Invoicing*, Jan./Feb. INT. VAT MONITOR 6 (2011) (discussing simplified invoices, cash accounting and the continuing requirement that customers control the use of e-invoices); Isabelle Desmeyiere, *The Hidden Features of EU Invoicing Directive 2010/45*, Nov./Dec. INT. VAT MONITOR 400 (2011) (explaining how new rules on the chargeability of VAT in instances where the related invoice has not been issued will lead to complexities when States exercise differing options, and the complexities that may result from further development of the cash accounting option); Joep J. P. Swinkels, *Confusing EU VAT Invoices from 2013*, May/Jun. INT. VAT MONITOR 174 (2012) (explaining how the large number of official languages in the EU and the compulsory clauses on invoices may cause confusion particularly in cases where a small business under cash accounting sells to a larger business).

[33] Article 55 (4) indicates:

> For the purposes of applying this Agreement, the Member States must accept the invoices in form, whether issued on paper or electronically, according to the terms and procedures determined by each Member State.

[34] As indicated above, *Id.*, this notice is not the full invoice, although there are indications that the full invoice will eventually be digital, and many of the commercial contracts in the GCC will be *smart contracts* placed on the blockchain that will develop through the full GCC system. See below for analysis of smart contracts on an Ethereum platform possibly developing in the GCC.

[35] Richard T. Ainsworth & Musaad Alwohaibi, *GCC VAT: The Intra-Gulf Trade Problem*, 84 TAX NOTES INTERNATIONAL 315 (October 17, 2016).

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Ainsworth and Todorov,[36] which is currently a very effectively enforcement tool in Rwanda.[37] Article 71(2) states:

> If the information registered by the Supplier and the Customer matches, each of them shall be given a number that must be retained for Tax audits performed by the concerned Tax authority and to confirm that this information matches what is included on Tax returns and other relevant information provided pursuant to this Agreement.

The essence of the Ainsworth and Todorov DICE proposal is the requirement for the Supplier and the Customer to notify their respective tax administration *in advance* that a cross-border transaction is contemplated. The notification specifies the details of the transaction. Taxpayers submit documentation in real-time to secure a digital confirmation notice, a process that takes a millionth of a second in Brazil.[38] Article 71(2) requires exactly the same this digital data-match, as well as the requirement to notify both parties of compliance.

The administrative/ audit benefits to having this real-time transaction data in digital form is immense. A rich database of transactions collected in real-time is precisely what artificial intelligence (AI) needs to scan the tax system for potential frauds. Figure 3 reproduces Figure 4 from the DICE paper, which initially proposed this system.

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[36] Richard T. Ainsworth & Goran Todorov, *Stopping VAT Fraud with DICE – Digital Invoice Customs Exchange*, 72 TAX NOTES INTERNATIONAL 637 (November 13, 2013)

[37] Richard T. Ainsworth & Goran Todorov, *Rwanda – Cutting-edge VAT Compliance*, 46 GLOBAL TAX WEEKLY 5 (Septenmber 26, 2013) available at:
http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2327521; Jean de la Croix Tabaro, *Billing Machines Increase Tax Collection by 16%*, NEWSOFRWANDA (September 8, 2014) available at:
http://www.newsofrwanda.com/featured1/24681/billing-machines-increase-tax-collection-by-16/
(indicating that the digital transmission of invoice details to the tax administration in real-time alone was responsible for significant tax increases, even before the data was used for comprehensive audit purposes.)

[38] Brazil has adopted a similar system of digital invoice verification in the *Sistema Publico de Escrituracao Digital* or Public System for Digital Accounting (SPED). SPED contemplates replacing paper tax and accounting books and documents with electronic versions where legal validity is confirmed with a digital signature. Once a firm begins to issue NF-e invoices, or CT-e electronic waybills paper replicas of these documents are not legally valid. Digital documents are given legal precedence over paper replicas. *See*: Newton Oller de Mello, Eduardo Mario Dias, Caio Fernando Fontana & Marcelo Alves Fernandez, *The Evolution of Electronic Tax Documents in Latin America,* PROCEEDINGS OF THE 13TH WORLD SCIENTIFIC AND ENGINEERING ACADEMY AND SOCIETY (WSEAS) INTERNATIONAL CONFERENCE ON SYSTEMS (2009) 449, 297, *available at*: http://dl.acm.org/citation.cfm?id=1627575&picked=prox; and Newton Oller de Mello, Eduardo Mario Dias, Caio Fernando Fontana & Marcelo Alves Fernandez, *The Implementation of the Electronic Tax Documents in Brazil as a Tool to Fight Tax Evasion,* PROCEEDINGS OF THE 13TH WORLD SCIENTIFIC AND ENGINEERING ACADEMY AND SOCIETY (WSEAS) INTERNATIONAL CONFERENCE ON SYSTEMS (2009) 449, 453, *available at*: http://dl.acm.org/citation.cfm?id=1627575&picked=prox

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Figure 3: Customs exchange

See: Figure 4 in Richard T. Ainsworth & Goran Todorov, *Stopping VAT Fraud with DICE – Digital Invoice Customs Exchange*, 72 Tax Notes International 637, 643 (November 13, 2013)
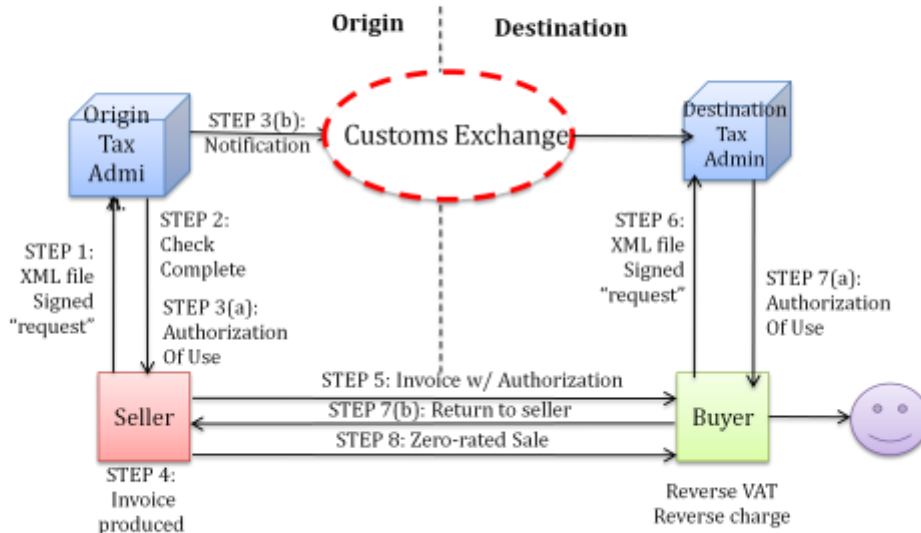
The application of AI to a rich real-time database of transactions was considered in detail in *GCC VAT: The Intra-Gulf Trade Problem*. This paper applied DICE to a speculative GCC fact pattern (at a time when the *Unified VAT Agreement for the Cooperation Council for the Arab States of the Gulf* was not available.) The analysis in that paper went beyond what is contained in the Article 71 of the GCC Framework Agreement. It considered the likelihood that *both* the GCC Member States and the GCC Secretary General would apply AI to their respective local and community databases. That earlier analysis assumed:

- that each Member State would require (domestically, or internally) the same level of advance digital notice of contemplated transactions that is being asked for at the community level, and
- that each Member State would provide the same kind of digital confirmation of matched bare-bones purchase order and bare-bones invoice as was being provided at the community level.

Whether these assumptions/ predictions are accurate or not awaits the publication of the local VAT laws in the GCC Member States. Figure 4 (below) reproduces a diagram from the earlier analysis, which illustrated these presumptions.

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Figure 4: DICE – one-stop-shop implementation
See: Figure 8 in Richard T. Ainsworth & Musaad Alwohabi, *GCC VAT: The Intra-Gulf Trade Problem*, 84 TAX NOTES INTERNATIONAL 315, 326 (October 17, 2016)
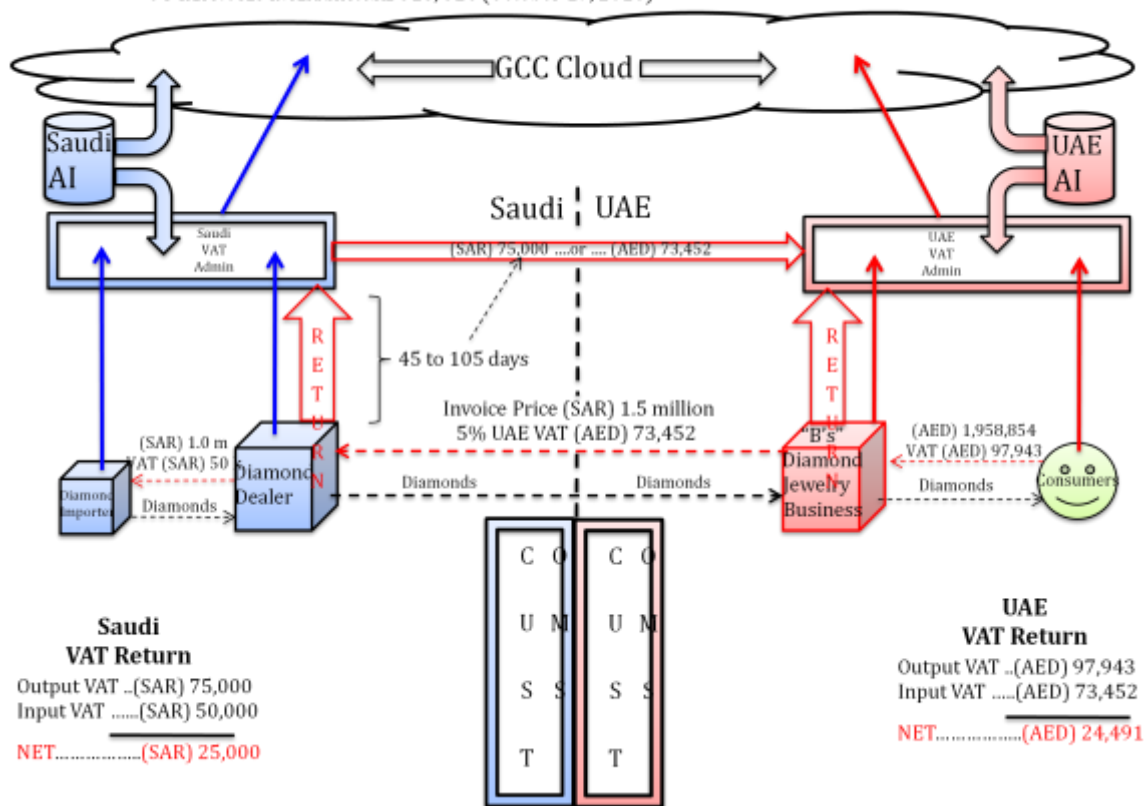
In Figure 4 (above) there are two sets of domestic transactions (Domestic Importer to Diamond Dealer in Saudi Arabia, and Diamond Jewelry Business to Final Consumer in the UAE) sandwiching a cross-border (or Internal Supply) transaction. Both the Saudi tax authority and the UAE tax authority collect and match the domestic transactions in real time, and apply AI to their databases. In addition, the Internal Supply is separately reported to the GCC Secretary General (GCC Cloud) where AI separately scrutinizes this data for the benefit of both the Saudi and UAE tax authorities.

The *Unified VAT Agreement for the Cooperation Council for the Arab States of the Gulf* does not go this far. In time it might.

Article 71(4)

The Internal Supply transaction (above) is the only transaction directly covered by Article 71. Article 71(4) makes it clear that when Internal Supply transactions are captured by the Secretary General's Tax Information Center they will be shared among the Member States.

We know nothing about the other purely domestic transactions. Those will be handled by local law, however the strong implication is that they will be handled in the

Electronic copy available at: https://ssrn.com/abstract=3007753

same manner as Internal Supplies, but using the Member State Electronic Services System, not the GCC Secretary General's Tax Information Center. Article 71(4) states:

> The concerned Tax authority in each Member State shall have access to the information related to Internal Supplies between Taxable Persons registered for Tax purposes.

Article 71(4) is remarkable. This is an information exchange, but it is *not* a VIES, request-based system, dependent on aggregate data submitted on quarterly returns. This is the Holy Grail of information exchange. The GCC is acquiring real-time intra-community transaction data, securing it, and then allowing Member State to have immediate, real-time access to it *on-demand*, not *on-request*. For exchange of information this is a sea-change. No VAT community does this.

<div align="center">

Article 71(3)

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Article 71(3) is best considered out of sequence. It is closely related to Article 71(5). From a technology perspective, Article 71(3) has a subtle, but striking impact. On its face Article 71(3) simply requires that the data collected by "the system must be safe and secure." However, "the system" is a broadly crafted term in this section, and clearly intends to capture both (a) the GCC Secretary General's Tax Information Center, and (b) "the Electronic Services System … [created by] … each Member State."

The reason for this is clear. Internal Supply transaction data will not pass directly from the taxpayer to the GCC Secretary General's Tax Information Center – it must first pass through the Member State's system. It may be relayed to the GCC Secretary General's Tax Information Center in real-time, but it will inevitably contain digital markers verifying that the data came from the taxpayer through the Member State's system. Otherwise the data should be rejected by the GCC Secretary General's Tax Information Center as non-conforming. This closes down a potential avenue for fraudulent matching of purchase order and invoices, and adds another layer of data verification into the whole system. Security only at the top means nothing for the taxpayer, if the Member State feeder system is vulnerable.

The technological impact of Article 71(3) resides in the negative inclusive phrase that explains what "safe and secure" means. Under Article 71(3) "safe and secure" is not an expression requiring protection only from external threats. Article 71(3) is also concerned with internal threats to data security. It is concerned that the system "does not allow the Supplier or the Customer [to have] access to any information other than what they are allowed access to." In other words, the *security restriction* is also *permissive*. Article 71(3) acknowledges a grant of permission for the Supplier and the Customer to *have access to "allowable" data* (both at the Member State and at the GCC level.)

Exactly what data a Supplier or Customer will be *allowed* to access is not defined, but it certainly includes the data of their own transactions. How would a taxpayer prove entitlement to a deduction for VAT paid, if he could not examine the data as it was received and recorded at the Member State and GCC levels?

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But we need to take a broader perspective. The GCCs VAT will be born with a genetic history in the EU. Thus, in light of the MITC and MTEC frauds in the EU, and rules in the EU that make a trader liable for fraud if he "knew or should have known" about a fraud further up (or down) the supply chain, it is entirely possible that a taxpayer in the GCC could have/should have/may be required to have access to the record of digital transactions throughout the entire commercial chain he is a part of.[39]

<div align="center">Article 71(5)</div>

As a result, Article 71(3) and Article 71(5) need to be read together. Article 71(3) allows taxpayer access to the databases of the Member States and the GCC, and Article 71(5) explains that the intent behind Article 71 is to allow the entire commercial chain to be accessible through those databases. Does this mean that both the tax authority (on audit), and the taxpayer (when performing due diligence on purchases or sales) should be accessing the database and checking the trustworthiness of the commercial chain?

Regulations should answer this question, but the capability is clearly present. Article 71(3) allows taxpayer access to the database as follows:
> The system must be safe and secure and does not allow the Supplier or the Customer access to any information other than what they are allowed access to.

Article 71(5) explains that the intent is to digitally link the entire commercial through the Member States *Electronic Services System* and the GCC General Secretariat's *Tax Information Center*. Article 71(5) is set out below (although there appears to be an error in the statute in the specification of Goods):[40]
> The System allows to track the Goods transfer evidence to the Final Destination Point of Entry.

<div align="center">Article 71 & Blockchain</div>

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[39] *Alex Kittel v. Belgium* and *Belgium v. Recolta Recycling SPRL* Joined cases C-80/11 and C-142/11 (establishing the *known or should have known* rule for fraud liability in the purchase chain); *Mahagében kft v. Nemzeti Adó-és Vámhivatal Dél-dunántúli Regionális Adó Fölgazgatósága* and *Péter Dávid v. Nemzeti Adó-és Vámhivatal Dél-dunántúli Regionális Adó Fölgazgatósága* (*Mahagében/Dávid*) CJEU judgment of 6 July 2006, Joined Cases C-439/04 and C-440/04 [2006] ECR 1-6161 (extending the *known or should have known* rule for fraud liability in *Kittel* to the sale side of a transaction). See also: Richard T. Ainsworth, *A Perfect Storm in the EU VAT: Kittel, R, and MARC,* 66 TAX NOTES INT'L. 849 (May 28, 2012); Richard T. Ainsworth, *VAT Fraud in the Customer Chain – Cases from Germany* 69 TAX NOTES INT'L. 471 (February 4, 2013); Richard T. Ainsworth, *Hungarian Cases Redirect EU VAT Enforcement Efforts* 67 TAX NOTES INT'L. 1025 (September 10, 2012).

[40] The error is quite significant, and very much needs to be changed. Only Goods, not Services, are mentioned in Article 71(5). It is not an error in translating the Agreement into English. Both versions have the same flaw. Article 71(5) indicates that the system will track Goods through the commercial chain to their final destination. It says nothing about tracking services. Services are a "catch-all" category, as in most VATs. They are defined as "any Supply that is not considered a Supply of Goods …" Article 7. There is a known "tradable services" problem. Some services, like software, VoIP, carbon emissions permits (CO_2 permits) are traded just like goods and create the same kinds of missing trader frauds as do transactions in goods. See: Richard T. Ainsworth, *VAT Fraud: MTIC & MTEC – The Tradable Services Problem*, 61 TAX NOTES INTERNATIONAL 217 (January 17, 2011).

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What makes Article 71 so remarkable is that with it, the GCC has designed multiple *shared centralized ledgers*. Both the taxpayers and the government have access to these ledgers, and the records within them are reasonably permanent, if the buyer's purchase order is required to match the seller's invoice, and a contemporaneous digital signature has been made of this match.

As currently designed, taxpayers could use these shared ledgers as authoritative back-ups for business records. However, the system the GCC has devised is potentially so much more. The current design is one step short of a *private distributed ledger*, or *permissive blockchain*. All that's needed is (a) the consolidation of the seven shared ledgers – one from each Member State and the seventh controlled by the GCC Secretary General,[41] and (b) a consensus mechanism.

Blockchain technology advances the craft of designing shared centralized ledgers, by creating a far more robust, secure, and transparent *distributive ledgers*.[42] The technique is revolutionary, and was announced in 2008 simultaneously with its most famous application – Bitcoin.[43] It is very clear that blockchain is not limited to cryptocurrencies, and the application of blockchain to the VAT by the GCC is one of them.[44] Blockchain is a software protocol based on cryptography that can replace any centralized ledger system that coordinates valuable information.[45]

Blockchain technology is *trustless*.[46] It is *trustless* in the sense that it does not require third party verification. It does not need a *trusted* third party (like a bank, or a tax administration) to help it negotiate (exchange) value. Instead of trusted intermediaries, blockchain uses powerful consensus mechanisms to verify the authenticity of transactions in the database.[47]

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[41] Assuming, of course, that the yet to be announced Member State *electronic Services systems* are designed to be fully compatible with the GCC General Secretariat's *tax information center*. This paper assumes that this will be the case.

[42] A ledger, as used in this sentence and in this field generally, means a value recording and transfer system. Simply stated, a ledger is an accounting tool that keeps track of who owns what. The ledger itself is a very old technology that has not changed much since its development by the Venetian Republic in the 15th century. Ledgers have long been digitized (in the 20th century), but it was only with blockchain that they have been *decentralized*. Prior to 2008 ledgers were only understood as *centralized*.

[43] Satoshi Nakamoto, Bitcoin, *A peer-to-peer electronic cash system* (2008) available at: https://bitcoin.org/bitcoin.pdf (note: Satoshi Nakamoto is a pseudonym).

[44] For another tax application see: Richard T. Ainsworth & Ville Viitasaari, *Payroll Tax Compliance and Blockchain*, 85 TAX NOTES INTERNATIONAL 1007 (March 13, 2017)

[45] Wright & De Filippi, *Decentralized Blockchain Technology* supra note **Error! Bookmark not defined.** at 4-8.

[46] The trust element is very important to the adoption of blockchain in tax compliance areas. It needs to be stressed that trusting the blockchain technology is different than trusting Bitcoin. Europol contends that it is not blockchain, but the "… Bitcoin [application that] is establishing itself as the single common currency for cybercriminals within the EU." Europol, 2015 INTERNET ORGANIZE CRIME THREAT ASSESSMENT, *Key Findings* available at: https://www.europol.europa.eu/iocta/2015/key-findings.html

[47] Tim Swanson, *Great Wall of Numbers Cryptoeconomics for beginners and experts alike*, citing Vlad Zamfir of the Ethereum project at the Cryptocurrency Research Group conference (brainstorming session) on Cryptoeconomics as posted January 30, 2015 at:

In the case of Article 71, a Member State or the GCC Secretary General controls each of the seven centralized ledgers. The essence of blockchain is to replace centralized oversight with a different way of verifying the accuracy of the transactions. There are many consensus mechanisms in use, and many more proposed.

Crypto currencies are noted for using cryptoeconomic incentives to get consensus.[48] A strong consensus mechanism makes a database safe (highly *trustworthy*) even in the presence of powerful or hostile third parties trying to manipulate the registry. Bitcoin uses Proof-of-Work (PoW) as its consensus mechanism. Alternate validation systems include Proof-of-Stake (PoS) and Proof-of-Identity (PoI). The European Central Bank indicates:

> A second type of validation system is proof-of-stake (PoS) consensus process. This assigns shares of validation rights to users according to their stake in the system … or the reputation of the validator in a restricted DLT (known as proof-of-identity (PoI)).[49]

In a *distributed VAT ledger* the consensus mechanism must be based on objective criteria that evaluate the *risk of VAT fraud*. Intel's approach to deriving workable consensus mechanisms in Sawtooth Lake might be followed.[50]

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http://www.ofnumbers.com/2015/01/30/cryptoeconomics-for-beginners-and-experts-alike/. Cryptoeconomics is:

> A formal discipline that studies protocols that govern the production, distribution and consumption of goods and services in a decentralized digital economy. Cryptoeconomics is a practical science that focuses on the design and characterization of these protocols.

[48] Cryptoeconomic incentives are most strongly associated with cryptocurrency systems. Bitcoin *mining* is such an incentive system. This is because Bitcoin uses pseudonymous and anonymous nodes to validate transactions, whereas a basic distributive ledger that engages entities with legal identities (commercial businesses, banks, financial institutions, government agencies) will be inclined to use use "permissioned" nodes to validate transactions. The DICE proposal used permissioned nodes. A basic distributive ledger is able to host off-chain assets (smart contracts) due to their authenticated, permissioned approach to validation. Tim Swanson, *Consensus-as-a-Service: A Brief Report on the Emergence of Permissioned, Distributed Ledger System* (April 6, 2016) *available at*: http://www.ofnumbers.com/wp-content/uploads/2015/04/Permissioned-distributed-ledgers.pdf.

[49] European Central Bank, *Distributed Ledger Technologies in Securities Post-trading: Revolution or Evolution?* OCCASIONAL PAPER SERIES, No. 172 at 14 (April 2016) available at: https://www.ecb.europa.eu/pub/pdf/scpops/ecbop172.en.pdf

[50] Intel created two new consensus protocols: "Proof-of-Elapsed-Time" (PoET) and Quorum Voting (QV). Both are available in Sawtooth Lake. PoET is a lottery protocol that builds on Trusted Execution Environments (TEEs) provided by Intel's Software Guard Extensions (SGX) as a way of dealing with a large population of participants. QV is an adaptation of the Ripple and Stellar consensus protocols and serves to address the needs of applications that require immediate transaction finality. On Ripple see: David Schwartz, Noah Youngs & Arthur Britto, *The Ripple Protocol Consensus Algorithm*, available at: https://ripple.com/files/ripple_consensus_whitepaper.pdf
The Ripple consensus algorithm circumvents the requirement that all nodes within the network communicate synchronously. It utilizes collectively-trusted sub-networks within the larger network. On Stellar see: David Mazières, *The Stellar Consensus Protocol: A Federated Model for Internet-level Consensus*, STELLAR DEVELOPMENT FOUNDATION, *available at*: https://www.stellar.org/papers/stellar-consensus-protocol.pdf The Stellar consensus achieves robustness through quorum slices – individual trust decisions made by each node that together determine system-level quorums. Slices bind the system

For Sawtooth Lake Intel developed two consensus protocols: "Proof-of-Elapsed-Time" (PoET) and Quorum Voting (QV). Both are available in Sawtooth Lake. PoET is a lottery protocol that builds on the Trusted Execution Environments (TEEs) provided by Intel's Software Guard Extensions (SGX). PoET helps Sawtooth Lake deal with a large population of participants. QV in contrast, is an adaptation of the Ripple and Stellar consensus protocols. QV allows Sawtooth Lake to address the needs of applications that require immediate transaction finality.

Because of the work devoted to the development of consensus mechanisms *The Economist* called blockchain, "The Trust Machine."[51] But it is also "The Efficiency Machine," because blockchain is replacing very expensive *centralized ledgers* with *decentralized distributive ledgers* and capturing huge cost savings and efficiencies.[52]

Thus, it only makes good sense for the GCC to move in this direction. Efficiency gains are immediate, and continuing, which is precisely what a new VAT system needs, especially one that is being adopted somewhat reluctantly by a set of countries that have not had a developed tax system previously. Decentralized distributive ledgers ride three exponentially declining cost curves:
1. *Moore's Law*: the cost of processing digital information (speed), halves every 18 months;[53]
2. *Kryder's Law*: the cost of storing digital information (memory) halves every 12 months;[54]
3. *Nielson's Law*: the cost of shipping digital information (bandwidth) halves every 24 months.[55]

Applications Demonstrating Article 71

Two examples will aid the above analysis. The first is a very simple example designed just to illustrate the provisions of Article 71. Very conservative/ necessary extensions are included for elements that are clearly implied, although not specifically

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[51] together. Compared to decentralized proof-of-work and proof-of-stake schemes SCP has modest computing and financial requirements.

[51] THE ECONOMIST, *The Promise of Blockchain: The Trust Machine* (October 31, 2015) available at: http://www.economist.com/news/leaders/21677198-technology-behind-bitcoin-could-transform-how-economy-works-trust-machine.

[52] Sinclair Davidson, Primavera De Philippi & Jason Potts, *Economics of Blockchain* (March 8, 2016) *available at*: http://ssrn.com/abstract=2744751

[53] Gordon E. Moore, Cramming More Components onto Integrated Circuits, Proceedings of the IEEE, Vol. 86, No. 1, January 1998) reprinting the same title from Electronics, 114-117 (April 19, 1965) available at: http://www.cs.utexas.edu/~fussell/courses/cs352h/papers/moore.pdf. Mr. Moore is the founder of Intel and Fairchild Semiconductor.

[54] Mark Kryder, *Kryder's Law*, SCIENTIFIC AMERICAN (August 2005) *available (as a reprint) at*: https://web.archive.org/web/20060329004626/http://www.sciam.com/article.cfm?chanID=sa006&colID=30&articleID=000B0C22-0805-12D8-BDFD83414B7F0000. Mr Kryder was the senior Vice President of Research and the Chief Technology Officer at Seagate Corp.

[55] Jakob Nielson, *Nielson's Law of Internet Bandwidth*, NIELSON NORMAL GROUP https://www.nngroup.com/articles/law-of-bandwidth/. Mr. Nielson was an engineer at Sun Microsystems.

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stated in Article 71, notably the use of encryption for data transmission, and the use of artificial intelligence (AI) to analyze the data streams.

The second application goes further. It accepts that the whole reason for setting up multiple *shared centralized ledgers* (one in each Member State and a seventh within the GCC's General Secretariat) is to lay the groundwork for the establishment of a *private distributed VAT ledger*, or *permissive VAT blockchain*. The missing ingredients are: (a) the consolidation of the seven shared ledgers, and (b) the selection of a consensus mechanism. None of this is specified in any part of the *Unified VAT Agreement for the Cooperation Council for the Arab States of the Gulf*, but it is clearly the direction of the technology, and the structure of the *Agreement*. Regulations could easily bring these elements to life.

As stated earlier, if this is the case, then two further elements are implied. First, the blockchain should not be limited to Internal Supplies – it should include domestic supplies within each Member State. Secondly, each of the Member States should replicate the matching function of the GCC Secretary General's Tax Information Center with each of the domestic transactions. The second example illustrates these elements.

First Example – Demonstrating Article 71

Assume a Saudi business [A] would like to enter into a contract with a UAE business [B] in an Internal Supply to purchase certain goods. Each party is required to digitally notify the tax authority of this pending contract through that Member State's Electronic Services System. Detailed regulations on the notification process are anticipated. The transmission will probably be encrypted. At a minimum the following data points (a) through (d) are needed per Article 71(1).[56]
  a. The TIN for the Supplier and the Customer;
  b. Number and date of the Tax Invoice;
  c. Description of the transaction;
  d. Consideration of the transaction.[57]

Upon receipt each tax authority will acknowledge the submission, date-stamp it, retain a copy, digitally sign and then encrypt the submission before forwarding it on to the GCC Secretary General's Tax Information Center. The Tax Information Center will decrypt the submissions, perform a match, and then return "a number that must be retained for tax audits" (which is most likely a *hash of the encrypted original transaction data/payload and a designation indicating that a match was found*.) Figure 5 (below) presents this example as a diagram.

It needs to be noted that the business people involved in this transaction have before them all of the elements of a *smart contract*. The GCC is not requiring that a smart contract be established, but it could easily facilitate it. In doing so there would

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[56] Because the GCC is essentially setting up structures for, if not actually mandating the use of, smart contracts, other smart contract elements could be added to the Article 71(1) mandate, for example, the taxpoint (or chargeable event) could be required (delivery, performance, payment, invoice issuance).
[57] *GCC VAT Agreement*, Art. 71(1)

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need to be provisions for payment or the performance required under some objective metric with links to a bank account or other payment vehicle, and authorization for delivery of the goods. All of this would be placed in the code. The smart contracts could be placed on the blockchain platform, if the platform was like Ethereum.

With a smart contract lines of code would establish the tax point and links would be added for payment of the VAT when due. If this occurs, the GCC could become largely a *smart-contract-based economy,* and move to real-time VAT remission, based on returns calculated daily (or weekly). Ainsworth, Alwohaibi and Cheetham anticipated this permutation of the GCC VAT in another context.[58] Figure 5 (below) provides a diagram of the operation of Article 71.

Figure 5: Article 71
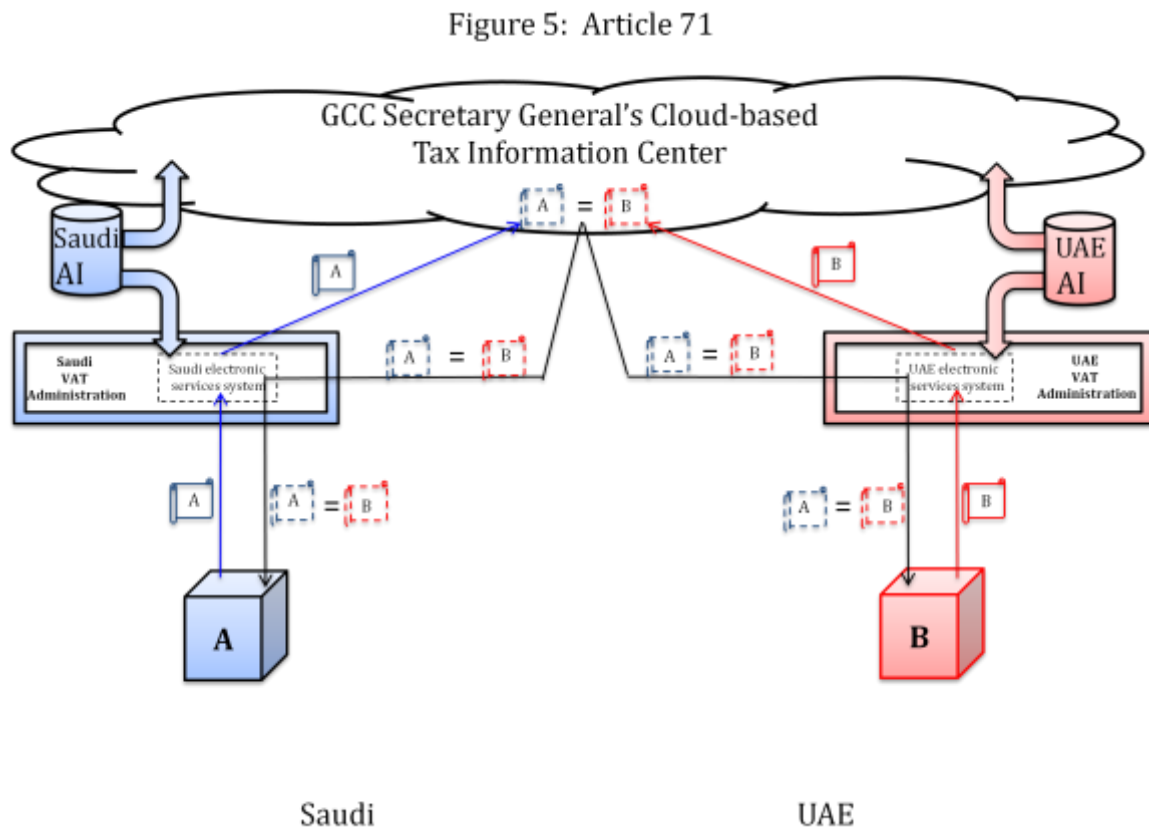
It should be noted that in this simple transaction we have stored the identical information in five *shared centralized ledgers* (the GCC's Tax Information Center, the Saudi and UAE Electronic Services System, and the central purchase or sales systems of businesses "A" and "B."

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[58] Richard T. Ainsworth, Musaad Alwohaibi & Mike Cheetham, *VATCoin: Can a Crypto Tax Currency Prevent VAT Fraud ?* 84 TAX NOTES INTERNATIONAL 703 (November 14, 2016)

Two additions to the diagram for functions not specified (but clearly implied) in the *Unified VAT Agreement for the Cooperation Council for the Arab States of the Gulf* are (a) the general use of encryption for all transmissions, and (b) the use of artificial intelligence engines by both Saudi and UAE tax authorities to search for fraud.

Just because A's bare-bones purchase order matches B's bare-bones invoice does not mean that there might not be a missing trader (or another kind of fraudster) in this fact pattern.[59] The match lets the UAE tax authorities know in real-time that a taxable purchase is contemplated. However, missing traders are willing to quickly leave a jurisdiction with VAT in hand. Having matched or unmatched invoice and purchase order does not answer all the questions on possible frauds. There remains a range of potential problems.

Missing trader fraud arises when one business in a commercial chain refuses to file any return, or an accurate return, or refuses to pay over the tax collected. The EU VIES commonly gives fraudsters a 6 to 9 month head start before the authorities are sure there is a problem. Matching under the GCC provides a large amount of real-time data, but risk analysis still needs to be performed on this data to identify potential fraudsters.

There are many other early indicia of fraud (other than un-matched invoices/ purchase orders). For example:
- are there newly established companies making millions of dollars in sales overnight;
- are there prices being paid for a fungible commodity that are "too good to be true;"
- is there a change in ownership immediately followed by a change in product or services offered with large increases in gross sales (for example, a long established laundry, that immediately begins selling high volumes of cell phones internationally);
- are corporate offices located at the address of the accounting firm, or at the legal offices of the firm's attorney.

These and other attributes are all factors that a good AI engine will use in conjunction with transaction data to identify suspect transactions. Figure 5 assumes that each Member State will use AI against the databases to risk-analyze taxpayers, even though this is not specifically provided for in the *Agreement*.

AI analytics should be on a par with the system SmartCloud Inc. developed for the State of Caerá, Brazil.[60] When considering a similar issue in the context of EU MTIC

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[59] Technically the GCC requires notifications from both contracting parties listing four contract elements, and this is not properly a "purchase order" or an "invoice" although one could imagine local regulations going the next step and asking for the full details of the agreement between the parties. The overstatement is intentional as it is meant to suggest the direction of technological development in the GCC VAT.

[60] For a discussion of the project in Caerá, Brazil that SmartCloud Inc. installed using an artificial intelligence (AI) fraud detection engine in Caerá see: Inter-American Development Bank Project BR-L1174 at: http://www.iadb.org/en/projects/project-description-title,1303.html?id=2044%2FOC-

frauds driven by phishing attacks on the Czech registry SmartCloud's CEO was asked about AI's function if the EU were to adopt DICE.[61] At that moment, the pressing concern was the migration of MTIC from CO2 into the power markets. The CEO, Kim Miyyasi, indicated:

> implementing a real-time transaction database of all power sales in the EU with advanced reasoning for back room analytics could implement the DICE proposal to eliminate MTIC from the EU power markets, and it could do so for the EU CO2 market right now. This is a typical challenge that our technology was designed to handle.[62]

Second Example – Blockchain

The first round of registrations for the GCC VAT includes companies with turnover in excess of $1m.[63] There are approximately 43,000 firms in this group in Dubai.[64] If these firms are like "A" and "B" in the previous example, then each will replicate the centrally stored data of their transactions that are also being retained by the Member State's Electronic Services System, and by the GCC Secretary General's Tax Information Center.

If a large portion of the GCC companies could be encouraged to dedicate computer resources to receiving and saving the full *distributed VAT ledger*, rather than just their portion of it, then a VAT blockchain could be constructed. Each Member State would play a part. This is certainly the direction that the Crown Prince of Dubai, Sheikh Hamdan Bin Mohammed Bin Rashid Al Maktoum is taking Dubai, which will be fully on a blockchain by 2020.[65]

The tradition in this field is to compensate nodes with cryptoeconomic incentives. They are needed to save copies of the blockchain, and to verify the authenticity of transactions in the database.[66] Incentive mechanisms can change.[67] If the GCC was to

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BR%3BBR-L1174 ; see also SmartCloud Inc.'s discussion of Fraud Prevention at: http://www.smartcloudinc.com/#!fraud-prevention-v2a/c9i1

[61] Richard T. Ainsworth, *Phishing and VAT Fraud in CO2 Permits: The Digital Invoice Customs Exchange Solution,* 77 TAX NOTES INTERNATIONAL 357, 367 (January 26, 2015).

[62] Personal communication (December 11, 2014) with Kim Mayyasi at kmayyasi@smartcloudinc.com. Transcript of this communication is on file with the author.

[63] Staff writer, *UAE firms with Over $1m Revenue First to Register for VAT*, ARABIANBUSINESS.COM (June 16, 2016) *available at*: http://www.arabianbusiness.com/uae-firms-with-over-1m-revenue-first-register-for-vat-system-635521.html

[64] Ehtisham Ahmad & Giorgio Brosio, *Setting a VAT Registration Threshold: GCC Considerations and Evidence from Dubai*, in FISCAL REFORM IN THE MIDDLE EAST – VAT IN THE GULF COOPERATION COUNCIL, ed., Ehtisham Ahmad & Abdulrazak Al Faris (2010) at 205. The GCC has in fact chosen a relatively low threshold under Article 51(1)(b) & 2 of the *Unified VAT Agreement for the Cooperation Council for the Arab States of the Gulf* of SAR 350,000 (at current exchange rates 342,729 AED or $93,328 USD). With this threshold the number of taxpayers in Dubai more than doubles.

[65] Rahilla Zafar, *UAE Announces a Virtual Hackathon to drive Blockchain Innovation in the Public Sector*, CONSENSYS (November 29, 2016) *available at*: https://media.consensys.net/uae-announces-a-virtual-hackathon-to-drive-blockchain-innovation-in-the-public-sector-4588ead67a3d#.5p91jtazi

[66] Tim Swanson, *Great Wall of Numbers Cryptoeconomics for beginners and experts alike*, citing Vlad Zamfir of the Ethereum project at the Cryptocurrency Research Group conference (brainstorming session) on Cryptoeconomics as posted January 30, 2015 at:

adopt a cryptotaxcurrency (as has been proposed) then VATCoins could be used to compensate nodes.[68]

Given the high probability that the GCC is considering a VAT blockchain, the restricted nature of confidential tax data makes it very likely that Quorum will be the platform.[69] Quorum is J.P. Mogan Chase's private/permissioned blockchain based on the Ethereum protocol.[70] Similar solutions are available in the IBM-lead Hyperledger Foundation. Quorum is part of the Enterprise Ethereum Alliance, a group of 30 "business giants" including Microsoft, JP Morgan Chase, Intel, BNY Mellon, ING, Santander, BP and Accenture that are

> … joining forces to create a new kind of computing system based on the virtual currency network Ethereum. … JPMorgan, for instance, has created a version of Ethereum known as Quorum that the bank has been using in tests to move money between JPMorgan branches in different countries. Quorum will become a part of the new version of Ethereum being developed by the alliance.[71]

Quorum supports smart contracts on a replicated, shared ledger. Quorum improves efficiency and reduces costs. It does so in a manner that provides data privacy, which is essential for the GCC. Article 71(3) requires the system to be "… safe and secure and … *not allow the Supplier or the Customer access to any information other than what they allowed access to.*" (emphasis added). The Quorum Whitepaper explains in more detail:

> Much of the logic responsible for the additional privacy functionality resides in a layer that sits atop the standard Ethereum protocol layer. … Quorum uses cryptography to prevent all except those party to the transaction from seeing sensitive data. … [There is] a single shared

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http://www.ofnumbers.com/2015/01/30/cryptoeconomics-for-beginners-and-experts-alike/.
Cryptoeconomics is:

> A formal discipline that studies protocols that govern the production, distribution and consumption of goods and services in a decentralized digital economy. Cryptoeconomics is a practical science that focuses on the design and characterization of these protocols.

[67] Cryptoeconomic incentives are most strongly associated with cryptocurrency systems. Bitcoin *mining* is such an incentive system. This is because Bitcoin uses pseudonymous and anonymous nodes to validate transactions, whereas a basic distributive ledger that engage entities with legal identities (banks, financial institutions, government agencies) will use "permissioned" nodes to validate transactions. Tim Swanson, *Consensus-as-a-Service: A Brief Report on the Emergence of Permissioned, Distributed Ledger System* (April 6, 2016) *available at*: http://www.ofnumbers.com/wp-content/uploads/2015/04/Permissioned-distributed-ledgers.pdf.
[68] Richard T. Ainsworth, Musaad Alwohaibi & Mike Cheetham, *VATCoin: Can a Crypto Tax Currency Prevent VAT Fraud ?* 84 TAX NOTES INTERNATIONAL 703 (November 14, 2016)
[69] See: HYPERLEDGER: BLOCKCHAIN TECHNOLOGIES FOR BUSINESS, *available at*:
https://www.hyperledger.org Hyperledger is an open source collaborative effort created to advance cross-industry blockchain technologies. It is a global collaboration, hosted by The Linux Foundation, including leaders in finance, banking, IoT, supply chain, manufacturing and technology.
[70] J.P. Morgan, WHAT IS QUORUM, *available at*: https://www.jpmorgan.com/country/US/EN/Quorum
[71] Nathaniel Popper, *Business Giants to Announce Creation of a Computing System Based on Ethereum*, NYT (February 27, 2017) available at: https://www.nytimes.com/2017/02/27/business/dealbook/ethereum-alliance-business-banking-security.html?_r=1

blockchain and a combination of smart contract software architecture and modifications to Ethereum. Smart contract architecture provides segmentation of private data. Modifications to the go-ethereum codebase include modifications to the block proposal and validation process. The block validation process is modified such that all nodes validate public transactions and any private transactions they are party to by executing the contract code associated with the transaction. For other "private transactions," a node will simply skip the contract code execution process.[72]

Large enterprises, the tax authorities in the six Member States, and the GCC Secretary General should participate as "nodes" in the network. The Member States would be charged with "making" the data blocks, and private enterprises would be charged with "voting" on the blocks. Majority vote will determine the linking of the bocks. This is the QuorumChain Consensus mechanism.[73]

Figure 6 below reproduces the diagram from the *Quorum White Paper*. Because the GCC Secretary General has access to all data from all transactions throughout the network, it would be in the position of the Regulator. Participants 1, 2, 3, 4 and n represent Member States and the private sector enterprises. Each of these parties has limited access to network data.

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[72] *Quorum White Paper* (November 22, 2016) *available at*: https://github.com/jpmorganchase/quorum-docs/blob/master/Quorum%20Whitepaper%20v0.1.pdf

[73] *Quorum White Paper* (November 22, 2016) at 2 indicates:

> Quorum uses a majority voting protocol dubbed QuorumChain, where a subset of nodes within the network are given the ability to vote on blocks. The voting role allows a node to vote on which block should be the canonical head at a particular height. The block with the most votes wins and is considered the canonical head of the chain.
>
> Block creation is only allowed by nodes with the maker role. A node with this role can create a block, and in doing so, will sign it such that, on block import, other nodes can verify that a block was signed by one of the nodes that have permission to make blocks.
>
> QuorumChain is implemented in a smart contract – a novel concept for managing consensus, and importantly, the consensus-upgrade process. The smart contract tracks voter and block maker lists, both of which can be maintained through standard transactions, thereby providing further control and clarity over how and by whom the network is managed.

Figure 6: Quorum network diagram – Figure 2 from *Quorum White Paper*
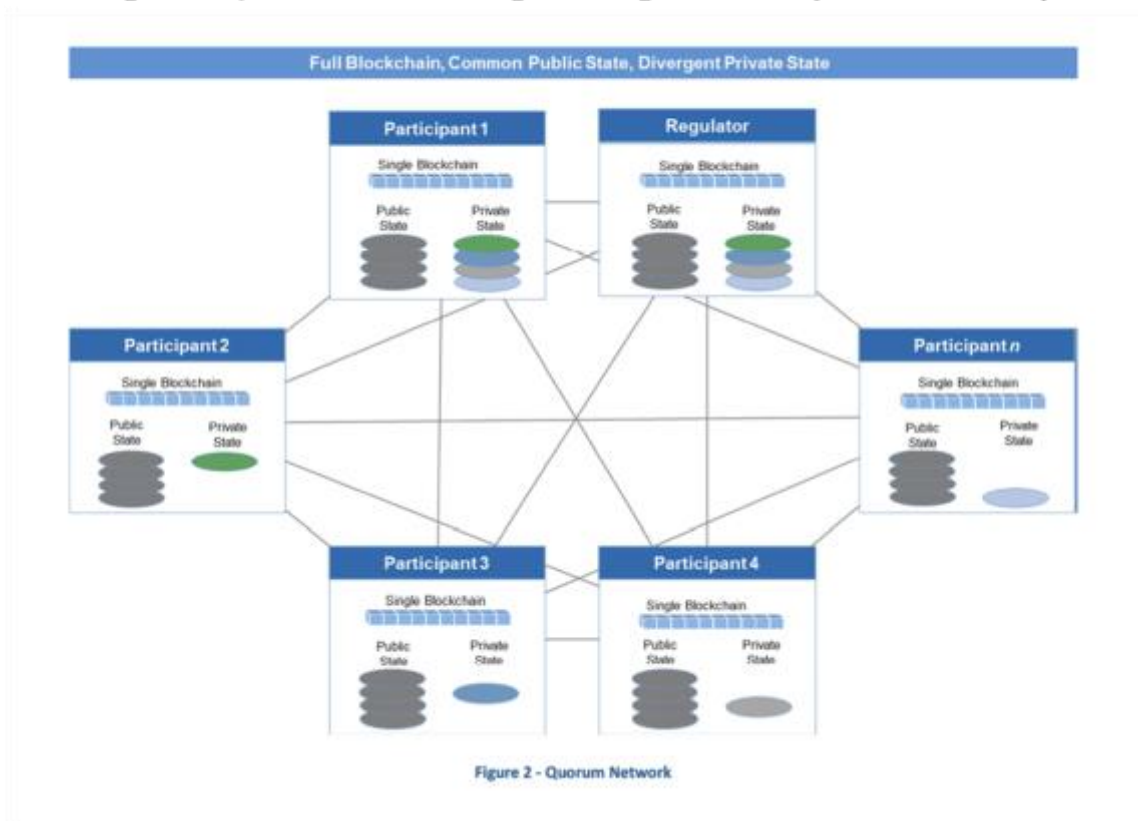
The key to Quorum's ability to keep some data private and yet allowing each participant in the Quorum network to receive a complete copy of the entire chain of transactions is represented by the set of small blocks designated "single blockchain" within each participant's box.

> The single blockchain in the diagram represents the fact that each participant on the given Quorum network has the same copy of the chain of transactions (even if a given participant is not party to every transaction)… For those transactions that should be private to a subset of participants, *privacy is achieved by replacing the original details of such transactions with a hash of the encrypted original transaction data/payload*. This simultaneously ensures that the each participant can receive these transactions (thereby giving rise to the single chain of transactions) and the relevant sensitive data is in fact kept private.[74]

Transposing the Quorum platform to the GCC fact pattern used in Figure 5 (above) produces Figure 7 (below). All five parties (the Tax Information Center, the Saudi and UAE electronic services systems, and taxpayers A and B) save complete copies of the entire chain. In some instances the data is a hash of the encrypted original

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[74] Tyron Lobban at Quorum Info (tyrone.lobban@jpmorgan.com) personal communication January 19, 2017 (responding to a series of questions about Quorum). *Emphasis added*.

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(represented by small green blocks). In instances where an entity is a party to the transaction the original data is visible (represented by small purple blocks).
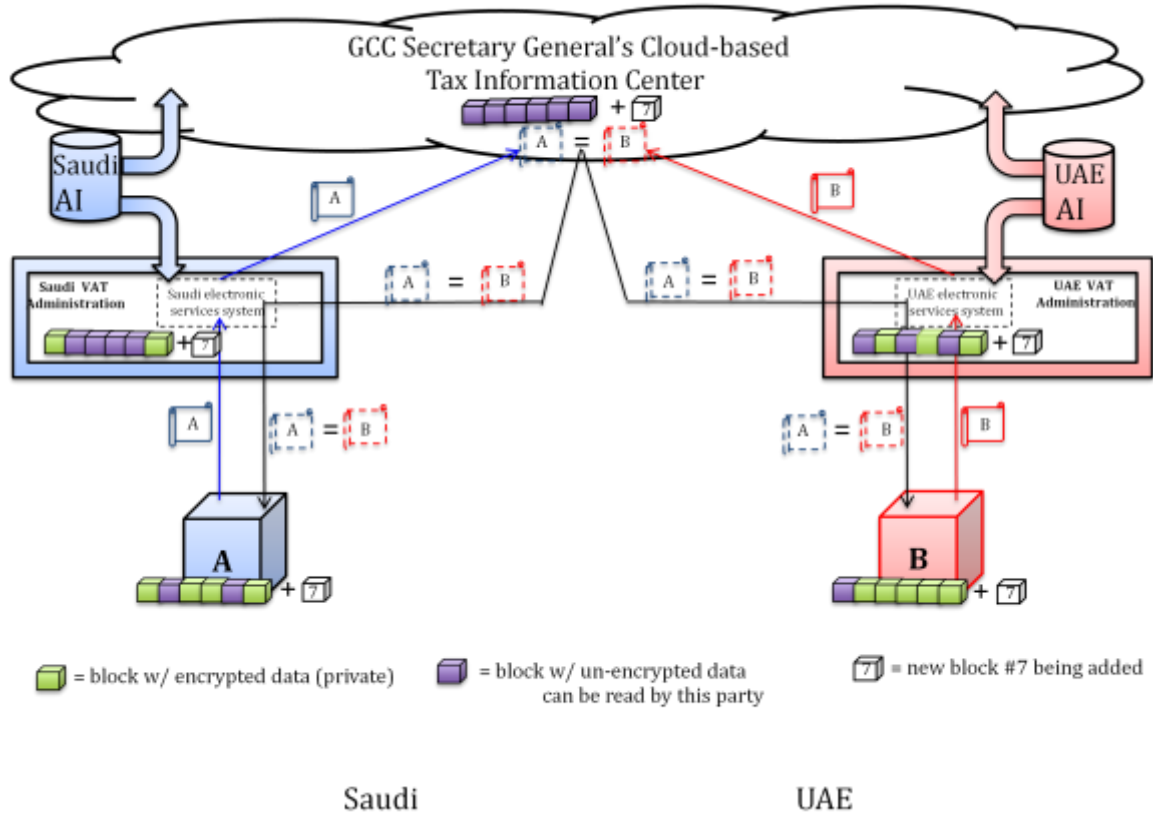

Figure 7: GCC VAT Blockchain

Figure 7 also shows a "block 7" which has been "made" by one of the designated makers (possibly including the data of this exchange), but which has not yet been added to the chain, because consensus (50% vote) has not been achieved yet. The larger the number of nodes in the system, the more secure it will be. With a distributed ledger there is no dispute about the data recorded, because hundreds of ledgers will have exactly the same record.

To understand how different the GCC approach to overseeing intra-community sales is from the EU approach, Figure 2 (above) should be compared with Figures 8 & 10 (below). Where the EU relies on the audit of returns (filed one, two or three months after a transaction has occurred) and intra-community exchanges of transaction data (through the VIES reports received a further three to six months later), the GCC intends to operate in real-time with an immediate exchange of transaction data.

The Wholesaler in France (in Figure 2, above) and in Saudi Arabia (in Figures 8 & 10, below) will receive a full container of cigarettes. The French or Saudi Wholesaler could easily disappear (with the VAT in hand) after selling on to the Retailer. The Saudi tax administration will have immediate knowledge of the cross-border transaction.

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Based on a trail of questionable invoices from the Wholesaler in the accounts of the Retailer a French auditor could possibly determine that something was amiss in the Distributor/ Wholesaler relationship. However, the French auditor would only know for sure that there was a problem after it received a response to a VIES request. The Saudi tax administration (in contrast) has immediate evidence of the cross-border transaction and the onward sale to the Retailer. This is real-time fraud detection.

The GCC Secretary General's Tax Information Center has matched the Distributor's side of the cross-border transaction [5] with the Wholesaler's side of the transaction [6] and communicated this match to the UAE and Saudi Electronic Services System, which has further communicated this match to the Distributor and the Wholesaler.

Figure 8: Importing Cigarettes into Saudi Arabia through the UAE
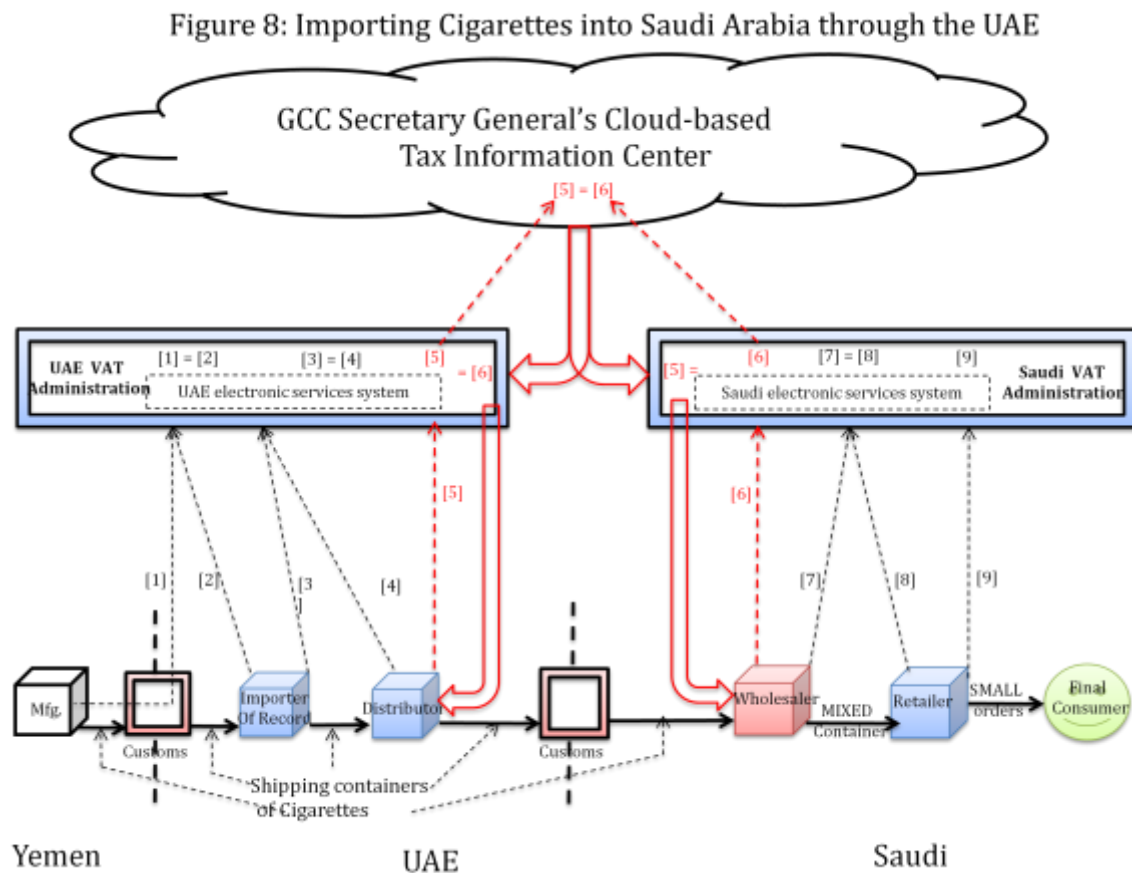
Cigarette Smuggling

The initial comparison examined by this paper contrasted (a) Danish chocolate frauds (which involved the movement of out-of-date chocolates in a circle: Denmark-to-Germany-to-Sweden-to-Denmark), with (b) cigarette smuggling in Saudi Arabia. In both cases fraudsters aimed for a three-way profit: (a) on the goods, (b) on a manufacturer's

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tax imposed on chocolate and cigarettes, and (c) on the VAT because the seller intends to go "missing" immediately after completing the sale.

Both Denmark and Saudi Arabia are concerned with the health impact of the commodity involved (chocolate and cigarettes). Because of this concern, both have decided to impose a manufacturer's tax on the production or importation of these products for resale within their country.

However, both are now concerned that the net result of these taxes may have been the creation of a lucrative tax fraud environment that accelerates the illegal importation and sale of these products to the detriment of public heath, and the national treasury, but to the benefit of organized crime and terrorist groups. Estimates have been made of the additional criminal profits from an increase in illicit cigarette trade projected over a three year period by Saudi Ministry of Finance as follows:[75]

Table 1: Estimated Profits Generated in Saudi Arabia With a Rise in Illicit Cigarette Trade by 25%, 50% and 100%			
	Yr. 1	Yr. 2	Yr. 3
25% increase in illicit trade	$114,000,000 USD	$121,000,000 USD	$128,000,000 USD
50% increase in illicit trade	$137,000,000 USD	$145,000,000 USD	$153,000,000 USD
100% increase in illicit trade	$182,000,000 USD	$193,000,000 USD	$286,000,000 USD

This paper argues that the design of the GCC VAT has unique attributes in this regard. Rather than working to *increase* the fraud, as with the EU VAT, the GCC's technology-intensive VAT should substantially *decrease* cigarette smuggling.

What is the result in terms of the GCC VAT if a 40-foot container of Marlboro cigarettes is smuggled into Saudi Arabia through the UAE with fraudulent paperwork suggesting that the container was properly imported into the UAE, and re-sold several times before reaching the Saudi Retailer (who is allegedly unaware of the fraud)?

This is the commercial pattern (false Dubai exportation documents), and quantity (40 foot containers) for cigarettes passing from UAE through Saudi Arabia into Jordan, which was uncovered recently in what has been called the "largest cigarette smuggling operation in history."[76] The UAE to Saudi smuggling route is a popular roadway.[77] Figure 9 shows this pattern limited to UAE and Saudi Arabia (below).

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[75] Nasser Saidi & Associates, *Taxation, Illicit Trade in Tobacco Products and Finance of Terrorism* (June 2015) at 7 & 8, available at: http://www.thecre.com/ccsf/wp-content/uploads/2015/11/Tax-Illicit-Trade-and-Terrorism-June-2015-Final-English-Version.pdf

[76] Raddad Alaqralh, *Customs "Frustrates the largest Cigarette Smuggling Operation in History*," ALGHAD (May 7, 2014) *available at*: http://www.alghad.com/articles/521118-%D8%A7%D9%84%D8%AC%D9%85%D8%A7%D8%B1%D9%83-%D8%AA%D8%AD%D8%A8%D8%B7-%D8%A3%D9%83%D8%A8%D8%B1-%D8%B9%D9%85%D9%84%D9%8A%D8%A9-%D8%AA%D9%87%D8%B1%D9%8A%D8%A8-%D8%B3%D8%AC%D8%A7%D8%A6%D8%B1-%D8%A8%D8%AA%D8%A7%D8%B1%D9%8A%D8%AE%D9%87%D8%A7

[77] Staff, *Amman Customs Thwarts Smuggling 1,000 cartons of cigarettes coming from Dubai*, SARAV NEWS (July 25, 2015), *available at*: http://www.sarayanews.com/index.php?page=article&id=318701

Figure 9: Smuggling Cigarettes into Saudi Arabia through the UAE
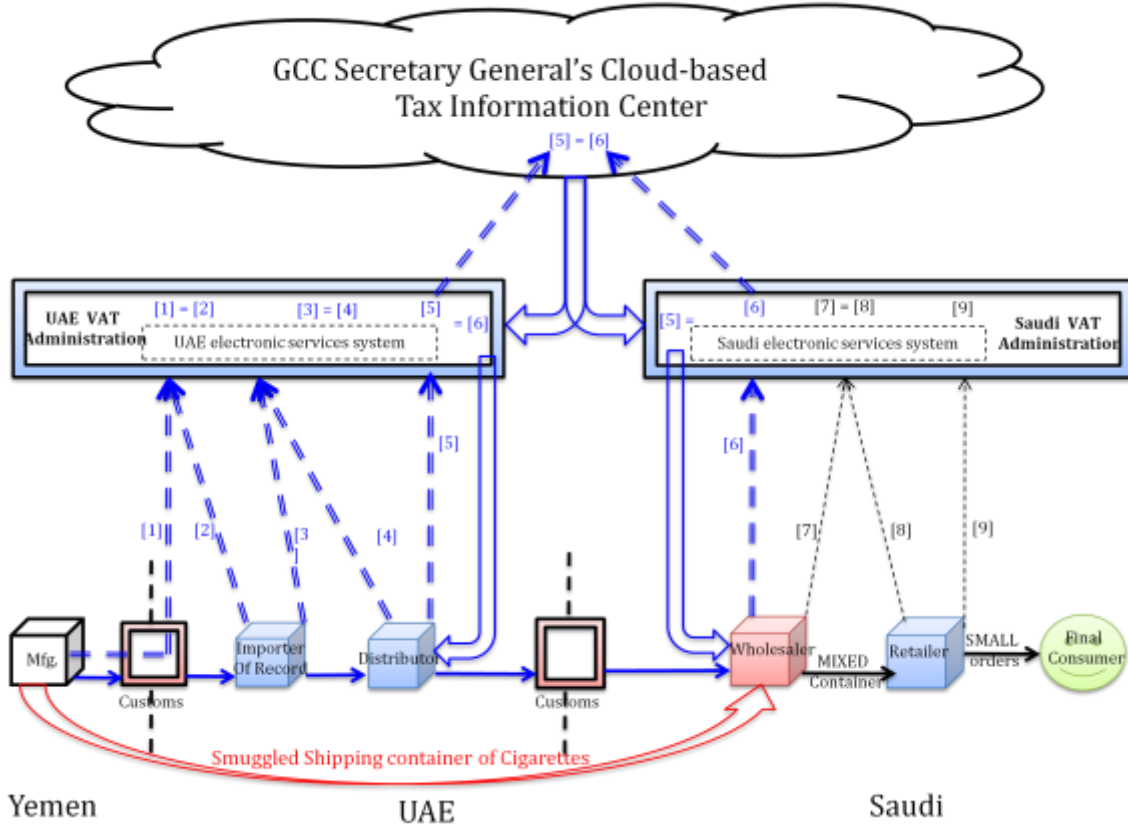
In Figure 9 each of the blue-colored transactions [1], [2], [3], [4], [5], and [6] would need to be "papered over" with fraudulent documents. The GCC Secretary General's Tax Information Center would not have been notified of transaction [5] and [6]. There would be no matching performed. There would be no record in the GCC Secretary General's Tax Information Center, the UAE or Saudi Electronic Services System, or the internal records of the alleged UAE Distributor, or the Saudi Wholesaler.

If the UAE had decided to replicate the matching function of the GCC's Tax Information Center in its Electronic Services System, there would also be no record there of [1] = [2], and [3] = [4].

The Saudi Wholesaler, who intends to be a missing trader, may be difficult to find in several months. He and his goods, the Cigarette Tax, and the VAT are long gone. He has broken up the container of Marlboro cigarettes and mixed the cartons and packs with other cigarettes (from other shipping containers) that were sold on to Saudi Retailers. These transactions would be difficult to follow in paper, but not if the Saudi notification and invoice requirements are detailed and digital.

This is where Saudi AI will play a key role in identifying this fraud in real-time. Assuming the Saudi domestic VAT law adopts the methodology of the GCC Secretary

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General's Tax Information Center and performs a matching of transmissions in its Electronic Services System:

- the match of notifications [7] and [8] will not be able to be followed back from the Wholesaler through the Distributor and Importer of Record; and
- there would be no matching of notifications [5] and [6] in the GCC Secretary General's Tax Information Center;

Saudi AI could check the blockchain within its Electronic Services System, and quickly confirm its accuracy in the GCC Secretary General's Tax Information Center as well as in the Retailer's records (if necessary), but all of the manifestations of the *distributed ledger* should be the same. Figure 10 below illustrates the interaction of AI with the blockchain.

Figure 10: Using AI to Identify Cigarettes Smuggled into Saudi Arabia allegedly through UAE
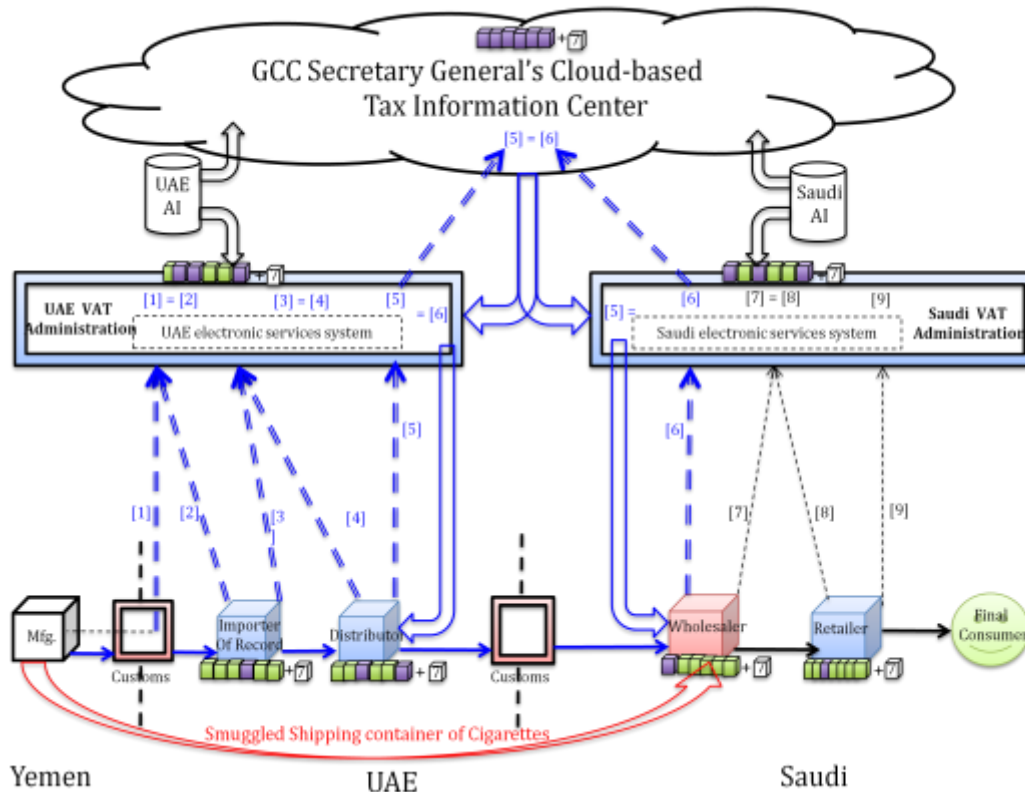
In the running examples of the blockchain developed for this paper, block 7 was represented as a block that was "made" but not yet confirmed, or added to the chain by a 50% vote of the QuorumChain Consensus mechanism. This stage in the development of the blockchain suggests that the system is apprehensive about transactions in this block.

This is what would happen if the "voting nodes" in network tried to confirm [7] = [8] by following the line of transactions from the Retailer back to the alleged importation

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of the shipping container of Marlboro cigarettes. This is what Article 71(5) promises that any node should be able to do:

> The System allows to track the Goods transfer evidence to the Final Destination Point of Entry.

CONCLUSION

The GCC has done its homework. It has taken the EU VAT and modified it in a manner that allows it to solve some very difficult problems; problems that continue to plague the EU VAT. The *Unified VAT Agreement for the Cooperation Council for the Arab States of the Gulf* is technology-intensive. It promises to be the first VAT to adopt blockchain technology, and deploy AI on a regular basis to identify fraud in an economic community in real-time.

One of the most significant benefits of the GCC VAT is not only the way it provides a permanent record of all transactions, and solves missing trader frauds, but how the data search capabilities of its real-time matching and its distributive ledger will help with the enforcement of other taxes. In this instance, cigarette smuggling was considered. Not only is cigarette smuggling a major terrorist funding vehicle, it perpetuates a health epidemic the government is anxious to contain.

The government's dilemma in this area has been – will raising the cigarette tax reduce smoking, or will it simply increase the smuggler's profits?

The three-part documentary on VAT fraud by Danish public television DR TV in early 2016 shows that criminals are drawn to situations where they can secure multiple "profits" from a single fraud activity. In *How Fraudulent Denmark* (*Sådan Svindles Danmark*), criminals profited from (a) re-selling expired chocolate, (b) re-directing Chocolate Tax revenues to their own use, and (c) securing illegal VAT refunds. The same criminal triple play could arise in the GCC where (a) profits from the illicit sale of stolen/ smuggled cigarettes can be supplemented with (b) theft of cigarette tax revenue, and (c) missing trader VAT frauds. But this was only possible with a VAT modeled on a EU design, and the GCC has not done this. The GCC took the EU VAT and improved it in a way that will put a stop to this criminal activity.

The GCC VAT is very worthy of attention, and not just because it is the world's first real-time, blockchain-secured, multi-jurisdictional VAT, but because its databases and AI search capabilities may be the solution to a large number of tax compliance problems.   This is potentially a remarkable accomplishment. It is worth the world's attention.