REPORT
ON ESTABLISHING A TRADE REPOSITORY IN UKRAINE

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Version 1.3 (deliverable version of report)

Date 28 October 2020

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LIST OF ABBREVIATIONS

- **ACER**: Agency for the Cooperation of Energy Regulators, an Agency of the European Union created in 2010 with a seat in Ljubljana, Slovenia. ACER is tasked with the data collection under REMIT.

- **ACER Code**: Code for identification of legal entities obliged to report under REMIT. ACER codes are assigned by the relevant NRA upon registration in accordance with Article 9 of Regulation (EU) No 1227/2011 (REMIT), and maintained in CEREMP.

- **API**: Application Programming Interface, a general type of computing interface which defines interactions between software components, specifying the kind of requests that can be made, data formats to be used, and other conventions to be followed when interacting with the software component via the API.

- **ARIS**: Agency's REMIT Information System, the central system for collecting, storing and analyzing orders, trades and fundamental data for the energy wholesale market in the EU. ARIS is built, maintained and operated by ACER.

- **ARM**: Approved Reporting Mechanism, a legal entity authorized under MiFID II to provide regulatory reporting services to NRAs or to ESMA on behalf of investment firms.

- **AS4**: Applicability Statement 4, an interoperability protocol that standardizes the use of secure and reliable web services for B2B data exchange and integration. AS4 used to be an Oasis standard (ebMS 3.0), and is now supported by ISO. AS4 is prevalent in the West European gas industry (ENTSOG)

- **BI**: Business Intelligence, a type of enterprise software for the data analysis of business information, commonly including reporting, online analytics, dashboard provision, and data mining. BI tools typically connect to databases, data warehouses or "data lakes" as sources of the data to be analyzed. Examples of BI tools are Board, Tableau, Qlik, and MS Power BI.

- **BIC**: Business Identifier Codes, a unique identification code (ISO 9362) for both financial and non-financial institutions, commonly used for banks.

- **BLOB**: Binary Large Object, a collection of binary data stored as a single entity in a database. Blobs are typically images, but the concept also applies to large structured files like regulatory XML messages.

- **C.P.**: Counterparty to the trade from the perspective of a party reporting a trade. The term is sometimes used interchangeably with market participant (MP).

- **CCP**: Central Counterparty or Central Clearing Counterparty, a financial institution that provides clearing and settlement services for trading in foreign exchange, securities, options, and derivative contracts. CCPs take the counterparty credit risk between the parties to a transaction and internalize it.

- **CEREMP**: Centralized European Registry for Energy Market Participants, a system for the registration of market participants under REMIT, maintained by ACER

- **CFTC**: Commodity Futures Trading Commission

- **CFTC SDR**: CFTC Spot Data Repository

- **CME / CME Group**: Chicago Mercantile Exchange, a financial and commodity derivative exchange, and its group entity

- **CME TR**: Trade Repository owned by the CME Group. In May 2020, CME TR closed its operations of the CME European Trade Repository, which had been an ESMA-registered EMIR Trade Repository covering all asset classes. Abide Financial and NEX Regulatory Reporting were shuttered at the same time.

- **CP**: See C.P.

- **CRD IV**: Directive 2013/36/EU of the European Parliament and of the Council of 26 June 2013 on access to the activity of credit institutions and the prudential supervision of credit institutions and investment firms

- **CSDR**: Regulation (EU) No 909/2014 of the European Parliament and of the Council of 23 July 2014 on improving securities settlement in the European Union and on central securities depositories

- **CTRM**: Commodity Trading & Risk Management Software, software applications that support the business processes associated with trading commodities, including the physical movement and delivery of those commodities and associated risk management activities. CTRM systems usually act as the detailed ledger systems for trading, with only aggregated positions carried over into the respective ERP systems. For regulatory reporting, at least some data needs to be extracted form CTRM system. Typical CTRM systems include OpenLink ENDUR and Findur, Allegro, FIS (Sungard) and Aspect.

- **DTCC**: Depository Trust & Clearing Corporation, a US company providing post-trade services to the financial markets. e.g. clearing and settlement. DTCC is also a central securities depository.

- **DTCC GTR**: DTCC Global Trade Repository, an ESMA-registered EMIR Trade Repository covering all asset classes, provided by Derivatives Repository Ltd., a daughter company of DTCC.

- **ElCom**: Federal Electricity Commission ("Eidgenössische Elektrizitätskommission"), the Swiss regulatory authority of the electricity sector. It is responsible for monitoring compliance with the Swiss Federal Electricity Act, and hence the REMIT-equivalent sections in it

- **EMIR**: European Markets Infrastructure Regulation, an EU regulation of over-the-counter (OTC) derivatives, CCP and TR. It came into force in 2012, followed up by technical regulations in 2013. The regulations include mandatory reporting of derivative contracts and provisions for TR. Official name is "Regulation (EU) No 648/2012 of the European Parliament and of the Council of 4 July 2012 on OTC derivatives, central counterparties and trade repositories"

- **EMIR Refit**: An initiative by ESMA to improve upon EMIR, ultimately resulting in new report structures, data elements and uniform methods of submitting data to TRs in Western Europe, following the ISO 20022 approach. The legal basis for the EMIR Refit activity is Regulation (EU) 2019/834 of the European Parliament and of the Council of 20 May 2019. The most comprehensive report is titled

"Technical standards on reporting, data quality, data access and registration of Trade Repositories under EMIR REFIT", consultation from 26 March to 03 July 2020

- **ERP**: Enterprise Resource Planning systems provide for the integrated management of main business processes, including general ledger, accounting, taxes. Typical examples are SAP, Oracle, Microsoft Navision or Sage. Certain types of regulatory reporting require information from ERP systems.

- **ESMA**: European Securities and Markets Authority, the EU's securities markets regulator

- **ETD**: Exchange-traded Derivative, standardized derivative contracts such as futures and options contracts that are traded on organized exchanges. ETDs are also a regulatory term in financial regulations.

- **ETRM**: Energy Trading & Risk Management Software, similar to CTRM, but focused on electricity, natural gas, emissions and oil.

- **FCA**: Financial Conduct Authority (FCA). financial regulatory body in the United Kingdom

- **FCP**: Financial Counterparty, a regulatory term. Examples are banks.

- **FCP-**: Small Financial Counterparty, an FCP below a certain threshold. This category only exists in certain financial regulations

- **FinfraG**: "Finanzmarktinfrastrukturgesetz", Swiss financial regulation package roughly equivalent to EMIR and MiFID-II, which came into force in 2016.

- **FINMA**: "Finanzmarktaufsicht", Financial Market Supervisory Authority, the Swiss government body responsible for financial regulation

- **FMIA**: Financial Market Infrastructure Act, see FinfraG

- **FTE**: Full Time Equivalent, a measure of team sizes (and cost) in project planning, where an FTE of 1.0 is equivalent to a full-time worker, irrespective of whether the work is done e.g. by one actual person working full-time or two people dedicating half their working days to it.

- **FX**: Foreign Exchange, trading between currencies

- **GDPR**: General Data Protection Regulation, an EU regulation on data protection and privacy which came into force in 2018.

- **GLEIF**: Global Legal Entity Identifier Foundation, an international organization tasked with the development and administration of the LEI system

- **GPG**: GNU Privacy Guard, an open source implementation of the OpenPGP standard as defined by RFC4880

- **ICE**: Intercontinental Exchange, a US company that operates exchanges and clearing houses including the ICE futures exchange in Europe and the New York Stock Exchange, and ICE Clear Europe. ICE dominates the trading in UK naturals gas (NBP)

- **ICE Tradevault** / **ICE TV** / **ICE TR**: an ESMA-registered EMIR Trade Repository covering all asset classes, and operated by ICE

- **ISIN**: International Securities Identification Number, a 12-character alphanumeric code uniquely identifying a security. The ISIN concept works well for securities with stable definitions like equities, but less well for securities like complex options or commodity futures with an underlying of revolving delivery times.

- **ISO 20022**: ISO standard for electronic data interchange between financial institutions using XML Schemata. ISO 20022 is primarily a meta-model and a common element library which can be used by standard-setting organizations to create messages for specific uses.

- **ITS**: Implementing Technical Standard, a type of secondary legislation set by ESMA

- **JIRA**: Issue tracking software developed by Atlassian used in agile project management and agile software development.

- **LEI**: Legal Entity Identifier, a unique global identifier for legal entities participating in financial transactions. The 20-character, alpha-numeric code is based on the ISO 17442 and issued by LOUs.

- **LOU**: Local Operating Unit, an entity issuing and administering LEIs

- **LSE** / **LSEG**: London Stock Exchange, and the group to which it belongs

- **MAR**: Market Abuse Regime, an EU regulatory package

- **MiFID II**: Directive 2014/65/EU of the European Parliament and of the Council of 15 May 2014 on markets in financial instruments

- **MiFIR**: Regulation (EU) No 600/2014 of the European Parliament and of the Council of 15 May 2014 on markets in financial instruments

- **MMSR**: Money Market Statistical Reporting, Regulation ECB/2018/33

- **MP**: Market Participant

- **NFC**: Non-Financial Counterparty

- **NFC-**: Small Non-Financial Counterparty, below specific thresholds depending on the regulation

- **NFCP**: See NFC

- **NFCP-**: See NFC-

- **NRA**: National Regulatory Authority

- **OMP**: Organized Market Place, a venue designation from REMIT

- **OTC**: Over-The-Counter Trading, also called bilateral trading. Trading outside a regulated venue, or at least without a CCP. To differentiate between OTC Trading on a broker platform (OTF), and trading without a broker, the latter is sometimes referred to as "pure bilateral", or "pure OTC" trading

- **OTF**: Organized Trading Facility, a venue designation from EMIR and MiFID II.

- **PKI**: Public Key Infrastructure, software and procedures for creating, managing, distributing and using digital certificates and public-key encryption.

- **PO**: Product Owner, a role in agile software development, classically known as project manager or team lead for software development

- **QA**: Quality Assurance, both the process in software development and the team role

- **REC**: Recommendation, in the context of this report

- **Regis-TR**: An ESMA-registered EMIR Trade Repository covering all asset classes, owned jointly by Deutsche Börse Gruppe and Bolsas y Mercados Españoles, the holding company of the main Spanish stock exchange

- **REMIT**: Regulation (EU) No 1227/2011 of the European Parliament and of the Council of 25 October 2011 on wholesale energy market integrity and transparency in conjunction with Commission Implementing Regulation (EU) No 1348/2014 of 17 December 2014

- **REST API**: Representational State Transfer API, a software architecture for Web services with the goal to provide interoperability between computer systems.

- **RRM**: Registered Reporting Mechanism, a legal entity authorized by ACER under REMIT to provide regulatory reporting services to MPs trading in wholesale energy.

- **RTS**: Regulatory Technical Standard, a type of secondary legislation set by ESMA

- **sftp / SFTP**: Secure File Transfer Protocol, also SSH File Transfer Protocol, a network protocol file access, file transfer, and file management. SFTP was developed as an IETF standard from 2001 onwards. Though fairly old in terms of internet standards, it is widely used for automatic system-to-system transmission of regulatory data in Europe. Very accessible, serves as a common denominator.

- **SFTR**: Securities Financing Transactions Regulation, European legislation for the regulation of securities lending and repo.

- **SIX TR**: Trade Repository in Switzerland, operated by the Swiss exchange SIX, using UnaVista technology. This TR is licensed by FINMA for FinfraG, but does not hold an EMIR TR license.

- **STOR**: Suspicious Transaction and Order Report, a report of a transaction or order which is suspect of being an attempt of market manipulation, insider trading or other prohibited practices. Under MAR, regulated venues, OTFs and other legal entities are required to make timely STOR reports to the competent authorities.

- **StromVV**: "Stromversorgungsverordnung", Swiss federal law regulating electricity and containing provisions equivalent to REMIT

- **SWIFT**: Society for Worldwide Interbank Financial Telecommunication

- **T+1**: Timing of Reporting being one day later than the Trading Day. Trading Days only count as far as they are regular trading days, so a trade conducted on a Friday would need to be reported before midnight of the following Monday.

- **T+30**: Timing of Reporting being 30 days later than the Trading Day

- **TCO**: Total Cost of Ownership

- **TR**: Trade Repository, typically under EMIR and/or MiFID II

- **UnaVista**: Trade Repository owned by LSEG, an ESMA-registered EMIR Trade Repository covering all asset classes.

- **UNIFI**: UNIversal Financial Industry message scheme, see ISO 20022

- **UPI**: Unique Product Identifier, a code for unique identification of OTC derivatives products.

- **UTI**: Unique Transaction Identifier, globally unique identifier for financial trades mandated by financial markets regulation

- **W+1**: Timing of Reporting being one week later than the Trading Week. A trade conducted e.g. on a Wednesday would need to be reported before midnight of the Friday in the following week.

- **XML**: Extensible Markup Language, a markup language widely used for the representation of data structures in regulatory reporting.

- **XSD**: XML Schema Definition, technical specification of the data structure of an XML document

SUMMARY AND RECOMMENDATIONS

With the enactment of Law No. 738-IX "On Amendments to Certain Legislative Acts of Ukraine Regarding Liberalization of Attracting of Investments and Introduction of New Financial Instruments", Ukraine is implementing the provisions of key European Union capital markets acts, including MiFID II, MiFIR, and CRD IV. The Law was adopted by the Verkhovna Rada on 19 June 2020, and officially promulgated on 15 August 2020.

With the Law No. 738-IX, Ukraine's financial regulators - in particular the NSSMC - have been tasked with the organization of information disclosure under enhanced reporting standards. The goal of these activities are increased transparency and integrity in the securities market, combined with convergence with EU capital markets regulations and standards. A key part of the reporting and disclosure of information is the Trade Repository (TR) as set out in Articles 2, 86 and following Articles of Law No. 738-IX.

Comparable Trade Repositories are already in place in the EU both for financial markets under EMIR and MiFID-II and for energy markets under REMIT. Countries like Switzerland, which are not part of the EU yet closely aligned with its regulatory frameworks, have enacted equivalent laws and instituted Trade Repositories as well, both for financial and commodity as well as energy markets. In order to learn from best practices in Western Europe, and to draft requirements for TR suitable to the needs of the capital markets as well as organized commodity markets in Ukraine, a project was started in the framework of the Financial Sector Transformation project (FST), and funded by the U.S. organization DAI. This report constitutes a key deliverable of that project.

As part of this project, we surveyed stakeholders of the proposed TR, including regulatory agencies, regulated venues, providers of financial market infrastructure and market participants themselves. They key findings from this round of interviews were that the capital markets in Ukraine exhibit some key differences when compared to similar markets and regulatory regimes in Western Europe:

- Small number of (regulated) financial instruments with somewhat significant liquidity

- In terms of liquidity, Ukrainian government bonds are the most significant financial instrument under regulation. For domestic government bonds, NBU acts as the only depository, which would allow regulatory reporting from a central ledger

- The only other market with significant liquidity in the Ukrainian financial markets (not considering physical power or natural gas) are the FX markets (mainly UAH-USD and UAH-EUR)

- Low trading volumes overall, when compared to countries of similar size in Western Europe

- Limited number of market participants, with the bulk of market participants being small to medium enterprises who do not capture their trading activities in enterprise level systems (e.g. CTRM / ERP systems)

- Lack of experience with system-to-system integration in financial markets, but also lack of a business case for automation of reporting function given the low trading volumes of most market participants

- Familiarity with form-based / Excel-based ad-hoc reporting or regular reporting through e-Mail or web interfaces to various regulatory agencies,

- Lack of belief that this reporting serves any useful function in line with the effort to perform it, it being perceived as yet another bureaucratic function, with data disappearing into a "black hole"

We conclude from this markedly different situation that the TR model from Western Europe is not directly applicable. In particular, the following characteristics would not readily apply to Ukraine:

- TRs tied to the major exchange groups (e.g. Regis-TR – Deutsche Börse Gruppe, UnaVista – LSE, ICE Tradevault – ICE) report primarily in-house, secondly as a service provider – not applicable due to a lack of a dominant exchange

- Strong emphasis on automated interfaces, due to high trading volumes and internal links between exchanges and "captive" TRs – not applicable due to technical readiness

- TR business case as an "add-on" to other services, e.g. trading or clearing fees

The technical readiness of the Ukrainian market combined with the spread of trading and low overall volumes leads us directly to our first recommendation:

REC-1	The Ukrainian TR should focus on semi-manual data collection through web forms, and provide upload mechanisms for XML files to be generated and modified by market participants using simple tools like Excel forms or XML editors. Collecting reporting data though automatic interfaces is not a priority, and should be kept as simple as possible.

The vast majority of reporting in Western Europe is performed through automated interfaces, typically using data-typed XML messages and with the ability to apply semantic checks and business rule checking. Semantic checks test the validity of an XML document against an XSD schema, validating that mandatory fields are present, and that data fields conform to the data types prescribed, i.e. that an LEI code has a maximum of 20 characters or that a time stamp carries the time zone indicator. Business rules are more complex and cannot be enforced using XML schemas alone. Examples are what-if relations, i.e. if a reporting entity is non-domestic, then it must also fill fields describing their local registration, which would be non-applicable for domestic parties. Other business rules imply a validity check of e.g. LEI codes or UTIs, which cannot be done by just looking at the length of the characters, but involve looking up external data sources or performing checksum calculations. Semantic checks are fairly static, and limited by both standard releases and the capabilities of XML schemas. Business rules can be calibrated and expanded over time.

Even so, the resulting quality of reported financial data under EMIR and MiFID-II in Western Europe is poor when looking at the whole market, across all TRs. This is a direct consequence of having multiple TRs, each with their own idiosyncratic data formats and methods of collecting and checking data, typically slotting them into legacy systems adding more differences. As a result, the reconciliation rates between different TRs is very

low in Western Europe, with data reported being hard to compare between TRs. Thus, a regulator cannot perform even simple reports or surveillance due to a lack of a complete picture across all TRs.

This situation would be acerbated in a hypothetical scenario with multiple TRs in Ukraine, each collecting their data through semi-manual interfaces. The quality controls applicable to such interfaces are weaker by necessity than is the case with automated interfaces. Even so, it must be a priority:

REC-2	Though the bulk of the data will be collected semi-manually, the focus of data collection must be high data quality through application of semantic checks and business rules as far out from the core TR as possibly, following the onion model: Catch errors on the outer layers of the system, before they are hard to purge.

Building and operating a TR is mainly a fixed cost proposition. Given the low overall trading volumes in Ukraine, it would be difficult to construct a pricing model such that even one TR can operate profitably, let alone multiple TRs. Compared to the multi TR approach in financial markets, energy regulators in the EU have chosen to legislate for a single repository (ARIS) operated by a single organization, namely ACER. Data is collected once, centrally, and then made available to all national regulators having appropriate access rights. The resulting data quality and ability to perform actual market surveillance and back up cases of investigations is much stronger. Even if competition between TR were to work, it tends to be a winner take all market. In practice, competition between TRs does not work in Western Europe, with reporting services held captive by the originating exchange or clearing house. Taken together, this leads us to our third recommendation:

REC-3	Even though Law No. 738-IX foresees multiple TRs, Ukraine should follow the ACER model, and provide for the appropriate institutional and regulatory guidelines to have only one TR for the financial markets. This one TR could be operated as a strongly regulated public or private entity created from scratch (greenfield) or as the function of an existing state agency, both operated at cost. Data and access would be made available to authorized parties from other regulatory agencies, again following the ACER model. In case there would be multiple TRs licensed according to Law No. 738-IX, there should be a mandate for reconciling the trade data between TRs, data transfer between TRs and making the reconciled information seamlessly available to the competent national authorities, following the ESMA Guidelines on transfer of data between Trade Repositories (ESMA70-151-552, dated 24 August 2017)

Regulated commodity markets for power and natural gas (energy) have only one TR under REMIT to begin with, so when translating REMIT into Ukraine, having only one TR for energy is the natural choice. Combining the TRs for financial and energy markets in Ukraine into one TR has a number of advantages, but it is a different question – see REC-7.

Even with one TR, having complete, accurate and timely information will be a challenge, depending on active cooperation by market participants. To overcome inertia and cynicism about the perceived value of collected data, training, awareness and education will be key. Such doubts can only be overcome by demonstrating the value practically:

REC-4	The Ukrainian TR should create some value by making available aggregate and anonymized data to all market participants. At the same time, such provision of information would also demonstrate the capabilities of the TR. In addition, the TR should have appropriate PR and dissemination of information related to market surveillance, again similar to the REMIT websites and reports operated by ACER.

Even though the Ukrainian market is an earlier stage of development when compared to financial markets in Western Europe, there is no need to reinvent the wheel. At the same time, reusing existing formats and technical methods to connect to TRs allows software vendors and service providers to reuse existing modules, training approaches and documentation when adapting their offering to the Ukrainian market. Even small adaptions take away the value of this approach, as is readily apparent from the Swiss case of StromVV vis-à-vis REMIT compared with FinfraG vis.-a-vis EMIR.

REC-5	The Ukrainian TR should copy existing data formats, data structures and channels for data collection verbatim wherever possible. When doing so, this should be made explicit with clear versioning and the lowest amount of changes possible. This report gives clear recommendations in these matters, with the key recommendation being the wholesale adoption of the EMIR Refit data formats and structures. The channels for collection need to be adopted to the needs and resources of the Ukrainian market, and will differ substantially from the bulk of data collection channels by TRs in Western Europe.
	Where there are discrepancies between these data formats and structures and the needs of the Ukrainian regulation now or in the future, the implementation should opt for making allowances for these different needs by using standard-compliant methods, i.e. by not populating optional fields or by providing static values to mandatory fields. These methods are backward-compatible to existing modules and interfaces serving TRs in Western Europe.

Without wanting to make a recommendation on make vs. buy, the difficulties in rolling out a system with most market participants being quite small, while keeping data quality high are apparent. It would therefore be premature to settle on a sophisticated system for data analysis if one does not know yet how this collection will progress and what the real issues in data quality are. A fisherman should first take a look at the lake and get a feel for the fish within before selecting the right fishing gear.

REC-6	The Ukrainian TR should focus on data collection and data quality in a first phase, without committing to a system for sophisticated data analysis, let alone automated market surveillance. That should come later, once the data collection and data quality is in hand.

Collection and storage of data related to energy (power and gas) is outside the scope of Law No. 738-IX. At the same time, power trading and settlement is one of the more active markets in Ukraine, and natural gas is a prime focus of the EU integration. If the financial markets TR are a first mover compared to the collection of trading data on the energy markets, the system and service provisions of the TR could be designed in a way so as to avoid additional cost and effort by market participants if reporting is extended to energy. This

would extend the concept of one Ukrainian TR from REC-3 to energy. Building and operating the TR will still be a fixed cost issue and not profitably. Why carry these fixed costs twice, either to the detriment of Ukrainian tax payers or by overburdening the market with fees?

If the TR were to cater for the financial and energy markets, and intra-agency cooperation model could be chosen. When REMIT came into force in Germany, the following solution was found: Traditionally, the German office of markets and competition ("Bundeskartellamt") had the regulatory oversight over pricing and market behavior of energy firms, while the office of energy regulation ("Bundesnetzagentur") had the oversight for transmission systems. REMIT touched upon both, so a common organization ("Markttransparenzstelle") was set up within the Bundesnetzagentur, but staffed by experts from both entities and directed by a joint steering group staffed by the heads of Bundeskartellamt and Bundesnetzagentur both.

REC-7	Design the Ukrainian TR in such a way that it can be used by multiple agencies (user rights, security), and that commodities and deal types could be extended to cover energy, provided the necessary cooperation between regulatory agencies in financial markets and energy exists.
	Combining forces and seeking synergies between financial and energy markets should not be limited to IT systems: If this approach is chosen, joint direction and organizational underpinnings should be developed as well. The nucleus could be formed by a temporary sub-entity within NSSMC, which in time would have joint oversight by the appropriate regulators from both the financial and energy markets. Once volumes grow and the actual collection of trade records from the energy markets commences, this sub-entity could be spun out to have its own legal form as a state entity responsible for data collection from both markets, just like ACER does for all EU countries.

Even though existing formats and technical methods to connect to TRs should be reused verbatim and without (mandatory) changes per REC-5, the same reasoning does not necessarily imply to the timing of reporting. In Western European regulation, this requirement is typically T+1, with T+30 for some special cases.

The cost and risks of building and maintaining a standard-compliant interface are driven by the complexity of the data structure, the need to populate data fields from data not in hand or not being easily available, and by the technical hurdles of conforming to a prescribed data channel. Whether such data structures are then filled on a daily, weekly or monthly basis does not materially change the effort, as long as there is no need to change staffing, e.g. by the need for night shifts or back-up staff in case specialists are on vacation or sick leave. Other than that, having a frequency and timing of reporting different than Western Europe would not require substantial modification of tools and interfaces.

In the case of automatic interfaces, there are no real savings to be had by using an interface less frequently. For manual interfaces, a case can be made for decreased effort and lower risk of non-sending by having less frequent timing of reporting. The cost for having somebody in-house who know what they are doing on a daily basis are higher than for weekly reporting, due to the need for back-ups in short absences and because slotting a task into each busy day incurs more overhead than doing so on a weekly or monthly basis.

REC-8	The Ukrainian TR can and should adapt the timing of reporting to the needs and resources of the Ukrainian market. This adaptation should balance the cost of compliance at participants against the need for high quality data and the question whether having such data in the hands of the regulator is actually time-critical. As a result, the timing requirements may differ from those requirements in Western Europe. The starting point for automatic channels of transmission should be the same timing as in Western Europe: T+1. In the case of manually operated interfaces (web forms or file XML upload), consideration should be given to lowering these requirements to W+1, with a reminder function in case manual reports are not submitted close to the deadline.

BACKGROUND

With the passage of Law No. 738-IX, Ukraine's financial regulators will place increased importance on information disclosure and enhanced reporting standards. The main aims of this undertaking are increased transparency and integrity in the securities market. Following the G20's reactions to the 2008 financial crisis, the importance of reporting in developing the capital markets was envisaged in corresponding EU legislation (EMIR and MiFID-II).

The NSSMC, as the securities market regulator in Ukraine, collects, analyses and discloses financial market information. At the same time, the current reporting requirements are not tailored well enough for different segments of the market. Currently different market participants report different sets of information. Transaction reporting is absent for certain transactions (e.g., OTC derivatives, commodities) or insufficient.

To remedy the existing situation, the NSSMC intends to implement relevant EU regulations that introduce extensive reporting requirements (MMSR, EMIR, MIFIR, SFTR, CSDR) and introduce a trade repository. Based on the Law No. 738-IX:

- The trade repository will ensure the centralized collection of information on derivatives (both OTC and those executed on the organized markets)

- The trade repository will assign UPI and UTI codes

- Legally speaking, there can be several trade repositories.

The specific list of information that should be submitted to the trade repository will be defined in secondary legislation.

In addition, the NSSMC plans that the trade repository will collect information on transactions with securities and other relevant transaction and asset classes as envisaged in the Assessment and Improvement of the NSSMC Reporting Standards and Systems, prepared by SWIFT. NSSMC envisages to adopt ISO 20022 in order to ensure full compatibility and consistency of data gathering.

Introducing the trade repository into the Ukrainian financial market infrastructure is a significant step towards increased market transparency for capital and commodity markets. It aims to ensure efficient functioning of the market and to mitigate risks to investors. With the help of foreign donors, the NSSMC plans to procure the software necessary for the trade repository. The USAID Financial Sector Transformation (FST) Project supports this initiative of the NSSMC and has contracted PONTON as consultants to develop technical and functional requirements for the proposed trade repository in Ukraine in line with EU requirements. The resulting specifications should be used for the possible procurement of the TR software and services in the future.

PROJECT DESCRIPTION

After initial discussions from January 2020 on, the project was tendered on 28 February 2020. After vendor Q&A and clarifications, PONTON submitted their bid on 7 April 2020, within the (extended) deadline. The project was awarded to PONTON on 15 April 2020, with the contract being closed subsequently.

Project Approach

The project approach was agreed as follows:

1. Analyze international best practices with regard to technical and functional requirements of trade repositories. This should include:

   a) Analyze the EU legislation with regard to trade repositories [and transaction reporting]

   b) Analyze the practice of successful introduction of trade repositories into financial market infrastructure (at least 3 countries), focus on applicable lessons learned

2. Prepare a report with a description of proposed technical and functional requirements for the operational system of the trade repository in Ukraine. This includes:

   a) Meetings with the relevant stakeholders (e.g., the NSSMC, exchanges) to discuss issues in implementing a Trade Repository in the Ukrainian market, including identifying customization requirements (if any) compared to a European benchmark solution.

   b) Analyze provisions of Ukrainian laws, secondary legislation and draft laws with regard to trade repository [and transaction reporting]. An excerpt of the draft for Law No. 738-IX was provided by DAI in translation.

   c) Prepare a first draft of the report and discuss it with the FST Project, the NSSMC and other stakeholders

3. Update the report based on the comments and feedback received

Interview Technique

Interviews were held with senior and top management of stakeholders from Ukraine, and with senior and IT management of TRs in Western Europe. Ukrainian stakeholder interviews were ably scheduled by our colleagues at DAI, the Western European interviews by PONTON.

Participants agreed to these interviews on the basis of not being quoted personally. Consequently, no individual will be named here. Further, no confidential information was to be shared. To foster frank discussion of lessons learned, all interviews were performed verbally with no recordings taken. Interviewees received a project summary and key questions prior to the interviews (Attachment), but no interviewee had to fill out a questionnaire or commit their own observations to writing. Most interviews did not cover all key questions, by focusing on the most salient aspects or controversial points. This was intentional.

In taking notes and not recording the interviews, only an abridged view of the most salient points emerges. With all these reservations in mind, we would be happy to discuss individual points, and back them up with more detailed notes, which could be corroborated by follow-up interviews if requested. In addition, all interviews with Ukrainian stakeholders were performed with one colleague from DAI present (mostly Anton Shevchenko), who also translated if needed.

Due to the COVID-19 pandemic, travel between Germany and Ukraine was not permitted or not practical for the runtime of the project due to mandatory quarantine periods following a hypothetical trip. The same restrictions applied to the locations of Western European TRs in Switzerland, Slovenia, Luxemburg and the UK. Therefore, all interviews and meetings were held remotely as video conferences.

The bulk of the interviews were conducted in June and July of 2020, with a few follow-up interviews held in late August into the first week of September 2020. Generally, availability and interest in cooperating was high, partly due to higher availability with everybody working from home due to the COVID-19 pandemic, but also (in the case of Western Europe) due to a 10+ years working relationship with PONTON in this field.

Interview Partners

Management and key personnel from the following companies and organizations in Ukraine was interviewed at least once, usually for a duration of 90 minutes:

- NSSMC, Ukraine
- NEURC, Ukraine
- Mercados, Ukraine and Spain
- Ukrainian Exchange (UX), Ukraine
- Settlement Centre (SC), Ukraine
- National depository of Ukraine (CSD), Ukraine
- Dragon Capital, Ukraine
- Citigroup, Ukraine
- Market Operator (REE), Ukraine

Management and IT specialists from the following companies and organizations in Western Europe were interviewed at least once, usually for a duration of 90 minutes:

- REGIS-TR, Luxemburg
- ACER, Slovenia
- UnaVista, UK
- Equias RRM, Netherlands
- CME TR, UK
- National Regulatory Agency (NRA), Non-EU country closely integrated with EU

Progress and feedback were discussed with project sponsor DAI at least on a weekly basis.

INTERNATIONAL BEST PRACTICES

Interviews and/or information gathering was performed with representatives of six TRs (or similar) in Western Europe. Three of these organizations are TRs in the financial markets under EMIR and MiFID-II, namely REGIS-TR, UnaVista and CME TR. Both ACER and the Non-EU NRA are Regulatory Authorities for energy in the EU and a Non-EU country respectively. As such, both collect transaction reports and store them for a minimum duration of 10 years, just like TRs in the financial markets. For the purpose of this report, they provide a useful alternative approach to reporting set-ups with a multiple TR. Equias RRM is not a TR in any sense, but acts as a data gathering and dissemination platform for both financial and energy markets, being connected to both ACER and the NRA repositories as well as to three financial TRs (DTCC, Regis-TR, UnaVista), thus allowing like for like comparison in terms of SLAs and data quality.

Differences between TRs in Western Europe

No two of the six organizations included in this survey are alike in every major way. Therefore, it is difficult to draw conclusions with high statistical validity. Nonetheless, lessons do emerge, which are captured in the key findings below.

Major differences between the TRs / organizations arise from circumstances beyond the control of any one TR, but also from early design decisions. Circumstances outside of a TR project design are:

- Scope, i.e. whether a TR should support EMIR and MiFID-II, or also REMIT

- Multi-TR or One-TR, i.e. whether the legislation foresees multiple TRs and this also happens in practice due to market volumes and competitive forces, or whether just one TR covers a certain legislation and/or region

- Tie-in, whether a TR is tied to a particular financial exchange and bound to offer reporting services for market participants there

- Licensing as a major concern, whether a TR needs to undertake costly and complex licensing, or whether by conjunction with being the TR function of a Regulatory Authority this is a tractable task

- Timing, the time allowed between the point in time that the requirements are fully known (i.e. list of data fields, storage requirements, access policies) and the time data reporting by legislation kicks in

Major differences arise from the following decisions of a TR project:

- Greenfield vs. bolt-on, whether the TR system is designed from scratch, or as an extension / migration of a system already in existence

- Software development bought from outside vs. developed in-house

- Standard software used for major functional parts vs. no standard software, e.g. market surveillance, but not counting common building blocks like databases and the like

- Data first, whether the initial focus was on data gathering and storage only vs. whether market surveillance was a project goal from the start

- Software operations bought from outside vs. software developed in-house

- Funding, i.e. as a profit center, with prices set in a somewhat competitive way, or at cost, using admin budgeting and fee setting

Key Findings from TRs in Western Europe

The key findings from the survey of six TRs / NRAs / RRMs are as follows:

- Running a TR as a competitive business in a multi-TR environment only works with a strong tie-in to an exchange with sufficient volume.

- Data quality in a multi-TR environment is mediocre at best, unfit for analysis at worst, when seen across all TRs supporting a given legislation

- Having a greenfield TR is much preferable to a bolt-on system.

- Archiving is not worth the effort; it is cheaper to keep all data – major new requirements and technology changes will come before data overwhelms the system. Plan for 15-year max retention

- Keeping the interfaces towards the market participants constant, or at least backward compatible is key to data quality and client retention / 3rd party support

- Core implementation team for an in-house build need not be large, i.e. multi-functional team consisting of 1 PO; 2-3 developers, 1 QA, + infrastructure people, in addition client facing on-boarding team with service

- Size of the implementation team doubles when taking into account legal, compliance, regulatory and public relations necessary to achieve TR licensing

- Runtimes are hard to compare due to scope and timing of clarity / secondary legislation, but best-case (shortest) scenarios are run-times of 8 months for a greenfield EMIR TR build, with the development team being on hand and active for an additional 6 months after go-live

- Start with data collection and storage, stay as close as possible to existing EMIR and SFTR formats

- Testing with market participants is key, but there needs to be a triage in place between deep testing with select (2-3) market participants who know what they are doing, and the bulk of the market, who only tie up the development team

- Tracked functional design and the ability to withstand an audit need to be built into the development process from the start, i.e. using versioned systems like Confluence and JIRA

- Whatever TRs do, regulated firms view reporting as a tax. Providing data back to the market may be useful to demonstrate capability though.

- Market surveillance can and should be postponed to avoid early commitment to the wrong system and vendor lock-in, but when it is introduced it also acts as data quality check

- Collecting orders should be left to the exchanges – focus on transactions. Market surveillance does need orders, but the order schemes cannot be compared between different auction models, closing times, etc.

- Complexity of multi-tier contracts is not worth collecting – focus on transactions / executions

- Registration and ownership data are key, but quickly outdated after initial registration

Approach to Reporting

The approach to registration and regulatory reporting of fundamental and transaction data instituted and observed in Western Europe can be split into three main areas:

1. Decisions taken by the legislator or authorized public agencies, be it in the form of primary legislation, secondary legislation, directives or case law;

2. Decisions taken by the TR operator itself as far as they concern the outside world in the course of regulatory reporting, i.e. market participants under reporting obligations, authorized persons accessing the information, and the public;

3. Decisions taken by the TR operator itself as far as they concern only the TR, its operations and technology.

In considering these different aspects, we focus on aspects which worked well (or the opposite of worth noting) in Western Europe when introducing EMIR, REMIT, MiFID-II and the equivalent regimes in Non-EU countries. A differentiation between measures in primary or secondary legislation seems less useful, as this would not directly translate into the Ukrainian legal framework.

LESSONS LEARNED FROM LEGAL OBLIGATIONS AND DECISIONS

- A core part of any regulatory reporting obligation is the definition of inclusion and exclusion criteria of WHO needs to report. Usually, such definitions of "market participants" or "counterparty" hinge upon participation in trading of certain instruments or on certain venues (cf. REMIT Article 2 (7) or cf. EMIR Article 2 (9)), or they use preexisting licensing schemes in financial markets (cf. EMIR Article 2 (8)).

- Both approaches of using pre-existing licensing and trading on venue work well, as these are clear criteria easily understood by market participants and new entrants alike. The adherence can be checked against registration lists of NRAs and registers of traders on venues.

- In comparison, the inclusion of trading outside of venues is more difficult. On the one hand, legislators want to avoid regulatory arbitrage which may result in having fewer obligations on OTC trading. In markets where OTC trading is significant or even dominant, a clear picture of market transparency cannot emerge without OTC data. However, OTC markets are by definition less organized and more dispersed. Thus, smaller participants may not be aware that they are engaging in regulated activities.

- In the absence of a CCP, the data sets to be gained by reporting will be less uniform. This is a problem insofar as the best way of checking OTC trade reports is by comparing it with the corresponding report of the counterparty to the trade. If the data quality of OTC reporting makes even finding the counterparty (C.P.) report difficult, the existence or absence of a report cannot be easily determined, let alone the content of the report checked.

- Reporting of OTC transactions in Western Europe works well only for larger, professional counterparties or in cases where the majority of the deal flow is already captured by professional brokers. (As is the case for wholesale energy trading in Western Europe.)

- Correspondingly, we suggest applying cost benefit calculations to collecting OTC trading: Even disregarding the cost of market participants themselves, if the data collected is so patchy in coverage and uneven in content, there may not be a resulting increase in transparency.

- If a decision is taken to phase in reporting requirements later for certain smaller segments of OTC traders, the criterion should be easily understood and cheap to calculate. If a de minimis rule applied to market participants requires constant calculations of trading thresholds, this is not the case. Better to apply such rules using economic indicators already in existence, checked by independent professionals (auditors) and published, e.g. revenues or balance sheet size form annual reports.

- Once market participants fall under a registration obligation, they need to register with the competent authority. This is the case across reporting regimes in Western Europe, with the only difference being where such registration takes place – for financial markets at a Local Operating Unit (LOU) for gaining a Legal Entity Identifier code (LEI), and then at one or more Trade Repositories for reporting, or for energy at the competent NRA for gaining an ACER code, and then at one or more Registered Reporting Mechanisms (RRM) for reporting.

- At the moment of first registration, these systems work reasonably well, though certain improvements could be made in applying the concepts to Ukraine. Insofar as the registration is published (i.e. CEREMP of ACER and via various LEI aggregation services), this system also allows checking of counterparty information, or in general allows CCP, ARMs, RRMs and other providers of services cross-checking and validation.

- Over time, the quality of registration data tends to degrade unless countermeasures are taken. This degradation is due to registration codes being used even though they have expired, to mergers and acquisitions not being adequately reflected in registration codes, to group structures not being represented well (e.g. reporting under one group LEI, counterparties use LEI of daughter companies), and to additional data being of questionable quality. Thus, the additional columns in CEREMP (ACER) contain many Banking Identifier Codes (BIC) which are not the codes of banks reporting energy trades, but the codes of banks being used by energy traders. Likewise, the validity date for the LEIs captured in CEREMP is never updated.

- Market participants usually maintain a number of business identifiers, e.g. commercial register number, national tax identification number, European VAT number, LEI and (if active in energy) ACER code. For non-EU countries, additional entity codes for financial markets may exist. These codes may

all be valid, but the relations between them are very hard to maintain. This presents significant problems when new requirements are introduced, or when the status of a country changes, i.e. through accession to the EU or in the reverse process (Brexit).

- The recommendation from the experience with reporting codes in Western Europe is clear: Stick with the LEI system for financial markets. For energy, a code specific to Ukraine could be instituted, which would already have the same format as ACER codes. Both systems would be compatible to reporting in Western Europe.

- In addition, the focus in coding should be less about gathering master data (static data about market participants already captured elsewhere), but on maintaining links of high integrity to other code registration systems

- To improve data quality, any coding system should be versioned, with the older versions (snapshots) being available to the public.

- Another core part of any regulatory reporting obligation is defining which instruments and trade type need to be reported. This are is mostly driven by primary legislation, and therefore less malleable in implementation. In addition, this is another area where legislators want to avoid regulatory arbitrage. Regulatory arbitrage is a practice whereby market participants exploit loopholes in regulations including reporting and enforcement in order to circumvent obligations or restrictions they perceive as unfavorable to their business practices. To accomplish this, a variety of tactics can be used, including the restructuring of transactions, financial engineering to slot the same volume into smaller transactions beneath regulatory thresholds, inventing newly named financial products, which are nothing but existing products in disguise up to geographic relocation to jurisdictions more amenable. Thus, primary legislation tends to use broad language here.

- Even though this offers some room for interpretation it should be noted that most problems again do arise in OTC markets – if a product is traded on venue, it is typically a regulated product and needs to be reported. The efforts to come up with product registries across venues have largely been unsuccessful, so the question of OTC products being essentially the same as products traded on venue is not easy to answer in some instances.

- De minimis rules apply certain thresholds to reporting, exempting market participants if they fall beneath a certain size. These rules tend to be more easily applied if they add a certain qualitative element, i.e. trading on own behalf or buying energy for final consumption. Otherwise, the effort to calculate the thresholds may be higher than the effort for occasional (delegated) reporting. Another argument against "de minimis" is the difficulty it creates in checking both sides of a counterparty trade without prior knowledge that one of the parties falls under "de minimis".

- Some reporting regulations impose a legal obligation to provide delegated reporting on venues. This has proven to be a success in proactive, as it provides for more streamlined operation venue – TR and professional responses to requests to fix data quality issues. We do recommend such an approach for the Ukrainian TR.

- It then remains to be determined whether the legal obligation to report is with the market participant or the venue. Generally, this legal obligation remains with the market participant, who is obliged to check the veracity of reporting from time to time. Such an obligation to offer delegated reporting therefore needs to be rounded out by an obligation to provide access to the reported data, so that the MP has a realistic chance to provide for spot checks.

LESSONS LEARNED FROM TR DECISIONS TOWARDS THE OUTSIDE WORLD

- In a competitive market for TRs, theoretically TRs have a choice in setting the scope of reporting – either limiting themselves to certain laws (EMIR and MiFID, but not FinfraG) or asset classes (equity and swaps, but not FX). In practice, such limitation rarely works, as the biggest clients of TR tend to choose TR on the basis of them catering for all reporting needs. As profitability mainly derives from catering for the home base trading venue, and not losing the biggest accounts there, a pick and choose approach does not work. The only place where TRs in Western Europe have opted in or out is the support for Non-EU legislation such as the Swiss market.

- This competitive framework, coupled with very high fixed cost and comparatively small variable cost leads to a winner takes all market. By September, all but three of the cross-EU TRs have left the market, with only Regis-TR, UnaVista and DTCC remaining as full-service offering. Given the size of the Ukrainian financial market, which is orders of magnitude smaller than Western Europe, it is hard to discern how a purely competitive, multi-TR model would work for Ukraine

- We have already mentioned the advantages of delegated reporting ("reporting on behalf of"), which should be a mandatory offering in the case of regulated venues. In addition, any TR should also support delegated reporting from other sources, be it counterparties or service providers, as any concentration of reporting volumes in more capable hands is a net win for efficiency and data quality. This support of delegated reporting from the outside in is fairly complex, as there is a separation between reporter, reportee and counterparties to the trade, so this needs to be clearly asset out in TR system design and functional specification.

- In the beginning of EMIR, some TR would allow for double-sided reporting, i.e. the submission of one trade file covering both sides off the trade. While attractive from a reporter perspective at first, this leads to higher downstream complexity, especially in reconciliation. REMIT on the other hand only allows one-sided reporting, so even a reporter reporting both sides of the same deal would have to send in to separate ACER files. This approach does not add much burden on reporters of both sides, who only have to copy the first file and swap the reportee roles, but it does streamline TR operations and reconciliation considerably. The Ukrainian TR should follow ACER's example, and only allow one-sided reporting.

- There have been different approaches to the on-set of reporting, namely with a phase-in by trade type. REMIT had a half year later start for reporting of complex contracts, and EMIR delayed the reporting of trades conducted prior to the reporting start by three months. (Back loading) Neither approach is particularly helpful for most market participants, as work on operations, systems and

interfaces is merely drawn out. Phase in models with a real impact on the market would apply to whole classes of market participants.

- If phase-in is considered, we recommend a model by which reporting starts for trades conducted on venue, with obligatory delegation. Later, reporting could be added for OTC trades, but would apply only to Financial Counterparties and to No-Financial Counterparties trading on behalf of third parties. In both cases, offering delegated reporting would be mandatory.

- We recommend against incorporating any backloading of data prior to the start of reporting obligations. The value of this outdated trade data is limited to begin with, and its quality never gets improved. In addition, the amounts of data put stress on the launch of reporting at the TR and CP side. It is better to start with a clean slate.

- In general, most reporting regimes impose a T+1 model on the timeliness of reporting, where T is the trading day of the reportable instrument. Some exceptions exist, i.e. complex contract or fundamental data where T+30 issued. This model has proven itself to be a good balance between timeliness and effort. Closing of market processes exist at venues anyways, so this is yet another step. The Ukrainian TR should follow this model. Keep it simple, T+1, and make sure that the clock is not running on Non-trading days. A trade conducted on a Friday would need to be reported on a Monday.

- Extending the above recommendation further, we have yet to find any market participants in Ukraine who keep staff on trading desks or back office systems overnight. Thus, any reporting, checking or reconciliation should be done during normal office hours, and not on weekends or public holidays. To impose or imply other timelines would add significant burden on market participants, in the worst case doubling or even tripling their expenditures on compliance and IT staff in certain key areas.

- There are only two places where the completeness of reporting for an individual market participant can be ascertained: Either at the market participant itself (source), or at the TR, but only in case there is only one TR. If there are a multitude of TRs, the reconciliation problems between them prohibit forming a complete picture of reporting, at least on an ongoing basis. In extraordinary cases, information from multiple TRs can be puzzled together for an investigation, but that is a level of effort not suitable for monitoring of compliance across the market.

- If the completeness of reporting for an individual market participant needs to be ascertained at the market participant itself (source), then this is best accomplished by having independent auditors check the trading portfolio and/or balance sheet against regulatory reports made and acknowledged. Without incurring undue cost or overtaxing the NRA, this can be achieved by inserting the compliance against the particular regulation into the regular year end activities of auditors, to be stated in their audit reports. Such an approach has been chosen in some EU member countries' national implementing legislation, e.g. in Germany via Wertpapierhandelsgesetz (WpHG), Articles 31 and 32.

- If the completeness of reporting for an individual market participant needs to be ascertained at the unitary TR, then this is best accomplished by a) doing a counterparty check and/or a CCP check, which assumes that coding problems are in hand, and b) by performing check sums of positions against

reported volumes. Needless to say, if certain transactions are questionable to begin with or form the content of a whistleblower report, then spot checks are in order as well.

- For OTC trading, there is only one place where the accuracy of reporting for an individual market participant can be ascertained with a reasonable amount of effort: At the market participant itself (source). Again, this is best accomplished by having independent auditors check the trading portfolio and/or balance sheet against regulatory reports made and acknowledged. For trading on venues, a comparison with venue reports could be made.

LESSONS LEARNED FROM INTERNAL TR DECISIONS

- Some of the TRs in Western Europe never faced a make or buy decision, because they did not have in-house capabilities to build such complex systems. This is largely true for regulatory agencies, so their approach to procuring the necessary systems for a TR came down to three decisions:

  o Whether to break up the TR system and procurement into parts (modules), and have them built or tendered separately, or whether to treat the whole system as one and consequently only choose one major vendor,

  o whether to use standard (pre-existing) software vs. custom-built software, and

  o whether the completion and budget risk for custom-built software and other services would be shouldered by the vendor, which in turn would require very detailed specifications up front (waterfall model), or whether there would be some risk sharing up to the point of buying services on a times & material basis, with the opportunity to approach the development on an agile basis

- Pre-existing TRs were typically tied to trading venues or clearing houses with considerable in-house software development capabilities, so they faced the additional decision whether to take part of the development outside or not (make or buy)

- Almost all development for TR in Western Europe between 2010 and 2017, be it for financial or energy markets, was performed under tremendous time pressure. This time pressure stemmed from:

  o Short lead time between the final publication of reporting requirements (directives, Q&A, binding guidance by regulators) and the deadline for reporting by market participants. In some instances, the reporting deadline had already been set while key parts of the (technical) reporting requirements were still missing.

  o Competition between TR (and RRM, and ARM) racing each other in announcing their readiness for reporting and achieving the seal of approval by the relevant NRA (or ESMA or ACER, as the case may be.)

  o Further reduction of lead time by the necessity of market participants in preparing their interfaces and testing against the test bed of TRs.

- These time pressures and short windows for designing, building and testing the new TRs led to projects of significant size (up to 20 project members) being squeezed into timeframes certainly shorter than a year, if not 6-8 months.

- Teams under such pressure do not always rise to the occasion, often preexisting patterns or modules are reused, even if the fit with requirements is not good – all to reduce delivery risk. With some TRs, this led to a fracturing of the internal architecture, either because the initial approach was not fit for the whole task, but there was not time for reworking, or because parts did exist for some asset classes, but not for others.

- Functional IT requirements for reporting were almost in all cases taken from the legislation (field lists, duration of record keeping), plus some rough and ready estimates on reporting volume by looking at the well-known volumes of "captive" venues. Detailed specifications typically only evolved in the course of the projects.

- Non-functional requirements were usually taken from other projects developed in-house with similar levels of confidentiality and SLAs. Where such pre-existing requirements did not exist (as in the case of NRAs or ACER), these were drafted in pre-tender consultations

System design of TRs

With all the different requirements (scope) and starting points in mind (most important: pre-existing architecture / in-house development or not) in mind, generalizing over the different TRs is not useful. Instead, we consider the following architecture as best-of-breed, based on the feedback of the TR / NRA interviewed.
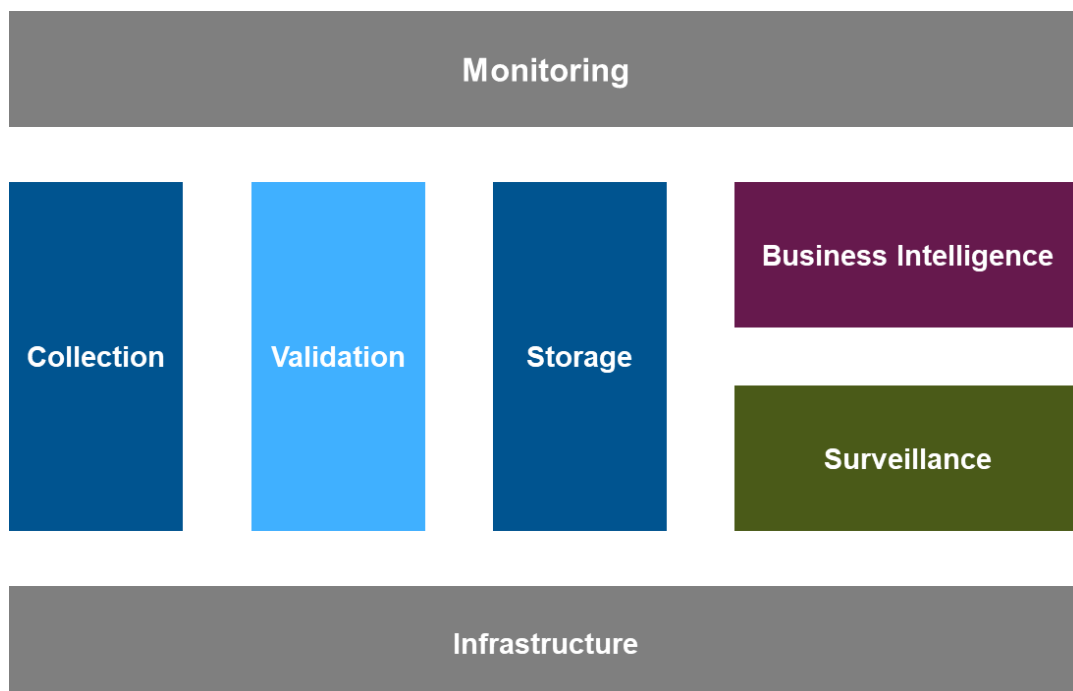
- Clean separation in modules:

  o *Data collection* from venues and market participants, including the system-to-system transmission channels like sftp, AS4, web front-ends and APIs, first level validity checks (e.g. against XSD files), authentication of senders, securing the transmission (e.g. electronic certificates), versioning of interfaces, this also includes feedback mechanism like the generation and transmission of technical acknowledgements, and the transmission of business acknowledgements generated from other modules inside the application. The Data Collection module should be able to run independent of further data processing by subsequent modules, such that downtime is minimized, avoiding a requirement for playback of data submissions by MPs which is burdensome and leads to excess load once the doors are open for submission again. Data collection also includes a web front-end, if available.

  o *Data validation and cleaning*, second level validity checks against business rules not encoded in e.g. XSD schemas, validation against codes and permission levels (e.g. valid LEI codes, valid relations for reporting on behalf of), mapping of different reporting formats or versions (where necessary for backward compatibility), code mapping and enrichment. In principle, any actions being performed during data validation and cleaning must be automatic, as human intervention does not scale in this area. There is a feedback loop between data problems, noise and wrong coding being discovered using BI tools and then applied to have fixes or stronger business rules for rejection in the Data validation and cleaning stage

  o *Data storage*, including extraction of key fields for storage in relational databases, storage of files as reported (for audit purposes) and as cleaned / enriched, automatic tagging with master data and audit trail, moving into longer term storage, purging. These steps are independent of the decision on how files and key data are to be stored and archived, i.e. by using a relational database and Binary Large Objects (BLOBs), or by combining relational database with flat file storage (Data Lake)

  o *Business Intelligence (BI)* tools for analysis and reporting, working primarily with extracted information and audit information, allowing the regular preparation of reports based on this data and the preparation of ad-hoc reports based on inputs outside the system. While the other modules before (Data collection, validation and storage) work largely automatically and without human intervention, this module is mostly used interactively by users in the TR or NRA or in other privileged function. The only exception are automatically generated reports. If there is (public) dissemination of reports or other data generated from regulatory data, these reports would be generated in this module as well.

  o *Market surveillance system*, an automatic system for automatically searching for pre-set abuse patterns, applying parameters and thresholds set to reduce the number of false positives while being sensitive to suspicious activity. Needs to be calibrated separately for different markets and asset classes. High-end tools for market surveillance typically contain some BI capability. Almost all standard software packages for market surveillance include workflow capability,

allowing the tracking of suspicious cases, escalation and providing an audit trail for the supervision function.

- o *Monitoring*, includes the monitoring of all relevant system functions and logs across modules, proactive alerting of incidents, and load and performance statistics. This is a technical function, not a monitoring of the markets operating properly.

- o *Infrastructure*, including access model, security and logging, back-ups, fail-over, business continuity, ticket and logging system and other infrastructure. Infrastructure certainly includes the provision of (virtual) servers and network connectivity. Whether databases are part of infrastructure or storage is a matter of design. However, most other components require access to database storage as well, so it makes sense to consolidate this function in one module at least for those other modules.

- Defining clean interfaces and areas of responsibilities between modules has a number of advantages:

  - o Allows for getting standard software for some modules, while getting custom-built or homegrown software for other modules, thus allowing a more nuanced make-or-buy decision

  - o Buffering between modules minimizes downtime in the event that one module needs to be upgraded or is down due to a technical incident

  - o Best-of-breed: Just because a particular market surveillance system is good does not make it the best solution for BI or data collection

  - o Even if all modules are to be procured form vendors, having separate modules decreases risk – not all eggs in one basket

  - o Some modules can be introduced later than others, allowing lessons learned to be applied. I.e. start with data collection, minimal data validation and storage, follow up by strong data validation and BI tools, and introduce market surveillance as a third step

- There are some drawbacks to splitting modules and areas of responsibilities between teams and vendors as well, namely finger pointing if something goes wrong, and the "not invented here" spirit hindering spread of good ideas. Again, having upfront clear definitions of interfaces which are testable stand-alone helps.

- Relational databases vs file storage: Both technologies are required, databases for fast indexing and analysis, file storage for complete records of what was reported and to save space in the database so that performance does not suffer in the long run. Whether Binary Large Objects (BLOBs) in databases are use, or whether flat file storage (Data Lake) is preferred should be left to the implementation team or vendor. The choice should be driven by their skill levels and experience. The key for selecting the components is scalability.

- The amount of data to be collected and stored is hard to forecast because:

  - o Lack of visibility of trading volumes and patterns in OTC markets

  - o Changing trading patterns overall, e.g. with the rising prevalence of algorithmic trading

- - - Change of scope in regulation, bringing new asset classes or deal stages under reporting

   - Underestimation of order volumes compared to trading volumes, the latter being easier to size

   - Underestimation of volume of trade lifecycle events (modification, order cancellations), these lifecycle events also tend to go up with the rising prevalence of algo trading

   - Inability to forecast how long the current TR architecture will have to last

- Scalability: given the above certainty, the architecture and tool stack for collection, validation and storage needs to be designed so that it can easily scale up (and down), with variable cost rising in linear fashion at most. This can be achieved by parallel processes, virtualization and other approaches, which should be left to the implementation team or vendor. The key requirement is a proven capability to increase volume throughput (data collection per trading day) as well as volume kept (long time data storage) without suffering undue performance penalties or unreasonably high cost. The worst-case scenario would be a hard ceiling of data volumes, beyond which a complete architecture redesign would be necessary

- Storage vs archiving: Some TR architectures foresee a split between storage (short to medium term) and archiving (long term). This may apply to both relational databases and to file storage. If such a split is envisioned, there is typically a trade-off between accessibility and cost, with archived data being cheaper to keep but harder to access. Since it is hard to predict which searches will be expected in 10 years' time, treating index data differently from full data sets is seldom a good solution. By and large, with the decreasing cost of storage and increasing amount of fully scalable solutions, this split becomes rarer. More often, a total duration of keeping the data is set using the statute of limitation plus safety margins, after which data can be purged outright. Even so, such purging needs to be prepared in the data model and indexing, otherwise it will become too labor-intensive in the future.

- The most successful TRs in terms of staying within time and budget while achieving the functional goals were designed in a modular fashion (see above) and from the outside in. The latter approach applies to data formats, data volumes, submission channels, (internal) user rights and use cases. This way, the field list of regulatory data did not become something to be forced onto an already existing data model and architecture, but were the starting point. Obviously, this will only work if the data formats are already known in a detailed manner at the time of system design. Some TRs in Western Europe did not have that luxury, but others in neighboring Non-EU countries did, and made good use of it

- Copy & paste from existing regulatory regimes will bring benefits, but these benefits diminish quickly for each variation and national exemption applied. Switzerland provides a case study: While the goal was to achieve some form of equivalence to EU regulation in both the financial and energy markets, the legislation and regulatory bodies stook different approaches for each.

- The Swiss energy regulation law StromVV was amended in a very short and elegant way to make room for a national variation of REMIT for power (but not gas, as there was no existing legislation). A

mere three articles were added to the existing law (26a, 26b, 26c), obliging market participants with domicile in Switzerland, who are trading in wholesale electricity and are obliged to report information on this to ACER to <u>deliver the same information at the same time and in the same form</u> to ElCom. This way, the Swiss NRA ElCom had a right to the "carbon copy" of the information sent to ACER. This law exempts Intra-Switzerland trades, but since Switzerland is surrounded by the EU, the bulk of wholesale transactions involve EU counterparties, generation or consumption. The resulting effort for market participants was reasonably small, as they (or their venues) were already reporting this information to ACER. In addition, systems and experience for dealing with market surveillance based on the REMIT data formats was available, since the Swiss regulation came into force later than REMIT. This resulted in a reasonable smooth start of reporting and operations at comparatively low cost in-house by the Swiss NRA. Note that this law will not need to be updated if and when REMIT is changed, because the obligation to send the same information works regardless of changes.

- Financial markets are important to Switzerland (more important than wholesale energy trading), so the regulatory design was done grounds up. A wholly new law (FinfraG) was drafted in parliament, with the secondary legislation in tow (FinfraV). These sets of law mirrored EMIR to a large extent, introducing obligations for mandatory clearing for all standardized OTC derivative contracts, risk mitigation techniques for all non-centrally cleared OTC derivative contracts such as timely confirmation, portfolio reconciliation, dispute settlement process, portfolio compression and party identification by LEI.

- FinfraG also introduced mandatory regulatory reporting to TR for almost all derivative contracts, both OTC and exchange traded, but deviated from EMIR in a number of ways:

    o In addition to the EMIR categories Financial Counterparty (FCP), Non-Financial Counterparty (NFCP) and Small Non-Financial Counterparty (NFCP-), FinfraG introduced the category Small Financial Counterparty (FCP-), presumably to place a lighter regulatory burden on small private banks.

    o EMIR calls for two-sided reporting, so each reportable OTC transaction would be reported twice, by both sides to the trade. Some TRs allow single submissions for reporting on behalf of the counterparty, so two-sided reporting is achieved at a later step. FinfraG made one-sided reporting mandatory, so that each transaction would be reported by one party only, following the Dodd-Frank approach. Who that party would be depended on the seat of the counterparty (Swiss vs Non-Swiss), the category (FC before NFC, Large before Small) and ultimately Seller before Buyer if all other details were at the same level.

    o While the data to be reported was broadly the same, the details between EMIR and FinfraG differed: EMIR has two tables, one for counterparty data (Table 1, 26 data fields) and one for trade data (Table 2, 59 data fields). FinfraG in comparison has one common data table which contains 9 fields on the counterparty and 70 fields on the contract.

    o These seemingly small differences between EMIR and FinfraG placed a considerably effort on market participants already reporting under EMIR. Two- vs one-sided reporting obliges every

market participant to keep track of the domicile and reporting status of all of their counterparties. Existing systems and experience for dealing with EMIR data formats could not be reused. Some TRs and service providers started offering FinfraG reporting, only to withdraw their offering in light of the complexity. Ultimately, only two TRs were authorized in 2017 (Regis-TR as a foreign TR and SIX TR using UnaVista / LSEG technology and hosting as a native TR), with one more (DTCC) following 2019 (DTCC).

  o In 2018, the Swiss NRA for financial markets (FINMA) announced a 9-month delay of the reporting deadline for Non-Financial Counterparty (NFCP). In 2019, this deadline was shifted by another five years to 2024, effectively exempting NFCP from reporting. Investments already made by market participants into compliance with FinfraG had to be written off.

- All told, it is hard to call the introduction of financial regulation in Switzerland a success story – it came later than originally planned, placed higher burdens on market participants, and ended up exempting all Non-Financial Counterparty from reporting. This case study needs to be viewed in conjunction with the developments between Switzerland and the EU in light of the Brexit developments, so it is not a purely "technical" question. But the difficulty of implementing a reporting framework outside of regulated venues and regulated banks becomes apparent. Size matters. Even though the Swiss financial markets are very much larger than the Ukrainian markets, they are apparently not large enough to bear competitive TRs if the differences get too large.

- Market surveillance is not the original task of (commercial) TRs under EMIR and MiFID II. On the other hand, market surveillance is a primary concern for energy NRAs operating their own TRs. Accordingly, some TR operators opt to not introduce market surveillance at all, or they introduce it later than data collection. According to the feedback from TR operators, there are advantages to introducing active market surveillance later than data collection:

  o A market surveillance system can be chosen with the strengths and weaknesses of the data set collected already known, if the lead time is one or two years

  o In the meantime, using a simpler Business Intelligence tool and ad-hoc queries will already uncover some data anomalies, or even suspicious transactions, and lead to a better understanding of the peculiarities of the markets

  o The vast majority of alerts being generated by a market surveillance system are false positives, mainly due to errors in data collection, coding, master data and the like. These issues can and should be detected earlier in the chain, at the stage of data validation. Having a STOR report is a very expensive way of detecting issues with the data. Introducing market surveillance later means that the bigger (and fixable) problems with data are already sorted, i.e. time zone issues, missing business rules, versioning.

  o If a joint TR system is tendered as a whole, it is likely that the market surveillance piece will take precedence because of its cost and complexity. Yet vendors offering standard software for market surveillance are rarely specialists for data collection and storage, which should not

be treated as an afterthought. By introducing the market surveillance module later, a natural division of labor applies.

- There are disadvantages to introducing active market surveillance later than data collection as well:

  o Time delay in automated surveillance

  o The system in the absence of the market surveillance module could be designed and built such that later introduction of market surveillance is needlessly hard. Therefore, interfaces for market surveillance should be designed and tested in the first phase.

Building and operating a TR

As in the previous section, generalizing over the different TRs is difficult due to the different requirements and starting points in mind. Where possible, we give ranges or alternatives based on the feedback of the TR / NRA interviewed:

- The TR operators who had to outsource or tender the building of the whole TR usually went through a formal pre-design phase, typically using both outside consultants and inhouse IT specialist from suitable government offices. The goal of this phase was to arrive at a specification suitable for a tender document. Due to the timing issues between release of secondary regulation and designing this system, the pre-design phase usually started "too early", i.e. before many regulatory details had been set

- The TR operators who had already made up their mind about building the whole system themselves did not go through a formal pre-design phase to arrive at a specification suitable for a tender document, but they had a phase for gathering requirements nonetheless.

- In the above phase, team sizes were quite small, in the range of 1.5 to 3 FTEs, depending on whether specialist with knowledge across areas were available or not. The other main driver in this phase is the amount of coordination and sign-off from stakeholders – the more, the harder

- When building the TR function in-house, the team typically had three sub-teams:

  o Tech Team: The core implementation team measured e.g. a multi-functional team consisting of 1 product owner; 2-3 developers, 1 QA specialist, and additional infrastructure personnel, who took care of severs, network, security, databases, helpdesk infrastructure, build pipeline, automatic testing infrastructure. The technical team size could be about 6-8 FTE then.

  o Legal & Compliance team: The non-technical sub-team dealing with legal, compliance, regulatory and public relations necessary to achieve TR licensing was usually the largest. These persons would easily make up a team of 10 people, but some of them would not be fully applied to the TR project, so closer to 4-8 when measured in FTE. This team mostly winds down after launch, but is necessary from time to time for maintaining licensing or when functional changes are considered which have a regulatory impact

- o Market team: The third sub-team usually consisted of people dealing with the market and with users, including the commercial side, so marketing & PR, client engagement, legal (for TR user contracts), support. During the build phase, this team would mostly engage with pilot users, answer questions form prospective users, and try to build the user base for the launch. Over time, this team morphs into the main operations team. Again, most of these client facing functions already exist in an existing organization like a venue or TR, so most senior experts would spend only a portion of their time on the TR launch. The helpdesk function was more usually full-time. Overall, this team could be 6 to 8 people, but closer to 3-6 when measured in FTE

- Whether a TR operator had the luxury to approach the TR build in distinct phases depended on the timeframe available between project start and launch of reporting. As these timeframes were generally very short, some of the phases had to overlap. Apart from that, it is hard to generalize across TR with or without a market surveillance module, and between in-house build and outsourced approach.

- For projects without a market surveillance module, a total run-time of 12 to 16 months between rough functional specification and launch seems necessary. If this time frame is shortened, the implementation team needs to be kept on hand for an additional time period until the system is bedded down. In other words, a shorter timeframe than 12 to 16 months is achievable only at the cost of launching a premature and faulty system, which then has to be fixed under live operating conditions.

- Having a market surveillance module in the build, the total run-time is typically longer by an additional 12 months. The market surveillance module might be operational before that, but it will give so many false alerts as to be unusable. If the data quality is not in reasonable shape by the beginning of the implementation of the market surveillance module, this timeframe is lengthened further still. In such cases, the market surveillance module acts as a very expensive data quality checker. In other words, introducing the market surveillance module in parallel to data collection and data validation modules does not offer time savings, when the real operational readiness and usefulness of the market surveillance module is considered.

- After launch and during operations, the team compositions typically changed:

- o Tech Team: After an initial hot fix period after the launch, the core tech team would typically disband. At any rate it is difficult to tether good tech people to operations, once the excitement of the launch has gone. The best that can be achieved is to involve the key architect in evolving needs and documentation, so that a project memory is maintained. The infrastructure personnel typically remained the same, but as these should be drawn from cross-project responsibilities, the actual time spent on the TR would go down. Thus, the technical team size during operations would go down to about 2-3 FTE.

- o Legal & Compliance team: For an inhouse build at an NRA, it is hard to differentiate between the support of the TR and the day-to-day business of enforcement against market participants. For commercial TR, the non-technical sub-team dealing with legal, compliance, regulatory and

public relations typically maintains their size in terms of people, but the dedication of time to the TR goes down, maybe to 2-4 when measured in FTE.

- o Market team: This sub-team tends to grow during operations, as it faces questions not just from pilot users, but from all users. Documentation, FAQs, brochures, how-to web videos – none of these were a priority during the hectic launch, and now need to be expanded and developed to drive down the effort in supporting users, and to convince potential TR users to join. In the case of just one TR (like ACER), convincing users to join is not the point, but with 15.000 companies across Europe as registered users, investments into self-service make eminent sense. Overall, this team could scale up to 10 or 20 people, depending on the market served.

- Data quality is hard to measure in totality, because it requires access to source systems and books at market participants. Because such access is costly, requires experts and legal foundation, only spot checks can be performed realistically. Checking reports of venues is easier, as they also report trading volumes and other key figures, which should be roughly identical to the totality of the line item trade reports form these venues.

- Even so, the distributed nature of TRs under EMIR and MiFID II in Western Europe makes for an ideal laboratory for data quality: If two counterparties report the same trade (or position), their reports should be identified as being two sides of one trade, and then be identical, save for the sender identity. Sadly, the TR system in Western Europe already fails the first test, even if both sides of the report are made to the same TR. This is partly because the UTI system of identifying trades has turned out to be less than optimal. Even if both sides report with the same UTI, the contents of the report are oftentimes out of synch. This is almost never due to malice, but to technical issues with encoding, master data and modelling of complex trades and lifecycle events.

- In its 2017 report on transfer of data between TR and intra-TR reconciliation (ESMA70-151-552), ESMA made a number of recommendations to solve these problems arising from multiple TRs, and from the withdrawal of TRs from the business. It is planned to implement some of these recommendations in the EMIR Refit.

- All TR operators – commercial or NRA - perform some pro-active monitoring of reporting obligations, either to have basic checks for market participants fulfilling their obligations for providing complete, accurate and timely submissions, if only to check their own systems.

- o Complete reporting is hard to check, see above on source systems. Even so, if large market participants or venues have predictable volumes with some fluctuations, a sudden drop might be cause for further investigation. Statistical measures such as these are relatively easy to set up with a proper BI tool in place. Investigating a single MP requires different tools though.

- o Accurate reporting is hardest of all to check. Even aligning all reports with counterparty or venue reports during a given timeframe requires manual labor. Ultimately, a look at the books of the MP in question is necessary. This dimension of reporting cannot be checked automatically with sufficient reliability. For NRAs in smaller markets, having officers who are

familiar with the business of the biggest market participants is feasible. In such cases, having a long institutional memory and little fluctuation is an asset to the NRA.

  o Timely reporting is the easiest to check: In theory, the difference between trading timestamp and report submission is all it takes. There are some issues around the correct determination of trading times, but in general this is the least problematic category once all systems are set-up. Where manual submissions are used, this point depends on the diligence and training of staff at market participants, so is more variable

- The practical value of Market Monitoring in terms of generating meaningful STORs is yet to be determined. Its main value might well be in other areas: As a whip to drive data quality, which also serves other purposes, and as a deterrent to market participants, who are left to wonder how powerful this tool really is. All NRAs operating TRs have introduced powerful Market Monitoring systems, as have one out of the three commercial TRs being interviewed.

- The key question on generating meaningful STORs is whether any of the abuse cases being published by the FCA, by ACER, or other regulatory agencies were actually triggered by automatic alerts from their Market Monitoring systems. We do not claim to have perfect knowledge here, most of these cases are shrouded in secrecy as far as their origins go. But anecdotally, most cases seem to be opened upon internal sources (whistle blowers), private sources (estranged spouses), routine checks in other areas of the business, or by venue operators (exchanges, brokers) raising the initial STOR.

- The high cost of introducing a Market Monitoring system does not wholly stem from license cost or external service providers. In the longer run, the internal cost of having to calibrate abuse pattern detection algorithms, and follow up on the multitude of alerts generated is the biggest cost driver.

- For the commercial TRs, the TR business has so far not been a commercial success. The exodus of CME and Abide in 2020 is proof that competition for reporting business tied to other exchanges is very hard, and that fixed cost is too high to maintain even a few viable TRs in Western Europe.

REQUIREMENTS FOR UKRAINIAN TR

Assumptions

The requirements for the Ukrainian TR are based on our recommendations as outlined in the summary of this report, and as they apply to the system design. Thus, the requirements follow the following assumptions:

1. Focus on semi-manual data collection through web forms, with the forms generating XML files to be processed downstream (REC-1)

2. Upload mechanisms for XML files to be generated and modified by market participants (REC-1)

3. Data collection through automatic system-to-system interfaces is not a priority (REC-1)

4. Focus on data validation through application of semantic checks and business rules as far out from the core TR as possibly (REC-2)

5. Unitary TR for the financial markets, no competition of TRs (REC-3)

6. Make aggregate and anonymized data available to all market participants (REC-4)

7. Copy existing data formats, data structures and channels for data collection from Western Europe verbatim wherever possible (REC-5)

8. Delay the introduction of automated market surveillance, do not commit to any specific system yet (REC-6)

9. TR needs to be used by multiple agencies, which impacts e.g. user rights, security and access channels (REC-7)

10. TR needs to accommodate multiple commodities and deal types beyond current scope of Capital Markets Reform act (REC-7)

11. TR needs to be designed to make use of synergies between regulatory agencies in financial markets and energy (REC-7)

In addition to the assumptions derived from our recommendations, we make use of the following assumptions from our interviews with Ukrainian stakeholders and general market information:

12. The financial markets in Ukraine have a lot of room to grow, both in terms of volume and in terms of level of automation and the professionalism attained by larger operations and staff. Therefore, focus is on designing a modular system which can grow, which can be adapted, and which can scale.

13. Since the volumes are so low in comparison to Western Europe, the only way to achieve a reasonably affordable reporting solution is to keep it simple.

14. Combining the need for change in the future with the constraints of cost, using local resources and ingenuity is key, combined with a leavening of some experience in Western Europe.

1. Register with TR – this does not include the registration of an LEI or Pseudo-ACER code, which need to be obtained from the relevant code registration authority

   a. Register as market participant, using manual interfaces only

   b. Register as market participant, using manual and system-to-system interfaces

   c. Register as venue, OTF, or system provider, using manual and/or system-to-system interfaces

2. Update registration record with TR

3. Terminate registration record with TR

4. Connect to TR – in the case of system-to-system interfaces, perform connectivity and resiliency checks for the subscribed interfaces and channels

5. Configure reporting account – this may include setting up authorized persons and requests for confirmation of Reporting-on-Behalf-of entities

6. Input and validation of master data – input of static data for the reporting organization, and if permissible for the organizations to be reported on behalf of

7. Perform simple data upload – perform basic upload of data based on a prescribed data set through the subscribed interfaces, but restricted to typical standard deal types and asset classes

8. Perform complex data upload – perform complex upload of data based on the full range of reporting data through the subscribed interfaces, including more exotic, rare or structured deal types or asset classes

9. Receive cancellation of data upload (technical cancellation)

10. Receive modification of data upload (business modification)

11. Validate data upload – technical validation (first level), authentication of sender, validation of content against XSD files and similar mechanisms for validation without taking recourse to external data sources

12. Validate data upload – business validation (second level) against business rules beyond simple XSD validation, validation against codes and permission levels (e.g. valid LEI codes, valid relations for reporting on behalf of). The confirmation of valid data upload in the second level is equivalent to a Data Receipt message, which has a timestamp and proves the timely receipt of the regulatory report.

13. Provide feedback to the uploader of data (first and second level), this feedback should cover both the first (technical) and second (business) level. In principle, feedback should be given immediately, or upon the first failure of validation. Feedback should always be via the same channel as the upload, so via a web interface if per web or via sftp if the data was uploaded via sftp. When the upload was performed manually (via web), feedback should be sent to an administrative e-mail address of the uploader in addition.

14. Perform simple data download – perform basic download of list of data receipts based on a prescribed data set through the subscribed interfaces, limited to trade and order UTIs with timestamps and counterparty identifiers and key deal characteristic in a machine-readable format sufficient for bulk reconciliation

15. Perform complex data download – perform complex download of reported data on a bulk basis to accommodate inter agency cooperation as described in Assumption 11. This data would need to be both in the extracted format, and in the original submission, and would allow for import and analysis in other systems

16. Keep the system available – the data collection module needs to be available 24 x 7 x 365, with planned downtime limited to such durations that internal buffering prevents loss of data already submitted. This includes automatic monitoring of all vital system components across all components, with automatic alert functions.

17. Store the validated data – store the reports for as long as the statute of limitation applies. Archiving is not a focus, but data should be bucketed by year of submission to allow for easy purging later

18. Make stored data available for BI tools – through sufficiently exposed interfaces and key data

19. Analyze data - prepare reports based on stored data either on an ad-hoc or regular basis using a BI tool.

20. Generate aggregate and anonymized reports and make them available to all market participants via web publication (static format like Excel or PDF is sufficient)

Input formats

In selecting suitable input formats and coding schemes, we try to follow the approach of the Swiss energy NRA, expressed in assumption 7 (Copy existing data formats and structures). We focus on the core format of trade reports and receipts in the following, that is to say XML files adhering to XSD schemata. This is the most prevalent technical means for a rich description of mandatory and optional fields, for repeating fields and sub-structures, and for the field content (semantic validity). As such, XML is the common denominator of regulatory reporting in Western Europe, both in financial and energy markets. Where other formats are supported (e.g. web entry, REST API, JSON), they should be mapped into the core format immediately to allow for a more efficient and uniform processing downstream. (See section "Input channels")

FORMAT OF TRADE REPORTS IN FINANCIAL MARKETS

When regulatory reporting was introduced in Western Europe with EMIR, trade reporting commenced after the requisite secondary legislation, RTS and licensing of TRs was in place. Reporting of OTC and ETD contracts to TRs started in February 2014, and collateral and valuation reporting in August 2014. At the time, there was no common and mandated technical description of the reporting format with all requisite detail. What was available were the Table 1 (Counterparty Data, 26 fields) and Table 2 (Common Data, 59 fields) in the annex of the Commission Implementing Regulation (EU) No 1247/2012 of 19 December 2012. These tables had three

to four columns, with an entry number, field name, format and in the case of table 2 notes on applicable types of derivative contract.

This description left a lot to the imagination, starting from capitalization and blanks in the field names, unclear information on cardinality and dependencies between fields, lack of naming convention for data types and other issues. The TRs responded by interpreting the instructions as best as they could, sometimes with a view to make them fit with systems already in place at the respective TR. Where legacy systems or split development teams were involved, some TRs came up with differing input formats depending on the asset class. This resulted in incompatible reporting formats between different TRs, making changing the TR difficult from an MP perspective. At the same time, the seed for the inability for reconciliation between TRs had been sown.

These standards were slightly revised in 2017 by the commission implementing regulation (EU) 2017/105 of 19 October 2016, e.g. by removing BIC as an entity identifier for parties, as this had led to misunderstandings where non-bank parties submitted the BIC of their bank, or by introducing some typing of IDs in separate fields. More details on business rules were published in the form of an elaborate Excel file, giving instructions on how each field in Table 1 and 2 was to be interpreted and parsed depending on the asset class and trade or position level. But the different reporting formats between TRs had by now been entrenched, and no interoperability of reporting formats has been achieved.

In the EMIR Refit initiative, ESMA has gone back to the drawing board. On 27 March 2020, the formal consultation has been started, which concluded 3 July 2020. ESMA notes that the current rules

> "have proved to be not sufficiently precise and […] fail […] to cover some technical details. As a result, the harmonization of the entire reporting system was not achieved since the TRs implemented the reporting requirements inconsistently, e.g. by developing different report structures or by using different data element names. This resulted in inconsistencies in the information reported by the counterparties as well as in varying practices across the TRs, thereby hampering the access to data and the correct aggregation and comparison of data across TRs."

To address these deficiencies, ESMA has proposed the provision of details of the derivative contracts in an XML format, using a template developed in accordance with ISO 20022 methodology. This approach is already in use in other regulatory arenas, namely in the reporting of EMIR data from TRs to NCAs, MiFIR transaction and reference data reporting and reporting under SFTR. The templates proposed by ESMA should specify the information reported from submitting MPs to the TRs, but critically also the feedback from the TRs back to submitting MPs. The latter part had been left out completely in 2012/2014, leaving the inbound direction integration (from the perspective of a MP) to the design of each TR.

In a scenario where a Ukrainian TR exchanges regulatory information with ESMA or – for reconciliation purposes – with another TR in Western Europe, adherence to this new standard would be mandatory. In addition, with the implementation of the ISO 20022 templates between submitting MPs and their TRs in Western Europe, tools, mappings in standard software and methods and experience by service providers will increasingly become the norm.

The differences between the "legacy" EMIR and the Refit proposal are significant:

- Number of relevant fields to be reported increases from 129 fields currently to 203 fields in the Refit version

- Of the 129 fields currently existing, 67 are redesigned or otherwise changed or specified differently

- Much more detailed handing of lifecycle events, with references

- Mandatory delegation of reporting by small non-financial counterparties (NFC-) to their FC counterparties is already in place since 18 June 2020

- Clearing threshold now needs to be calculated once per year only, applied since 17 June 2019

- Intercompany reporting has been stopped since 17 June 2019 as well

The results of the ESMA consultation on EMIR Refit including the final Technical Standards are expected in Q4 of 2020. Hence, the regulatory technical standards (RTS) and implementing technical standards (ITS) on standards, formats, frequency and arrangements for reporting to TRs under EMIR are expected to be submitted to the European Commission in 2020. These regulations will come into force 18 months after having been formally adopted, leading to a start of regulatory reporting under the new standards Q3/Q4 2022.

Supporting both the legacy version and the Refit version in one common system would be so complex and costly as to be untenable. Therefore, the only option for supporting the old version would require a major redesign of most parts of the TR system very shortly after launch of the refit version.

For these reasons, we advise the Ukrainian regulator and TR to "leapfrog" the legacy formats and table definitions from EMIR 2012/14 and its revision in 2016/17, and to adopt the new standards proposed by EMIR Refit from the start. In the context, "start" does not mean the time when EMIR Refit reporting comes into force legally, but the time that the following documents are released and binding:

- RTS on details of the reports to be reported to TRs under EMIR (currently in draft as Annex IV of the ESMA consultation paper published 26 March 2020, reference ESMA74-362-47)

- ITS on standards, formats, frequency and methods and arrangements for reporting to TRs under EMIR (currently in draft as Annex V of the ESMA consultation paper published 26 March 2020, reference ESMA74-362-47)

- RTS on procedures for ensuring data quality (currently in draft as Annex VIII of the ESMA consultation paper published 26 March 2020, reference ESMA74-362-47)

- RTS on operational standards for aggregation and comparison of data and on terms and conditions for granting access to data (currently in draft as Annex IX of the ESMA consultation paper published 26 March 2020, reference ESMA74-362-47)

- XML Schema set for Counterparty and TR data exchange under EMIR, which contains a PDF, an XSD and an Excel file for each message type and sub-type (See example for SFTR reporting: https://www.esma.europa.eu/policy-activities/post-trading/sftr-reporting, under the heading "XML SFTR Reporting Schemas")

- The following two XML Schema sets are less critical for the design and implementation of the Ukrainian TR:

    o XML Schema sets for Inter-TR data exchange and

    o XML Schema set TR to authority data exchange.

The RTS an ITS on registration and extension of registration of TRs under EMIR are less applicable to the Ukrainian TR insofar as there are no legacy TR yet, and we are assuming a unitary TR.

Where these standards are not fully available or finalized yet, Ukraine should put the requisite standards on the critical path of the TR design.

To recap, we advise the full adoption of the EMIR Refit message between submitting MPs and their TRs, which implement the ISO 20022 templates. To reap synergies, there should be no deviation in terms of changed XSD schema files or business rules. Having said this, certain optional fields in the data set may not be applicable to the Ukrainian market, therefore a web front-end will not have to support them. But the processing should cover any and all fields contained in the standard, even if never populated by Ukrainian MPs in the first few years. This way, testing approaches and exchange of data with other TR or ESMA will work regardless. Rather than rewording the standards, secondary legislation could refer to the standards published, and provide a non-binding translation, following the ElCom approach to (not) translating ACER into Swiss law.

FORMAT OF TRADE REPORTS IN ENERGY MARKETS

Following Assumption 11 on synergies between financial and energy markets, the following observation is meant for the sake of completeness in TR design, even though Energy markets are outside the scope of this report. Even though a REMIT refit has been discussed a number of times in the past years, we do not expect a massive change in the coming three years. Therefore, any TR design allowing for synergies between financial and energy markets should work under the assumption that the full and current set of ACER XML specifications is to be implemented with no deviation. In particular, this refers to (all documents on https://documents.acer-remit.eu/)

- REMIT Reporting User Package with XSD schema files
- Transaction Reporting User Manual (TRUM), containing field lists, mappings, sample XML documents
- Manual of Procedures on data reporting
- RRM Requirements

The following documents should be disregarded:

- List of Standard Contracts

CODING OF LEGAL ENTITIES

For the coding of legal entities in the course of TR reporting in Ukraine, only the Legal Entity identifier (LEI) should be adopted, following the practices proscribed in the EMIR Refit. This 20-character reference code is an international standard (ISO 17442), which identifies the parties of a transaction.

Legal entities in Ukraine can register an LEI already today. Under EMIR, LEIs need to be used for encoding:

- Counterparties which are a legal entity
- Beneficiaries which are a legal entity;
- Brokers
- Central Counterparties (CCP)
- Clearing members
- Submitting entities (e.g. reporting service providers)

This system works reasonably well upon introduction of reporting, when most legal entities in the market will have to get a new LEI. There have been issues with renewal of LEIs and with the transfer in the event of mergers etc. To improve upon these issues, the EMIR Refit introduces business rules ensuring the validity (i.e. updating) of the LEI code. The Ukrainian TR should implement these rules to ensure continuing data quality:

- LEIs need to be issued by an endorsed LOU (Local Operating Units) of the Global Legal Entity Identifier System (GLEIF)

- LEIs need to be duly renewed and maintained according to the terms of the respective LOU

- All accepted LEIs must be in the status of "Issued", "Pending transfer" or "Pending archival".

- This business rule check applies to all LEIs in a report, not just the reporting or submitting party itself

This requirement implies live connection of the Validation module to the GLIEF database.

IDENTIFICATION OF TRADES

So far, the Unique Transaction Identifier has not been a success story in EMIR, REMIT or MiFID II. The bulk of the problems with reconciliation between counterparties and between TRs originate with the generation and use of differing UTIs. Even when counterparties recognize the non-reconciliation, it is not clear which party needs to make a change, especially in OTC trading.

Added to this are technical problems, in particular when the triplet of counterparty 1 LEI, counterparty 2 LEI and trade UTI is used to search, store and identify trade reports. In such a scenario, UTIs cannot be changed after submission, rather a faulty UTI needs to be corrected by a technical cancellation of the original report, followed up by a new submission. This approach is complex, and opens up issues of late reporting, so it is very rarely applied to fix an UTI reconciliation issue. Everybody in the market seems to have become used to UTIs not being aligned. If that is so, why make the effort to change it locally?

In a nutshell, the independent generation of UTIs by two separate parties will rarely result in the same UTI for the same trade. ACER tried to standardize this approach with their Guidance on the Unique Transaction ID (UTI), Annex IV of the TRUM. Under this guidance, counterparties use standard data elements from the trade (such as trade date, counterparty codes, volume, rice and delivery), which are formatted, normalized and then concatenated into one (rather long) string. This string is then hashed to arrive at the right string length for a UTI, but also to maintain confidentiality about the trade details. If any of the data fields are not exactly the same, or if the hashing algorithm is applied incorrectly, the resulting UTI will differ markedly. Unfortunately, this is very often the case. REMIT is no exception to the UTI conundrum.

Theoretically, ACER could have chosen to apply the UTI generation protocol itself, centrally upon submission to the ARIS system. All elements used in the hashing algorithm are contained in the ACER XML files. After central generation, the UTI would have been sent back to the reporting parties. This hypothetical approach would have turned ACER into the provider of a trade matching platform, which mostly matches upon first submission, but sometimes not. The follow-up (amendments?) would have to be performed by the reporting parties though – hardly practical. In addition, problems with non-reconciliation would have been the fault of ACER, not the reporting parties.

Since algorithmic and independent generation of UTIs does not work, and the central provision at one TR is not an option either, ESMA have chosen to mandate the generation of UTIs by one side as far as possible. This is done by a rather expansive flow diagram (page 28 of the of the ESMA consultation paper published 26 March 2020, reference ESMA74-362-47), which can be summarized by a ranking of parties. Roughly, and in this order (leaving out cross-jurisdictional cases and special master agreements):

- UTIs for cleared transactions should be generated by the CCP

- UTIs for centrally executed transactions should be generated by the venue

- UTIs for centrally confirmed transactions should be generated by the confirmation service

- UTIs for OTC trades between parties of different regulated status (e.g. FC vs NFC-) should be generated by the party with the higher regulated status (e.g. FC in this case)

- UTIs for OTC trades between parties of the same regulated status (e.g. NFC- vs NFC-) should be generated by the party with the LEI which comes first in a prescribed string ordering algorithm

This approach seems sound, however it omits the question on how UTIs would be transmitted between parties prior to reporting. For CCP, venue and central confirmation, this is less of a problem. In the purely bilateral OTC space, it remains to be seen how practical this is.

We propose the full-scale adoption of these UTI business rules for the Ukrainian TR. Business rules in the validation module should contain checks on whether UTIs submitted do indeed come from venue or CCP, as stated above. A provision of these UTI in the receipt messages would be a bonus.

CODING OF PRODUCTS AND MARKETS

So far, the Unique Product Identifier (UPI), formerly International Securities Identification Number (ISIN) and Alternative Instrument Identifier (AII) have not been great success stories in EMIR, REMIT or MiFID II either. Most venues, OTFs and CCP reverted to their idiosyncratic way of naming and numbering traded products. Cross—venue comparison remained elusive. For the energy markets the whole subject is further complicated by physical delivery locations and dates, which either lead to an explosion of ISINs or make comparisons useless.

The ESMA Refit suggest that

- ISINs should continue to be used for the identification of derivatives admitted to trading on trading venues or systematic internalizes, where ISINs already exist due to MiFIR.

- ISINs would also apply to OTC contracts for products admitted to trading on a trading venue.

- UPIs should be used as a product identifier for all other derivatives

We find the notion of traders conducting an OTC trade, and looking up the equivalent trade on a venue to get the right UPI for a report to be far-fetched. The main reason for keeping ISINs in Western Europe is the "installed base" of legacy coding. This separation of coding schemes may generate more issues then it fixes.

Internationally, UPI seems the more broadly accepted coding scheme. <u>We therefore advise to focus reporting for Ukrainian markets on UPI</u>. However, the system should be able to handle ISINs as well, should these be imported from outside sources. The key is the establishment of a joint look-up system (list) for UPIs, to be populated by the venues and OTFs of Ukraine.

Input channels

System input is not limited to automatic transmission of XML files. In fact, the majority of market participants will use other routes. But in each of these cases, the input format will be translated to XML. <u>We recommend three main ways to upload data to the TR, as shown in the diagram below</u>. The secure web front-end is part of the module "Collection", but is shown detached for greater clarity.
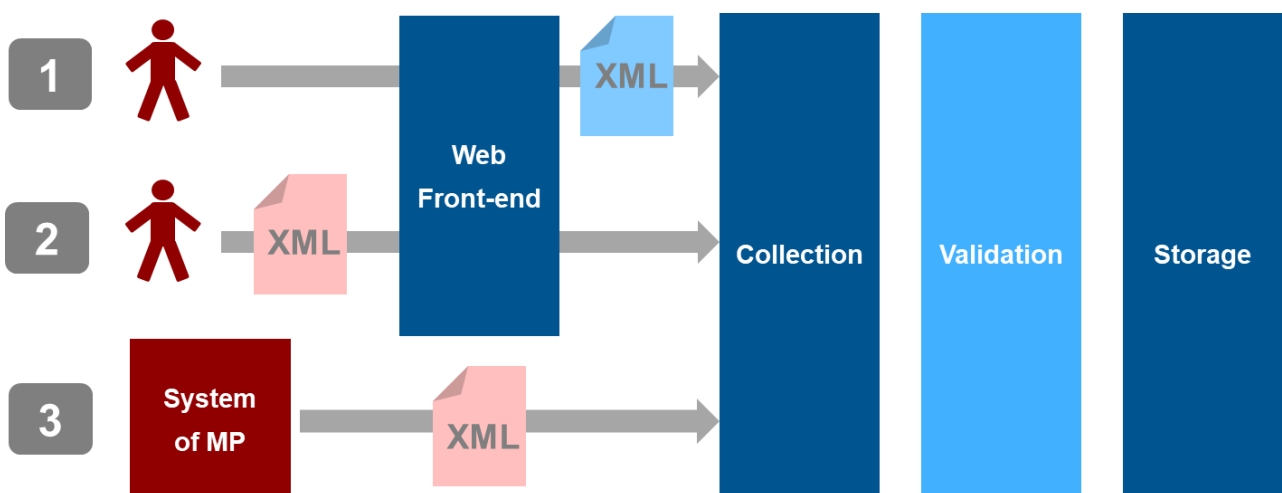
1. By manually entering the data through a secure web front-end provided by the TR, with the front-end mapping the entered data into the required XML format, and passing it on for validation. To avoid user frustration when using this front-end service, validation of the form must be provided, such that mandatory fields cannot be left blank, typed data fields have to be filled in the required manner (e.g. LEI fields have to have the required character length, dated have to be valid), or drop down fields are used where fields must be populated from a finite set. The aim is for the web front-end to be able to produce a valid XML file. The front-end should be made secure by user + password, coupled with certificate authentication (best practice: https://www.acer-remit.eu/certificates)

2. By manually uploading an XML file through the upload function of the secure web frontend. This XML file needs to be prepared off-line, either by using an XML editor in the case of recurring file transmission with very little change, or by other means such as an Excel file with macros. The TR operator should make sample XML files accessible for changing, adapting and submitting. The TR

operator may make sample Excel files available as well, but should refrain from taking these into support and maintenance, as they cannot be easily locked down. These tools can and should be changed by users, but supporting the changed variants cannot be done with reasonable effort anymore.

3. By automatic transmission of the XML files to the TR. This is the most prevalent means of submitting regulatory data to TRs in Western Europe, but it is dependent on trading and risk management systems able to produce these reports, and upon the volume to justify the significant fixed cost to make such a connection work. The most robust and widely-spread technology for this transmission are:

   o Secure File Transfer Protocol (sftp), combined with PKI payload encryption and authentication (recommended: GPG implementation of OpenPGP)

   o Followed by REST Web Service with channel encryption

We recommend starting with sftp, combining the provision of certificates with the certificates for web access.

Output and reporting

The output to submitting entities is not the first priority, but should not be left to later phases to ensure rapid and smooth uptake. The following channels should be provided:

- Web front-end for rapid feedback to reporting, look-up of UPI codes

- Excel, for providing more complex information via the web interface

- PDF, for reports to the pubic

- REST API for codes, list of trade reports submitted

SYSTEM DESIGN

Usability

- Usability: The TR must be intuitive to use. The technology needs to be transparent to users, so it enables them to concentrate on their tasks, rather than on system usage issues.

- Accessibility: Information needs to be accessible for users and partners to perform their respective duties, yet with security and privacy measures according to the applicable law

- Support for multiple languages (Ukrainian, English, others where advisable) needs to be delivered from the start

Modularity

- Interoperability: Software and hardware must follow established standards that promote data, application, and technology / functional interoperability (i.e. European standards, EMIR and MiFID-II standards).

- Components and services between modules must be loosely coupled to ensure flexibility and continuity. This enables replacement or modification with reduced risk of unexpected side effects.

- When designing the application, vendor should assume that the underlying infrastructure / layers will evolve and that the TR application must be able to cope with this evolution

Release planning

- Vendor need to provide a concept for future releases, independent of their own planning

- Standard release schedules should foresee a major release per year, and one code fix releases per quarter

- Where possible, testing and releases of the code per module should be independent of other modules, decreasing risk and effort

Openness for future needs

- Elasticity: There is no determination yet whether the solution should be deployed on-premise, in the cloud (cloud native), or be Cloud-ready

- Ideally, the system could be deployed to a particular cloud ecosystem, but could also be pulled from that environment if cost or security makes that necessary

- The IT architecture must be planned to reduce the impact of technological changes and ensure flexibility in business continuity

- Maintainability: Data management processes and tools to control the growing number of system users.

Buy vs. build

- The question of Buy vs. Build has been discussed in the experience of the TRs in Western Europe.

- Following the modular approach, there is no need for a uniform answer

- Without jumping to conclusions, we find it likely that the following component will be standard products, configured and extended to the needs of the Ukrainian TR:

    o Business Intelligence module (BI Tool)

    o Market Surveillance module (though postponed)

    o Monitoring module, but with a heavy dose of customization

- The following modules will most likely by custom-built:

    o Data Collection, including web front-end

    o Data Validation module

    o Data Storage module, though the underlying database and data lake / file storage will definitely be standard products

    o Infrastructure

Licenses and open source

- In general, open standards and/or open source software is preferred over proprietary standards

- In case of proprietary standards or closed source software, vendor should demonstrate an exit strategy should the cost or functionality of such proprietary tools become untenable in the future

- Where software is developed specifically for the TR, vendor must provide an unlimited, non-expiring license and provide for source code escrow

SYSTEM REQUIREMENTS

The development of the TR including the provision of standard software components should be guided by the following principles. These principles are not fixed and may evolve in the future. Potential vendors should be prepared to demonstrate how their solution adheres to these principles, or in case of gaps or deviations should justify these.

Security

- Security by design: The TR solution must adhere to the latest IT security strategy and legislation. (Xaas policy, IPG policy, development guidelines).

- The overall TR must be secure at all application levels

- The TR software must be secure by itself

- The solution must adhere to current Ukrainian and EU privacy standards and legislation as it relates to personal data, in particular GDPR

- Shared Information: Users have access to information that is necessary for performance of their respective tasks. Therefore, information is shared between different regulatory agencies and positions, depending on the security levels established for that particular set of information.

Availability

- Business continuity: Business activities on the TR must be maintained, despite system interruptions

- Scalability: The TR solution and concept needs to be scalable for example, if number of transactions, orders or market participants go up significantly

- Availability: In principle, the system should be available 24 x 7 x 365, but human intervention on the TR side, e.g. monitoring or operations staff needs to be kept to normal working hours (8 x 5), otherwise cost is increased manifold

Verifiability

- At any stage of processing the data submitted and receipts being sent, the steps of data handling, validation, enrichment and mapping must be transparently logged

- Key to verifiability is a chain between the data as it has been submitted by the reporting party, and the data as it ultimately arrives in storage

- Audit trails will need to span multiple modules

Load and performance

Estimating the number of market participants, venues, and trade and order reports is difficult upfront, because only the scope of reporting put down in the Capital market Reform act and secondary legislation will bring light to these. Having said these, the following key figures have been mentioned in interviews with Ukrainian stakeholders:

- Market participants (MP)

    o Investors trading on their own behalf and liable to report: 200 to 500

    o Brokers, OTFs, arranging financial trades or trading on behalf of others: 300 max.

    o Total number of financial MPs: about 1'000 max., of which three - four major banks and some 80 smaller banks / brokerages

    o For comparison, there some 450 MPs registered for trading on the exchange, out of which only 60 are active. This is roughly the figure of active clearing members

    o Total number of energy MPs: 1'000 to 2'000 max., in practice (power markets) only 400 registered MP, of which 200 are actively trading

    o Total number of MPs across financial and energy markets: 5'000 max reporting entities, with a higher bound of 20'000 entities counting beneficiaries and non-active MPs which may be included in reports

- Trades (transactions), not counting orders or lifecycle events:

    o Number of trades in energy markets (only power, Day-ahead and Intra-day): 300 per trading day

    o For benchmarking, the notional value of traded power is about 25 % of total consumption. This is the opposite of churn, the bulk of power is not traded on wholesale markets, but sold using long-term contracts

    o Number of trades in the financial markets: less than 100 bond transactions per day, less than 1'000 FX transactions per day

    o Equity market has low liquidity, with only 10 stocks having market makers and 4 stocks making up the index

    o With these two financial markets (government bonds and FX) being the most liquid, the overall reported trading volume is in the low thousands per trading day

- Users (persons) per entity

    o The bulk of trading entities is very small, so we expect to have one to two persons as named users per entity.

For comparison, the following figures apply to financial and energy markets in Western Europe:

- In 2018, ESMA reported it receives seven million records on financial instrument reference data per day.

- In one month in 2018, total of 3 million EU financial instruments that were published

- ACER processes the following number of records per year:

  o 2017 437 Million records / year

  o 2018 728 Million records / year

  o 2019 1'036 Million records / year

- One record can be an order or a transaction, with the messages of fundamental data being negligible.

- The typical order to trade ratio is three to one. Therefore, the above figures implied a transaction count of 260 Million transactions / year.

- Since energy is mostly traded on week days, this amounts to a daily volume of one million transactions

It is apparent that the total size of the Ukrainian market and the daily trading activity is about four orders of magnitude smaller than in Western Europe. This is good news, as systems do exist to deal with the magnitudes in Western Europe. A look at the ACER figures also show growth rates of 25 % y-o-y. Still, using the same software and storage architectures as for TRs in Western Europe would be unnecessary.

OPERATIONS

Training

- Vendor or operator must provide trainings to initial TR staff

- Training to pilot users should be combined with workshops

- Training to hundreds of users cannot be given in person, instead focus on short instructional videos, combined with a train-the-trainer approach with auditors and consultants.

Documentation

- Vendor must provide documentation of software, focusing on tool tips, FAQs and context-based documentation

- Massive PDF manuals are rarely read.

Total cost of ownership

- Vendor should commit to TCO calculation, assuming certain growth rates in data and users

- Due to the split in modules, this TCO calculation can ultimately only be done by the operator.

NEXT STEPS

This section on "next steps" is an attempt to sketch out a possible sequence of events after the acceptance of this report, which would bring the envisioned future reporting landscape and TR into existence. It has been written without a detailed understanding of the mechanisms and timing of bringing secondary legislation into force. Another point not fully considered is the question of budgeting – where an initial budget would come from, and how long it would take to secure it. One thing about budgets is certain though: The lower the cost, the easier the approval process. By the same token, any sponsoring organization would like to see quick results, with the ability to make changes as necessary. The last point precludes a waterfall model of development, where every last detail is specified, and then rigidly implemented. Agile development seems more suitable, especially in an environment where many requirements are not fully formed yet.

Choosing the scope for the first stage

We are assuming that all recommendations and assumptions in this report hold. The first decision to be made concerns the scope of a first stage delivery. Following the recommendations in this report, we remove the Business Intelligence and – crucially – the Market Surveillance modules from the first stage. As a consequence, significant parts of the monitoring and infrastructure are not required at first. However, the infrastructure should be chosen in a way that allows for later additions to cater for the needs of these modules omitted at first. The same goes for the data volumes, scalability is key. If the intention is to go for a cloud-deployed architecture, that is what the first stage should start with as well. Nonetheless, the infrastructure and monitoring component will be significantly lighter and less costly for this stage, resulting in this picture of the first stage (greyed out parts are out of scope):
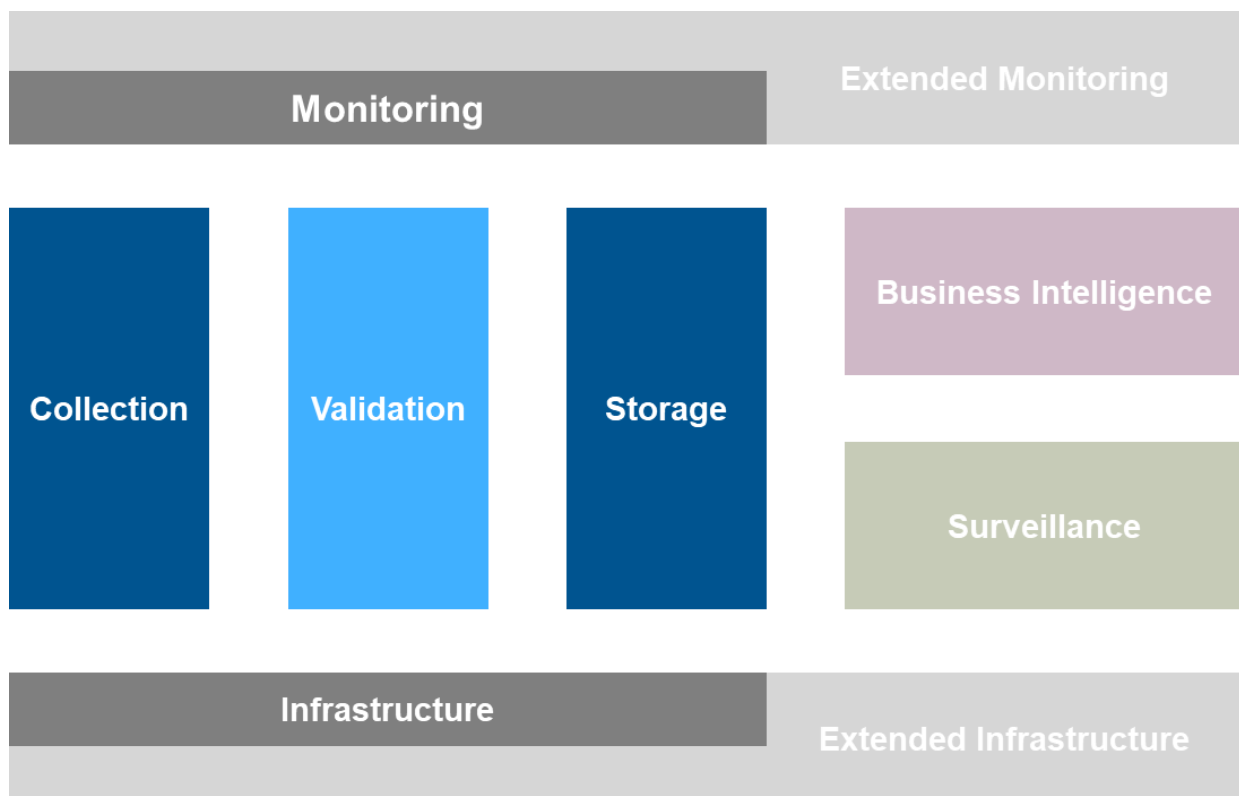
The data channels are reduced by one: The web entry (No. 1) assumes a fully functional web interface for form-based entry and quick validation. This is very dependent on the choices of the implementation data set, in other words the breadth of fields optional under EMIR Refit, yet to be removed from the set for entry into the TR. At the same time, usability, good flow, tool tips and sensible choices for default values are required to make this work well. Front-end development is also quite time consuming. Starting this component early wastes a lot of effort on something which will have to change later. This leaves the two file-based channels, one for manual upload (2) and one for system-to-system transmission like sftp (3). Thus, we have the following picture of the first stage for data channels:
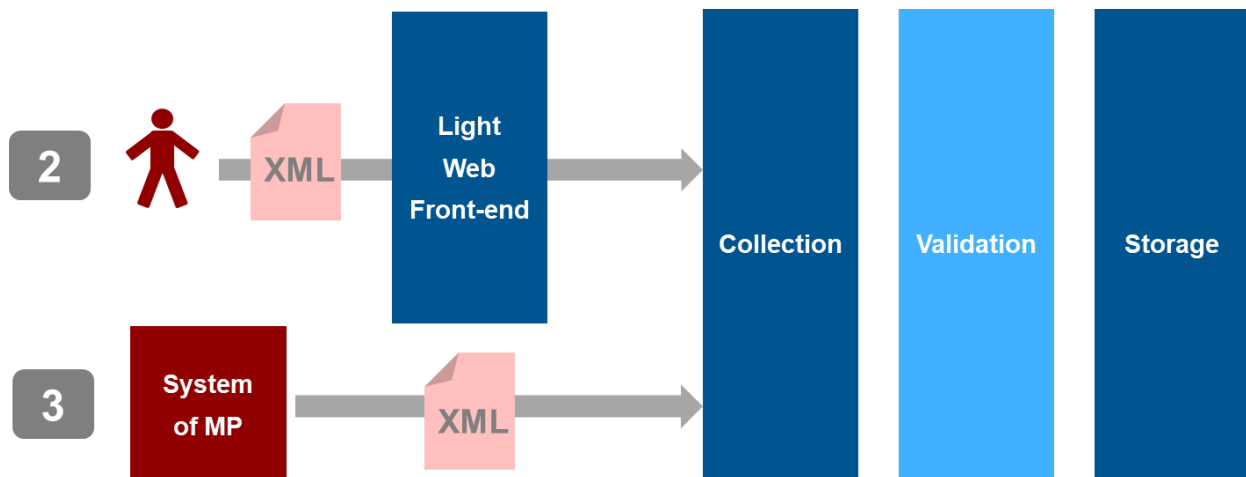
In both channels, users have to prepare the compliant EMIR Refit XML files themselves, locally. As a convenience, the TR operator could provide some sample XML files for different asset classes, which users can then modify and submit, using license-free XML editors and the like.

Note that this architecture is not a throw-away prototype, but a first, fully functional step to the TR architecture as envisioned.

Another scope decision to be taken concerns the types of asset classes for the first stage, the deal types etc. Here, the focus should be on what the pilot users actually have transactions in and can bring forward through an interface / file types to be developed. This follows the approach of "build first only what you can test quickly".

TR as a not-for-profit operation

This report makes a strong case for having one TR for financial markets in Ukraine only. Regardless of tendering or licensing models, even this reduction in complexity and competition will not result in a viable business case for a commercial entity looking at building and operating the TR. This unfortunate fact is a consequence of the high fixed cost for building and operating a TR combined with the small transaction volumes in Ukraine to be reported to a TR.

Even TR operators in Western Europe are struggling with how to make and keep their TRs profitable, due to the many changes in regulation and the high cost of compliance for keeping the license. Most TRs in Western Europe mainly exist to protect the data and clients inside the walled gardens of the exchanges and clearing

houses of their respective groups, those operations being truly profitable. Data services are a fast-growing business too, but these exchange / settling groups already have the data from price finding, settling and clearing. Putting a TR on top does not increase the value of the data, it just prevents the competition from accessing it.

With these facts about (lack of) profitability in mind, the fees for using a Western European TR are typically structured like this:

- One-off / registration / on-boarding fee, e.g. 2'000 €

- Flat fee / membership fee / minimum fee independent of volume, e.g. 3'000 to 6'000 € p.a.

- Volume based fees, e.g. between 0.1 and 10 € cents per UTI, depending on volumes

These prices are (just) sufficient to cover the cost of operations and ongoing changes of the large TRs. Whether the investment of the first build phase can be recouped from the revenues is an open question – probably not.

Keeping in mind that the cost of building and operating the TR is primarily fixed cost, it becomes apparent that the prices for Ukrainian market participants would have to be significantly higher – maybe by two orders of magnitude – to make up for the smaller volumes and user count. Such high prices would critically endanger the functioning, let alone the growth of the financial markets in Ukraine.

How to get to a "business model" which works? Firstly, one should accept that this is not a commercial opportunity, but calls for a state-run or state-sanctioned not-for-profit operation instead. Collecting taxes is not a commercial undertaking either. Secondly, the commercial TRs in Western Europe incur roughly half their cost in making sure they stay within the licensing requirements, keep on the good side of regulators, have all the appropriate documentation, etc. Regulators in charge of their own TR like ACER or the No-EU NRA are able to run a much leaner organization.

Therefore, the TR for financial markets should be run by the regulators itself. For the financial markets this means a suitable combination of NSSMC and NBU.

While the nucleus of the compliance and legal responsibility is within NSSMC, the IT work should rest on the shoulders of teams already existing. Much of the work to be done requires specialists, but many of them would not be required full-time. With existing personnel, there is chance to soak up resources without incurring extra cost. The natural fit for this role is therefore SMIDA.

The resources available within NSSMC and SMIDA could be augmented by external sources, e.g. consultants, but not in the way of tendering away the project responsibility.

Setting up the team to make it work

Start with a vision, and involve market participants early. The following team composition could work:

- Project lead, with a strong grasp of market needs and IT implications (full time, key contact for Steering Group)

- Head of architecture, design and test strategies (full time, in charge of vendors)

- Head of usability and user interaction, market facing (key person for dealing with pilot users)

- Head of security and infrastructure, operations

Any personnel below these functions could be variable staffers, outside help and the like. The steering group would require sufficient commitment and time to make hard decisions about scope, so that function would be fairly detailed for some members.

Timeline

With the above scope in mind, it should be feasible to deliver a working system within 6 to 8 months, provided that pilot users (one commercial bank, one exchange) are on board and cooperate in building out to something which will change.

Agile development means working in sprints, e.g. lasting three weeks. Each sprint brings a new increment of usable functionality.

The resulting system would validate the approach, serve as the nucleus for the TR under the NSSMC, and provide valuable and detailed feedback for forming the outstanding secondary legislation and detailed design for the target TR system.