The Gateway to the Barcodes of Finance

Progress on Implementation of the
Global Legal Entity Identifier (LEI)

**Research
by
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Financial InterGroup

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The Global LEI Implementation

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Introduction

A global identification system for financial market participants is being designed around regulatory mandates at the global level through the G20 and at the local level through sovereign market regulators. It is being coordinated through the Financial Stability Board, a standards body created by the G20 to instigate and coordinate regulations to stabilize the global economy.

The first implementation of this system is being tested for trading, reporting and clearing of swaps transactions. The intent is to observe the risk exposures associated with these transactions. The system has been inaugurated by requiring each counterparty and each financial supply chain participant in a swaps transaction to obtain a unique code. It is then intended that these codes will become associated with its parent or controlling entity.

It is planned that this coding convention, referred to as the legal entity identifier (LEI) can be extended to all financial market participants involved in the supply chain of all financial transactions. In parallel, unique codes for instruments and contracts - the Unique Product Identifier (UPI), and the Unique Transaction Identifier (UTI) - for observing an audit trail throughout a transaction's life cycle will follow a similar mandated trajectory; first for swaps transactions then for all financial transactions. The ultimate goal is to develop the electronic equivalent of the unique codes found in barcodes. This would permit computerized data aggregation and matching of financial transactions for any specific firm, counterparty, contract, instrument or market and, ultimately for all firms in all markets for global systemic risk analysis and straight-through-processing.

After three decades of attempts at a global identification scheme and its associated reference data the technology of the information age has made this aspiration of both regulators and industry members compelling. The impediments to success are still there through silo mindsets and legacy thinking of both constituent groups.

> *"But as I dug into the 2008 crisis I also saw a world where different teams of financial traders at big banks did not know what each other was doing, even inside the same (supposedly integrated) institution. I heard how government officials were hamstrung by the fact that the big regulatory and central banks were crazily fragmented, not just in terms of their bureaucratic structures, but also their worldview. Politicians were no better. Nor were the credit rating agencies, or parts of the media. Indeed almost anywhere I looked in the financial crisis it seemed that tunnel vision and tribalism had contributed to the disaster. People were trapped inside their little specialist departments, social groups, teams, or pockets of knowledge. Or, it might be said, inside their silos."*
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> **Gillian Tett**
> **Author and Financial Times Financial Industry Reporter**
> **The Silo Effect - The Peril of Expertise and the Promise of Breaking Down Barriers**
> **Simon & Schuster 2015**

Background

Early Interest in Reference Data in the US

In 2004 Financial InterGroup (FIG) and academic colleagues published a working paper on Operational Risk and Reference Data, since updated, that made the business case for standardizing business and product identifiers and the reference data associated with them (see Operational Risk and Reference Data: Exploring Costs, Capital Requirements and Risk Mitigation *Journal of Operational Risk, Vol. 1, No. 3, 2006)*. In the intervening period, up to the financial crisis of 2008, FIG presented its business case to individual financial industry members, trade associations, regulators and continued publishing in academic journals (see **Infrastructure Issues in the Financial Services Industry: A Case for a Central Counterparty for Data Management, Journal of Securities Operations & Custody**, Vol. 2, No. 3, pp. 202-224, October 2009 at http://ssrn.com/abstract=1393022).

Thereafter, as both the CFTC and the SEC, and later the newly established US Treasury's Office of Financial Research (OFR) became engaged in data quality and unique identification for systemic risk purposes FIG organized the Global Data and Standards Alliance to further engage with regulators. See http://www.prweb.com/releases/2010/09/prweb4547144.htm. This Alliance was made up of financial institutions, standards bodies and new age technology companies. In the US in 2010 the CFTC, the SEC and the US Treasury asked for a unique code, the Unique Counterparty Identifier code (UCI) to be designed and made available to parties to financial transactions, initially for parties to swaps transactions. This identifier is now called the LEI (Legal Entity Identifier). In the US it began as the CICI (CFTC Interim Counterparty Identifier) and later relabeled the GMEI (Global Markets Entity Identifier).

> *"The ability to compare and aggregate those data across the SDRs and across borders is absolutely critical to monitor those threats…We live in a world of global markets and global institutions and there's no escaping the fact that, if we don't standardize data and harmonize them across those borders, then we won't be able to use them. …The implementation reflects the need to use standards for entity identification (LEIs).*
>
> *Obviously those are important. Equally important will be the use of instrument and product identifiers….and the use of hierarchies to organize those data in a coherent framework and those identifiers in a coherent framework so that we can compare and aggregate similar, but not exactly alike, either entities in a particular industry segment or instruments in a particular asset class, and both with respect to entities and instruments."*
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> **OFR**
> OFFICE OF FINANCIAL RESEARCH
>
> **Richard Berner**
> **Director**
> **Office of Financial Research**
> **US Treasury: at the CFTC Technology Advisory Committee Meeting**
> **12 September 2013**

The Financial Stability Board Takes the LEI Global

The momentum for implementing this barcode equivalent for financial services now comes from the G20, passed on from the OFR to the G20 and, in turn, to its Financial Stability Board (FSB). The FSB organized and empowered the Regulatory Oversight Committee (ROC), a group of global regulators from 60

different countries to oversee the LEI initiative. The ROC, taking guidance from the International Standards Organization (ISO) established a standard for the construction of the code and authorized and assigned their issuance to facility operators, referred to as Local Operating Units (LOUs) The ROC in 2014 passed the implementation of the LEI to a Board of Directors of a newly formed Global Legal Entity Identifier Foundation (GLEIF) that will make final decisions and implement a central core facility, the Central Operating Unit (COU) now referred to as the GLEIF facility, to operate the Global Legal Entity Identification System (GLEIS).

The GLEIF facility concatenates 29 separate LEI registries into a central data base without assuring that no duplicate LEIs exist. That is left to each local operating unit (LOU) that operates each registry. The final GLEIS is evolving incrementally and has yet to be defined in any finalized operational or technical detail. The LEI code system is being implemented for immediate regulation of the swaps markets. Its first use was to aggregate swaps data in multiple swaps data repositories (SDRs) in the US and across the globe.

It is expected that continuing guidance will be issued so that the GLEIS can be transitioned to accommodate all financial market participants in all financial markets as it evolves. Paramount in the issuance of additional guidance will be the use of the LEI in counterparty risk data aggregation for all financial transactions engaged in by all financial market participants globally. Such aggregation of data will be required for systemic risk analysis across multi-located business silos of individual financial institutions and across global regulatory boundaries.

> *"There is widespread agreement among the public authorities and financial industry participants on the merits of establishing a uniform global system for legal entity identification. Such a system would provide a valuable 'building block' to contribute to and facilitate many financial stability objectives, including: improved risk management in firms; better assessment of micro and macro prudential risks; facilitation of orderly resolution; containing market abuse and curbing financial fraud; and enabling higher quality and accuracy of financial data overall. It would reduce operational risks within firms by mitigating the need for tailored systems to reconcile the identification of entities and to support aggregation of risk positions and financial data, which impose substantial deadweight costs across the economy. It would also facilitate straight through processing. But despite numerous past attempts, the financial industry has not been successful in establishing a common global entity identifier. The finance sector consequently lags well behind many other industries in agreeing and introducing a consistent global framework for entity identification."*
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> **FSB** FINANCIAL STABILITY BOARD
>
> **FSB Report: Global Legal Entity identifier for Financial Markets**
> **8 June 2012**

Financial supervisors have promulgated a framework for data aggregation functionality in individual financial institutions, beginning with the largest globally systemically important banking institutions (G-SIBs). G-SIBs were to begin implementation in 2016 - see Basel Committee's Principles for Effective Risk Data Aggregation and Risk Reporting now referred to as BCBS239, at http://www.bis.org/publ/bcbs239.htm.

Subsequently, in 2017, supervisors reported on their assessment of implementation progress and concluded that "the level of compliance is unsatisfactory and the overall implementation progress remains a source of concern to supervisors." see https://www.bis.org/bcbs/publ/d399.pdf. As envisioned in BCBS239 it is expected that the LEI will be used internally to aggregate data across geographically dispersed global financial institutions domiciled in multiple sovereign jurisdictions. This capability, while a principal objective of the GLEIS, has yet to be defined and activated.

> *"One of the most significant lessons learned from the global financial crisis that began in 2007 was that banks' information technology (IT) and data architectures were inadequate to support the broad management of financial risks. Many banks lacked the ability to aggregate risk exposures and identify concentrations quickly and accurately at the bank group level, across business lines and between legal entities. Some banks were unable to manage their risks properly because of weak risk data aggregation capabilities and risk reporting practices. This had severe consequences to the banks themselves and to the stability of the financial system as a whole."*
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> BANK FOR INTERNATIONAL SETTLEMENTS
>
> **Basel Committee on Banking Supervision**
> **Principles for Effective Risk Data Aggregation and Risk Reporting**
> **January 2013**

Data aggregation will require data linkages between legal entities of the same controlling business entity. This will further require relationships and hierarchies of ownership to be organized within or external to the GLEIS. It was the presence of multiple non-unique identifiers, the absence of linkages between them and the inability of regulators to observe these linkages that caused risks to cascade across the globe. This was observed by regulators as the 'Lehman problem', later understood as an industry problem, that gave impetus to the GLEIS initiative. This data linkage mechanism (Lehman had 6,300 legal entities) and its operational and technical details have been the subject of the ROC's Sept. 7, 2015 consultation document on collecting data on direct and ultimate parents of legal entities in the Global LEI system.

On March 10, 2016 the ROC published Collecting data on direct and ultimate parents of legal entities in the Global LEI System - Phase 1. The report summarizes the public responses in the Appendix to the consultation. The collection of this data begins May 1, 2017. The principal recommendations are summarized later in this research note.

A Typical Example of the LEI

The ISO LEI Standard
The LEI is governed by the ISO 17442:2012 LEI standard. A financial market participant must provide its official name and address, and its headquarters location, legal form, and business register identity code where one is available. This is referred to as 'business card' data. It is the first, most minimal amount of information required. Later stages of the GLEIS require more extensive reference data to operationalize the LEI for use in identification and aggregation systems for both financial institutions and regulators.

The LEI in Practice

To give an example of the LEI code as it is now defined we use a UK headquartered London Stock Exchange member BTIG LIMITED registered with the UK's LOU (operated by the London Stock Exchange) as LEI 213800YZXS7U4QZP6441. A LEI is also assigned to a US private company BTIG LLC with the US's LOU, the GMEI Utility with LEI code of 549300GTG9PL6WO3EC51.

Both BTIG LIMITED and BTIG LLC have no mechanism at this time to define their connection; no 'ultimate parent' in either registry. These companies are quite typical of a small financial intermediary with multiple locations, multiple financial intermediary registrations, and multiple foreign jurisdictions that they operate within.

Fig 1 - The Many Parts of BTIG LIMITED and BTIG LLC

Name – Country/State of Formation	LEI code
Condor Trading L.P. (CA) US	
Condor Trading LLC (CA) US	
BTIG LIMITED - United Kingdom	213800YZXS7U4QZP6441
BTIG Honk Kong Limited – China	
BTIG Limited Singapore PTE. LTD. –Singapore	
BTIG Australia Limited - Australia	
BTIG, LLC – California (US) [headquarters]	
B T I G DYNASTY LLC - Ohio (US)	
BTIG, LLC - New Jersey (US) [branch]	
BTIG, LLC - Connecticut (US) [branch]	
BTIG, LLC - Tennessee (US) [branch]	
BTIG, LLC (Hawaii (US)	
BTIG, LLC - Delaware (US)	549300GTG9PL6WO3EC51
BTIG, LLC- Massachusetts (US)	
BTIG, LLC - Pennsylvania (US) [branch]	
BTIG, LLC - West Virginia (US)	
BTIG, LLC - Florida (US) [branch]	
BTIG, LLC - New York (US) [branch]	
BTIG, LLC - New York (US)	
Pacific View Asset Management NZ (New Zealand)	
Pacific View Asset Management LLC (CA)	
Bass Trading LLC (NY)	
Bayridge Securities	
Baypoint Trading LLC (CA)	
Constellation Associates LLC (NY)	
Fusion Partners (NY)	
TradeSave (CA, NY, TX)	

The absence of such a connection or relationship feature renders any association of the two BTIG entities neither observable nor detectable by computerized means. However, for risk data aggregation purposes, it is necessary to understand their relationships. Using either name their collective website www.BTIG.com is accessed suggesting they are related. Also, consulting other public sources the multiple

BTIG LLC companies can be observed individually but with no way of determining whether they are part of the same parent company.

We also note that BTIG, LLC (Delaware - US), a private company, has filed as a broker-dealer with SEC CIK (Central Index Key) code 0001178937, but this filing is a paper document, therefore not detectable by automated means. Also BTIG, LLC (San Francisco-US) has filed as a Swaps Firm and as an Introducing Futures Broker with NFA ID 0348720. It is difficult at this time to determine associations with other components of similarly named companies, let alone companies that are related but have no parent recognition in the names of their affiliates, subsidiaries, etc. as is the case with BTIG's Pacific View Asset Management, Baypoint Trading, et al. This was the case with many non-recognizable Lehman owned companies. In fact investigating further finds Condor Trading LP shows up as the ultimate owner of BTIG, LLC and its many components. Lehman's 6,000+ legal entities, as the forensic accountants and trustees found, was not as easy to investigate.

The Depth and Breadth of the GLEIS

The LEI is Part of a Bigger Issue – Data Aggregation
There may be a need to register hundreds and in many cases thousands of LEI codes for a regulator to understand the component parts and hierarchies of a financial market participant to determine risk exposure. As examples, at some point Goldman Sachs had 11,029 legal entities and Morgan Stanley 9,788 registered at the Federal Reserve. These are the number of legal entities that individually or collectively may put each parent company or controlling entity at risk.

Also all financial infrastructure intermediaries operating in the OTC derivatives space and all reference entities must also be identified in this same way. This is the CME's legal identifier SNZ2OJLFK8MNNCLQOF39. The DTCC Data Repository (U.S.) LLC's is 549300H9ZM7RDBM87W85. Later all financial market participants in the supply chain of all financial transactions will be labeled uniquely, not just participants in swaps markets. Unofficial estimates place the required number at between 2.5 and 3.0 million legal entities.

A sample solution to the problem of identifying individually unique codes and names within an organizational hierarchy and associating them with an ultimate parent or controlling entity is represented in another forum, in the data base maintained by the Federal Reserve's National information Center (NIC) at http://www.ffiec.gov/nicpubweb/nicweb/Top50Form.aspx. This data base identifies and contains a listing of the top 50 bank holding companies' legal entity hierarchies.

In the sample of the NIC data base shown on the next page each separate legal entity has a unique code (the RSS ID) shown embedded after the name on each line item as does the ultimate parent, American Express Company (1275216), shown at the top and in the first line. Also assigned is a sequential number to each legal entity that, in combination with the parent entity ID becomes the mechanism for both establishing the parentage of each legal entity but also for organizing the hierarchies of ownership. The

sequence numbers are re-sequenced each time a merger or other corporate reorganization takes place or a new entity is created.

Fig 2 – Sample Federal Reserve Legal Entity Data Base

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AMERICAN EXPRESS COMPANY (1275216)

Sequence Number l Name & RSSD ID l Parent Sequence l City State or Country l Entity Type

1 * AMERICAN EXPRESS COMPANY (1275216)  NEW YORK NY Financial Holding Company  Domestic
2 -* AMERICAN EXPRESS TRAVEL RELATED SERVICES COMPANY, INC. (3793536)  1 NEW YORK NY Financial Holding Company- Domestic
3 --* AMERICAN EXPRESS CENTURION BANK (1394676)  2 SALT LAKE CITY UT Non-member Bank
4 ---* CROWN AT MONROE, LLC (4313315)  3 RICHFIELD UT Domestic Entity Other
5 ---* USB NMTC FUND 2011-5 LLC (4365800)  3 ST. LOUIS MO Domestic Entity Other
6 ---* U.S.A. INSTITUTIONAL TAX CREDIT FUND LXXXVII L.P. (4379085)  3 GREENWICH CT Domestic Entity Other
7 ---* AMERICAN EXPRESS UTAH EQUITY FUND LIMITED PARTNERSHIP (3945054)  3 COLUMBIA MD Domestic Entity Other
8 ----* BLUE MOUNTAIN DINE ASSOCIATES LLC (2685782)  7 BLANDING UT Domestic Entity Other
9 ----* BRIDGE PROJECTS, LP (3960721)  7 SALT LAKE CITY UT Domestic Entity Other
10 ----* CANYON VIEW PARTNERS, LLC (3961102)  7 PROVO UT Domestic Entity Other
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450 -* AMEX ASSURANCE COMPANY (3950526)  1 PHOENIX AZ Domestic Entity Other
451 -* AMERICAN EXPRESS FOUNDATION (3952744)  1 NEW YORK NY Domestic Entity Other
452 -* + NEW YORK STATE CORPORATE TAX CREDIT EQUITY FUND, L.P. (4036780)  1 NEW YORK NY Domestic Entity Other
453 -* AMERICAN EXPRESS BANK LLC (3939389)  1 MOSCOW RUSSIA International Nonbank Sub of Domestic Entities
454 -* AMERICAN EXPRESS AUSTRIA BANK GMBH  (3939491)  1 VIENNA AUSTRIA International Nonbank Sub of Domestic Entities
455 -* AMERICAN EXPRESS BANK LTD. S.A. (3939503)  1 CIUDAD DE BUENOS AIRES ARGENTINA International Nonbank
Sub of Domestic Entities
456 -* AMERICAN EXPRESS BANK (URUGUAY) S.A. (3939512)  1 MONTEVIDEO URUGUAY International Nonbank Sub of Domestic

* Institutions Matching Selection Rule
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Hierarchies of Ownership

An aggregating mechanism within the code itslef is present in the above example of the Federal Reserve's legal entity data base. There a sequence number combined with the parent ID that allows all legal entities to be organized across its organizational hierachy. However, the technolgical solution of hierachical structures in a centralized singularly controlled data base, as is the Federal Reserve's data base, is simpler than in the GLEIS where the required virtual data base with separte nodes across the globe is to be viewed and maintained as a single data base across its entire ownership hierarchy. Presently the GLEIF organizes the complete data base as a cancatenated file from daily downloads from multiple LOUs

The ROC has offered recommendations on relationship data, requesting entities that have or acquire an LEI to report their "ultimate accounting consolidating parent", defined as the highest level legal entity preparing consolidated financial statements, as well as their "direct accounting consolidating parent" to the LOU maintaining the LEI. This reporting is to begin May, 2017 and will be managed in a separate concatenated data base. In all cases, the identification of the parent would be based on the accounting definition of consolidation. The ROC is referring to this effort as a six month pilot, after which they will evaluate outcomes. They also have recognized that this falls short of complete hierarchies as requested by the FSB, which they expect to be addressed in further consultations.

The GLEIS
There are many references in the FSB and ROC documents that further improvements are warranted and the expected acceptance of existing LEIs and LOUs into the GLEIS might be subject to further scrutiny. In fact, the CFTC's appointment of the GMEI Utility's facility operator expired in mid-July 2014, then again in 2015, and was extended each time by another year awaiting the final implementation of the GLEIS. The

CFTC regulations also allow for multiple LOUs to be designated by the CFTC (see http://www.cftc.gov/ucm/groups/public/@newsroom/documents/file/cici_factsheet.pdf)) if the Global GLEIS is not yet operational. In Germany there are already two LOUs.

The LEI code design does not contain any link or handle to associate the LEIs to their respective parent registering entity, an approach that was thought to violate the concept of having no-intelligence in the code construcion adoped early in the code's design. Had this beeen allowed the use of the code for direct data aggregation would be facilitated. Now the code prefix (the first four digits of the code) links to the initial local operating unit that issued the LEI.

Fig 3 - Sample of Existing LEI Codes

- Post Nov 30, 2012
  - 5439-00-RGZJYII1SEAD-39
  - 5439-00-NN6KIX56NYMZ-82
  - 5439-00-R2RXX5U3QWHI-44
  - 5439-00-2GNBAU84FZOL-24
- Pre Nov. 30, 2012
  - EZGFBZUBSZ4QWOL703-95
  - OGHUSTPW44DZDNC7XV-23
  - LLCXAGHJKBLRTJUVZXTMH-59
  - BGGKTFDDYCJKLFYCXAC-12
- More to come:
  - 5299 + oo + entity-specific 12 character code + CD
  - 6354 + oo + entity-specific 12 character code + CD
  - 1392 + oo + entity-specific 12 character code + CD
  - 7890 + oo + entity-specific 12 character code + CD
  - 2534 + oo + entity-specific 12 character code + CD
  - 9695 + oo + entity-specific 12 character code + CD
  - ....
  - NNNN + oo + Multiple other formats

This prefix was manadated after Nov. 30 2012. This can be seen in a sample of existing LEI codes in the Fig. 3 above. In 2012 the GMEI Utility (formerly the CICI Utility) had to remove 20,000 previously assigned codes, 3,000 of which have already been used in trade reporting. This change occurred as the FSB and the ROC evolved their understanding of the code's registration process and use. More change may be expected as multiple uses for the LEI and its technology alternatives evolves.

Another example of LEIs in use is the German Postbank's currently registered LEIs at the German LEI registry.

Fig 4 - Describing a Hierarchy of LEIs in the GLEIS in Germany

QPA2KT0GZRLD6DKRHZ40	German Postbank AG
5299004D25S8SGTHNR85	German Postbank Best Invest chance
529900MSU9GH1I8Q1A55	German Postbank Best Invest growth
5299000A4W3W6SW7F947	German Postbank Business Basic
529900ACJ0HEJ87MLX69	German Postbank euro cash
5299001DF6SZJJ0E5T17	German Postbank Europe Fund shares
52990002CN0HNULFQ377	German Postbank Europe Plus Fund
529900E89XFNE6RK3916	German Postbank Europe pension funds
529900TYH44YY8WYW281	German Postbank global player
K7V3K4YZRNLVZAK8WA86	German Postbank International SA
529900B1ZSCSSCV13232	German Postbank Protekt Plus
5299006D03PCQ91Y3V07	German Postbank VL Invest

In the German Postbank example '5299' is the designation of the initiating German facility operator, WM Datenservice, the '00' is for future expansion and the remaining 12 alphanumeric characters are randomly generated, followed by two check digits calculated from the previous 18 characters. The formal LEI structure is presented below, to be adhered to by each LOU.

Fig. 5 - The LEI Structured Code Format
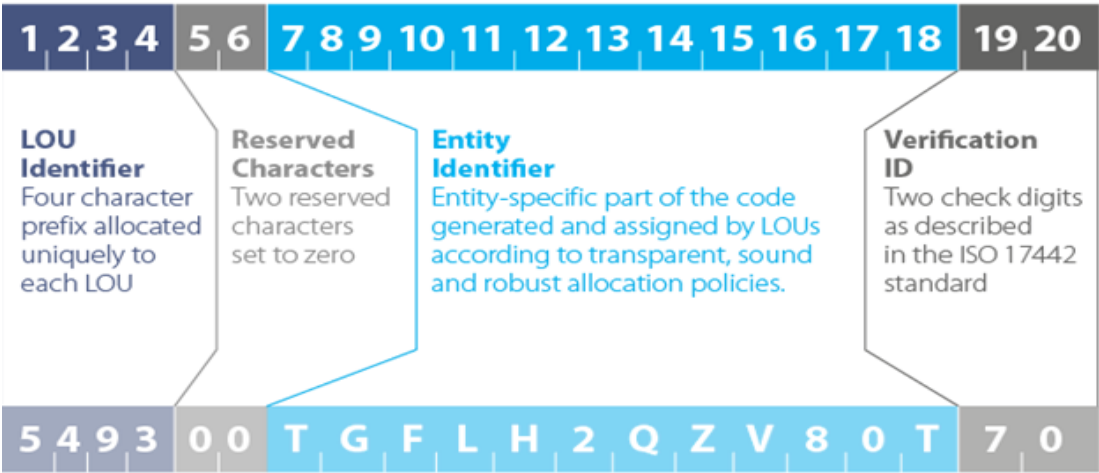
The two codes in the German Postbank example that starts with QPA2KT and K7V3K4 are left over from generating the entire code completely randomly that DTCC/SWIFT (the former CICI Utility now GMEI's facility operators) had used when they started to generate codes for their operation of a centralized LEI Utility for the issuance of all LEIs globally. These codes have been grandfathered into the interim GLEIS and subsequently transferred to the German LEI registry as are most other legacy LEIs have been transferred to other registries.

Global Dispersion of Grandfathered Codes
There are 160 countries that have companies that had been given an older code by DTCC/SWIFT (the operator of the GMEI Utility) that may have to be transferred. Given that each LOU must agree to transfer LEIs unconditionally to another LOU when asked by a registrant, the prefix originally assigned will no longer refer to the original LOU that first registered the LEI. In the current construction of the LEI code, the prefix must also be transferred as it is the only way that uniqueness of the code is maintained, given each LOU assigns the entity specific portion of the code (positions 7-18) using their own method. Duplicates would otherwise arise, although centralizing the issuance of a portion of the entity specific code would serve the same purpose of not allowing duplicates. An example of such a solution is described in a later section of this document, under Technical Solutions.

The Issues – Known and Yet To Be Explored

Duplicate Codes

Labeling a registering financial market participant with a globally unique LEI code is the first task of building a global coding scheme. A duplicate of the same legal entity but with a different LEI code is unacceptable. The same LEI code but with a different legal entity name is also unacceptable. The aim is to have a unique, unambiguous and universal coding scheme and quality reference data for describing the legal identity.

The early approach by the first approved LOU, the CICI utility (now the GMEI Utility) was to have itself be a third party facilities operators to both register name & address information and assign a code to the legal entity. Subsequently the ROC made it a requirement to have the legal entity self-register. Now only the code is to be created and assigned by domestically approved facilities operators (LOUs) or by third parties with the registrants' approval. For example DTCC/SWIFT is the CFTC's chosen operator in the US, WM Datenservice and the German Federal Register is BaFin's in Germany, INSEE in France, the Irish Stock Exchange appointed by its Central Bank for Ireland, the LSE's Sedol subsidiary is the chosen facility operator in England, Takasbank in Turkey, the Dutch Chamber of Commerce in the Netherlands – in all 31 pre-LOUs have been identified to date, 29 are operational – see [Endorsed Pre-LOUs of the Interim Global Legal Entity Identifier System (GLEIS)](). Regulatory sponsorship for LOU status is not required, but had been in the past. The GLEIF has now taken over accreditation of LOUs, having accredited four so far at the time of this documents publication in 2017.

In many cases LEI data must be resident in the sovereign domicile of the registered entity. This compounds the technical difficulty of updating of LEI data for the parent entity as multiple LEIs for a single ultimate registering parent will be spread across the world in multiple proprietary data bases run by multiple LOUs. This makes changes of LEI reference data by its parent entity a technological challenge. However, new Big Data initiatives, formerly the province of the military and intelligence community, and Distributed Ledger Technology implementations, formerly the province of the Blockchain, have now become pervasive in financial applications.

It should be expected that the design of the final GLEIS, as more is understood about the ultimate uses for it, will evolve to embrace such newer technologies better fit for more near real-time processing in support of all financial market participants needs throughout the financial supply chain. The applications of these new technologies in financial business applications is moving pre- and post-trade processes closer to near real-time which may necessitate the GLEIS to operate in near real-time as well.

The current registration process can also lead to duplicate registrations as LEI codes are being requested in the same overall business entity by globally scattered individuals. Further, lapsed (non-renewed) LEIs, now comprising 30% of all issued LEIs, may correspond to an entity that has ceased its activity or merged with another but did not inform the managing LOU. The risk to the GLEIS is that changes to an LEI in its name or status is not recorded and that a second LEI is assigned to the same entity, jeopardizing the uniqueness of the LEI. It would, thus, seem obvious that an executive such as the CRO, CFO, Counsel or

Compliance Officer of each registering business entity at the ultimate parent level should control these assignments centrally. This will also be a central point to keep the internal codes synchronized to the external LEI codes.

As indicated earlier in this research paper, the GLEIF is awaiting further decisions from the ROC's consultation on hierarchies of LEIs after the six month pilot ends at year end 2017. Thereafter, the GLEIF still appears committed to issuing a RFP to formally develop the final version of the GLEIS - see GLEIF, Board Meeting Minutes, https://www.gleif.org/content/1-about/6-governance/7-board-minutes/minutes-gleif-board-meeting-14-2015-06-24.pdf, June 24, 2015, at page 2

Mapping Issues

To aggregate financial transaction data associated with LEIs a mechanism for representing the same parent for a series of LEIs that it controls must be enabled. The GLEIS as envisioned at its final stage will have a subsidiary data base linking LEIs to other LEIs that are represented as immediate and/or ultimate parent LEIs. Therefore, there is nothing inherent in the LEI that will be present in a financial transaction that can permit the aggregation of the associated data with other LEIs under common control. This leaves the industry to again use mapping techniques for associating one LEI to another for aggregating information, an issue that was supposed to be resolved in the GLEIS.

The result would also continue perpetuating mapping tables for associating one LEI to many proprietary equivalent LEI codes leading to incremental operational risk as is the situation currently (see example of a mapping table for Tesco PLC below).

Fig 6- Partial Mapping Table for TESCO PLC with Existing Proprietary Codes

Alacra ID 1016514	LSE Ticker: TSCO
AVOX Avid 3213705	Moody's Global Credit Research 2714
BoardEx 30463	Mergermarket Intelligence 2155
BVD Zephyr GB00445790	Perfect Information Company Filings 1113
Capital IQ 413744	PHGroup 00445790
CICI: 7FTL6V8JNGVNYXY4HA68	Reuters Filings 100036877|Tesco PLC (ADR)
Corporate Board Member 8851	Revere Research Reports 218152
CUSIP: G87621101	S&P Credit Research 339672
DUNS # 216854067	SEC CIK: 0000885834
Experian 00445790	SEDOL: 0884709
Fitch Research 80359969	Swift BIC TSCOGB2LTPF, TSCOGB2LXXX
FCA (UK) ID: TESCO PLC	TF Disclosure Company Filings S_0884709, T318900000
Financial Times and FT.com Tesco PLC	TF Market Research TESCO PLC
Graham & Whiteside Executive Listing 0043625	Thomson StreetEvents TSCDY, TSCO.L
Hoovers In Depth Reports 90426	TableBase Statistics TESCO PLC
OneSource Company Reports 90171	TF Worldwide M&A 881575
ICC Document Images 00445790	TF Worldwide New Issues 881575, 88158F
Investext Investment Research TESCO PLC	UK Registration No.: 00445790

This mapping issue is exemplified by those LEIs registered for JPMorgan Chase (JPMC), a portion of which is shown below. JPMC may eventually need to register as many as 5,442 codes, one for each legal entity registered at the Federal Reserve, when all components of the GLEIS are fully operational. The codes in this example have been assigned by the GMEI Utility. The '5493' is the pre-LOU designation of the GMEI Utility assigned after Nov. 30, 2012.

Fig 7 JP Morgan Chase's LEIs in the Interim GLEIS for the US Swaps Market

QO1OF94G0YPTPSETN881	Commingled Pension Trust Fund (International Equity) of JP Morgan Chase Bank, N.A.
JJL0K5ZCQGWGDKVH2F57	Commingled Pension Trust Fund (International Rates) of JP Morgan Chase Bank, N.A.
54930002MRPG4D203Z16	LUCRF Pty Ltd as Trustee for the Labour Union Co-Operative Retirement Fund as custodied by JP Morgan Nominees as nominee for JP Morgan Chase Bank
3BHFFFIGJ4I48LGUZU82	Wellington Trust Company - National Association Multiple Collective Investment Funds Trust II - JP Morgan Pension Advisers Group Emerging Markets Debt Portfolio
4UPZD66XEST55IYY6C59	J.P. Morgan Securities (C.I.) Limited
5493009H2EPHG3FWFK39	J.P. Morgan Bank (Ireland) Public Limited Company
0L7IEHBDU4E5R3KF3U52	Commingled Pension Trust Fund (Emerging Markets-Fixed Income) of JPMorgan Chase Bank, N.A.
135694FS0VCYILCRE581	Commingled Pension Trust Fund (Fixed Income Sub-Advised PIMCO) of JPMorgan Chase Bank, National Association
1SOMMM7SK2U50QFO2P2	Commingled Pension Trust Fund (Mortgage Backed Securities) of JPMorgan Chase Bank, N.A.
2BIX7481YGGUUDUCU943	JPMorgan Chase Funding Inc.
37BETVJ1CAFYVBZGAG10	Commingled Pension Trust Fund (Global Opportunities) of JPMorgan Chase Bank, N.A.
3JW073HFQ5BWJ2WE6K78	Commingled Pension Trust Fund (Diversified Global) of JPMorgan Chase Bank, N.A.
3RF3Y6N71RVXLXWGXM56	Commingled Pension Trust Fund (Long Credit) of JPMorgan Chase Bank, N.A.
412KRG56ILM2ITGI5742	Commingled Pension Trust Fund (High Quality Long Credit) of JPMorgan Chase Bank, N.A.
4PVD1EFQH3I8B4M7S110	Commingled Pension Trust Fund (Emerging Markets - Equity Focused) of JPMorgan Chase Bank, N.A.
54930000CYUV09A9FH65	JPMorgan Fund ICVC - JPM Cautious Managed Fund
54930000U79ZJ622LX23	Chevy Chase Funding LLC, Mortgage Backed Certificates Series 2006-3
54930002MRPG4D203Z16	LUCRF Pty Ltd as Trustee for the Labour Union Co-Operative Retirement Fund as custodied by JP Morgan Nominees as nominee for JP Morgan Chase Bank

During the interim state of the GLEIS, in some instances a counterparty not registering for a LEI was permitted to default to a proprietary non-conforming code (SWIFT BIC codes have been allowed by some swaps regulations). Since then EU regulators have mandated the use of LEIs in all regulatory reporting beginning in 2018, although they are permitting lapsed LEIs to persist. The US has been behind in mandating such use of the LEI except in swaps regulations.

In recognition of the GLEIF's attempts to register LEIs where privacy situations prohibit such identification and to obtain ultimate parent/immediate parent LEIs, it may not be able to obtain LEIs for all such potential registrants. Therefore a default LOU code will be assigned and used in the interim state of the

GLEIS for such purpose. For ultimate parent/immediate parent LEIs, LOUs will be allowed to construct PNIs (Parent Node Identifiers) as a substitute for an LEI. The GLEIF has already suggested a default LEI could be created for other situations where no LEI is available (http://www.iosco.org/library/pubdocs/500/pdf/Global%20Legal%20Entity%20Identifier%20Foundation%20(GLEIF).pdf, at page 2). These 'rogue' codes may prove difficult to transition and could result in permanent mapping issues when the Global LEI System is finalized.

Finally, the reference entity referred to in a credit default swap (CDS) may also need to be specified as requiring a LEI as well as the identity of any referenced underlying financial instrument. Without it a global view of the systemic risk of a downgrade in credit rating or a defaulting company (the reference entity) will not be able to be aggregated across multiple CDS transactions in multiple data stores. Right now there are instances where regulators are allowing proprietary codes to be used (Markit's Red codes are one example having been allowed).

Resolving Names into LEI Codes
It should be noted that the lookup by name to retrieve a LEI is not a trivial exercise. The LEI registered names, unlike Domain Names that were created for the first time at the inauguration of the Internet, already existed before they were registered in the GLEIS. Therefore same named companies exist even though the entities are distinct. For example, the same named company can exist in different countries, provinces or states, making the legal domicile of the company important to be described in the search criteria. Such additional data is now to be included in the GLEIS.

Further, a distinct and uniquely identified legal entity identified by name and assigned a single LEI can be registered with multiple financial regulators, both domestically and globally. For purposes of data aggregation, and for local and systemic risk analysis, an understanding of the regulator that has supervisory risk responsibility for the entity would be important. Otherwise associating risk limits and risk triggers for appropriate computations of domestic market risk and global systemic risk would not be available to regulators in using the GLEIS. It would be left to local data providers or individual regulators to provide those links with no assurances of the quality or correctness of the mapping tables associating these relationships. Given the systemic risk objectives for the LEI initiative, and the global nature of the use of this data, this too is under consideration as a distinct additional data element to be included in the GLEIS.

Exploring Next Steps

Self-Registration
The focus of legal entity registration is on self-registration and self-certification as a recent ROC announcement (see http://www.leiroc.org/publications/gls/lou_20131003.pdf) clarified these requirements. It would therefore seem that the code and its supporting data could be both centrally coordinated internally by the parent entity and assigned by the financial market participant itself. This is how codes are registered and assigned domain names through Internet Service Providers (ISPs) on the

World Wide Web (WWW). This method has also been used in the global trade supply chain for barcodes for over four decades.

On the WWW we receive immediate feedback that tells us whether the code (domain name) is valid globally and that no duplicates have been registered. This is accomplished through the DNS (Domain Name Server) system, a federated name/code resolution service of the WWW. Also by assigning a globally unique randomly chosen prefix to each registrant's parent (as is now done for assigning a prefix to each registrant's LOU) it would allow the codes to be aggregated easily up to the ultimate registering parent level. More importantly, such a prefix would be available for aggregation without access to other external files, or to other reference information. It would be contained directly in the financial transaction which itself would contain the LEI thus making data aggregation of risk exposures possible through analyzing streaming data alone. This is a most important consideration as data communicated over networks can thus be parsed in real-time for observing triggers of systemic risk for regulatory purposes.

Current Implementation of LEI Registries

After three years of operating without LOU data standards data files have now been standardized for each submitting LOU in the Global LEI System. Data in these standard registration formats (see A Common Data File Format for Pre-LOUs, Part 2 : Framing Note) are now to be validated by accredited LEI facilities operators (LOUs) daily so that the LEIs can be checked for duplicates both internally and amongst all other pre-LOUs. Potentially, data bases of all the LEIs are to be kept updated at each facility operator to accommodate duplicate data checking. Expanding this technique to all sovereign countries that support their own LOUs can introduce more risk and costs. It is expected that there may be many more than just the 31 LOUs that had previously been authorized by the ROC (with only four accredited to date by the GLEIF) given LOUs now needn't get authorization by regulators anymore.

Alternates are being proposed as the GLEIF plans its transition to the final GLEIS including, perhaps, a simpler internet based duplicate checking solution and a federated virtual data base. This design is how the domain name registries on the World Wide Web work and can be used to provide a federated virtual view of all the component LEI data bases, as we now do when we do a Google search. This is a most promising solution for the final GLEIS. To its credit, the FSB and the ROC have endorsed such an internet-like design (see FSB report Global Legal Entity Identifier for Financial Markets at page 4 footnote 3). It remains to be seen how the Board of the GLEIF responds to this recommendation through its expected RFP noted above, especially as newer technologies have been introduced into the equation, most notably Distributed Ledger Technologies (DLTs), since the conceptualization of the LEI in 2008.

The Role of the GLEIF in Resolving GLEIS Issues

With the Board and staff of the GLEIS in place perhaps the lapsed issue will be resolved; perhaps the assignment process will be reevaluated; perhaps the required "plug-in architecture" and "network card", still described as the design criteria of the GLEIS in the FSB recommendation (see FSB report Global Legal Entity Identifier for Financial Markets at page 45) will be substituted for passing data files around the globe and concatenating all these files into a vulnerable-to-attack central data base.

Thereafter, with such improvements, it will be technically feasible that financial transactions can be matched in real-time via a globally unique counterparty identifier through multiple trading venues (SEFs) and multiple CCPs (see CFTC's "Concept Release on Risk Controls and System Safeguards for Automated Trading Environments" at the Federal Register / Vol. 78, No. 177 / Thursday, September 12, 2013 / Proposed Rules). Then as a byproduct, data aggregation of the LEI's swaps details across multiple SDRs is possible as is STP.

Finally, when trying to analyze systemic risk (ultimately the purpose of the Global LEI System), as in the "flash crash" and the "flash freeze" or in looking for the next systemic contagion, individual LEIs have to be aggregated up through a business entity's control hierarchy to see if the overall business is at risk.

The lack of a 'handle' or prefix as part of the code itself that associates each LEI to its ultimate registering parent and/or controlling entity appears to be an impediment to data aggregation for risk purposes. It may be seen as a temporary expediency in the acceptance of the current LEI code construction, a consequence of the preemptive early attempt of the incumbent US facility operator of the first LOU to advance its own design for the code. The CFTC granted temporary approval to the CICI Utility, later renamed the GMEI Utility which constructed their own code before the FSB began its deliberations formally and in earnest. Hopefully this can be resolved by the GLEIF in the final GLEIS design as the LEI codes are now mainly being used in external mapping tables as just another code. The LEIs sit at the edge of legacy systems in mapping tables, not embedded in them and, therefore, transitioning to a more robust code is relatively simple.

Technical Solutions

The Common Handle
Technology exists to rapidly gather globally disbursed codes into a top of the house single aggregate of risk exposure without any mapping tables when there is a common element in the code itself that is used as a primary key in the search criteria. The randomly generated entity specific code, part of the LEI, has no such 'handle' or prefix. The only handle or prefix is the designation of the initiating LOU, which itself has no use once a LEI has been transferred to another LOU. These transfers will be quite common as companies are acquired, spun-off or merged. The prefix is not to change or it will destroy the uniqueness of the LEI. Also a mechanism to recognize the component LEIs of a single parent entity is important when changes due to mergers, acquisitions, spin-offs, etc., occur. To date there is no mechanism to update the GLEIS globally for such corporate actions, leaving the interim GLEIS vulnerable to being out of synch with vendor and financial firms' updated systems.

Perhaps the GLEIS will transition its LEI codes to a unique global set of codes where access to and aggregation of each LEI belonging to a single parent or controlling entity is possible directly from the code, thus eliminating mapping tables. These codes could be assigned in blocks of randomly chosen codes by the GLEIF to on-boarding LOUs, and given by the LOU individually as single prefixes to each financial market participant as the self-registrant's control entity-level prefix (a Registration Domain Identity).

Fig 8 – Alternate LEI Code Substituting Multiple Unique Registering Parent for Unique LOU Prefixes

Alternative LEI ISO 17442:2012 Compliant Code						
Characters	1 – 4	5 - 6	7 - 17	18	19	20
Description	Prefix	Expansion	Legal Entity	Expansion	CD1	CD2
Notes	RID - Unique to each Registering Parent	Reserved by FSB	*(11) For use by each Registering Parent to assign unique LEI codes*	*For use by each Registering Parent*	*Check Digit Calculated from previous 18 characters 1 of 2*	*Check Digit Calculated from previous 18 characters 2 of 2*

As shown above each separate registrant entity, thereafter, would be left to themselves to combine their globally unique prefix to a sequence code for each LEI before registering their data. This later approach would synchronize the internal codes to the external GLEIS, thus assuring changes in one, such as those affected by corporate reorganizations, can be reflected in the other. This would also provide for eliminating mapping issues as both internal and external codes could be made identical and synchronized when the retirement or creation of new entities occurs. In the latter case the new Registering Parent Prefix would be substituted for the retired parent. The expansion characters would be used to indicate a changed prefix, thus eliminating the possibility of creating duplicates. A common "app", administered through the GLEIF, would be used to update both internal and GLEIS codes simultaneously.

The above concept fits well with the evolving understand of who is to own an entity's digital identity, especially as security of data becomes a paramount issue and networked distributed data bases, the Blockchain's DLT concept in particular, argues for elimination of infrastructure intermediaries, thus, placing end node validation at the entity itself (or a trusted third party, as would be the case of an auditor designated as a Registration Authority).

An Alternative Code Fit for Purpose
An example of an alternate code construction with the same capabilities as described above but also fitting within the existing ISO LEI 17442 -2012 code definition is shown below.

Fig 9 -Example of Alternative LEI Construction Existing Within Existing ISO LEI Standard

An example of its use is shown below, where '614141' would be assigned to the German Postbank in the earlier example making it technologically feasible to aggregate and/or locate LEIs that are distributed globally. More importantly, any financial transaction simply containing the '614141' prefix can be matched to its parent registering entity, thus facilitating counterparty risk exposure aggregation. The 'non-intelligent' requirement for constructing the LEI is preserved (non-intelligence is defined by the FSB as 'not able to parse the code to discern any meaning'). The parent entity referred to as '614141' is unknown to a computer looking at the code. It must be looked up in another data base or by referring to its reference data. That is not to preclude a human from memorizing the code and its owner, but that applies to all non-intelligent codes.

Fig 10 – Alternate LEI Use Case

Centrally Controlled RIDs	----	Regionally Distributed RIDs	---	Locally Registered RIDs
614141-00001	614141-00001	614141-00004	614141-00006	614141-00001-LOU#1
-00002	-00002	-00005	-00007	614141-00002-LOU#2
-00003	-00003			614141-00003-LOU#3
-00004				614141-00004-LOU#4
-00005				614141-00005-LOU#5
-00006				614141-00006-LOU#6
-00007				614141-00007-LOU#7

The First Test - Issues with Swaps Data

The CFTC and the EU are not able to aggregate data from the four (4) US SDRs it currently has under its supervision. See "CFTC's O'Malia Calls for Plan of Action on Swap Data" December 4, 2013 (http://www.jdsupra.com/post/documentViewer.aspx?fid=24d49e2b-ee06-40d4-aee3-30fb901b1daa) nor can the EU with its 6 SDRs. The CFTC has declared a 'problem' with aggregating data from their SDRs and called a public meeting of its Technology Advisory Committee in April, 2014 to address this. http://www.cftc.gov/PressRoom/PressReleases/pr6573-13.

Subsequently the CFTC issued a consultative paper on March 26, 2014 "Review of Swap Data Recordkeeping and Reporting Requirements" (http://www.cftc.gov/ucm/groups/public/@lrfederalregister/documents/file/2014-06426a.pdf). Responses were due May 27, 2015 and are available at http://comments.cftc.gov/PublicComments/CommentList.aspx?id=1484&ctl00_ctl00_cphContentMain_MainContent_gvCommentListChangePage=1. Specific questions on the LEI and the UPI and UTI (formerly identified as the Unique Swaps Identifier - USI), were asked. FIG's response is available at http://comments.cftc.gov/PublicComments/ViewComment.aspx?id=59876&SearchText.

A follow up consultation was issued by the CFTC on Dec. 22, 2015 (available at http://www.cftc.gov/idc/groups/public/@newsroom/documents/file/specificationsswapdata122215.pdf

> "In our original rules, we purposely didn't prescribe exactly how each field should be reported – for two principal reasons. First, when the agency issued the reporting rules, we didn't yet have any data to inform our views. And second, we needed the industry to take coordinated steps toward standardizing its reporting. That, unfortunately, has not happened."
>
> **Statement of Chairman Timothy Massad**
> **Request for Comment, Draft Technical Specifications**
> **for Certain Swap Data Elements**
> **December 22, 2015**

The aggregation issue has become a global issue as there are 21 other SDRs worldwide with the same data aggregation problems. Globally each will have to conform to standardized participant identifiers (the LEI), and yet unfinished (and unproven) product identifiers (the UPI), transaction identifiers (the UTI) and standardized ('harmonized') data elements placed in reportable swaps transactions in order to aggregate data. As such it is not yet determined whether the LEI is serving its purpose for uniquely identifying legal entities for aggregating financial transaction data (in this case swaps transactions) that contain the LEI. It is being dealt with by the FSB - see 'OTC Derivatives Markets Reforms, Sixth Progress Report" "issued on Sept. 2, 2013 at http://www.financialstabilityboard.org/publications/r_130902b.pdf.

> "In response to a call from G20 Finance Ministers and Central Bank Governors, the FSB has launched a feasibility study on how information from trade repositories can be aggregated and shared among authorities, so as to enable comprehensive monitoring of risks to financial stability….The study group anticipates publishing a report for consultation in February 2014 and a final report by the end of May 2014."
>
> **OTC Derivatives Market Reforms**
> **Sixth Progress Report on Implementation**
> **2 September 2013**

The FSB subsequently issued a consultative paper on Feb. 4, 2014. See "Consultation Paper: Feasibility study on approaches to aggregate OTC derivatives data", 4 February 2014 at https://www.financialstabilityboard.org/publications/r_140204.pdf.

The comments are available on the FSB's public website at http://www.financialstabilityboard.org/publications/c_140416.htm. FIG's response is at http://www.financialstabilityboard.org/publications/c_140416j.pdf. Final recommendations on the SDR aggregation issues were posted on the FSB's website on Sept. 19, 2014 at http://www.financialstabilityboard.org/2014/09/pr_140919/. The aggregation issues are being worked on with a mid-2017 target for resolving the remaining issues, at least at a framework level.

Late to understand, the regulators are now informed of the three components of data aggregation: (1) unique, global identification of a financial transaction by use of the LEI, UPI and UTI and its associated reference data; (2) proper identification and tagging of the data elements that define the specific components of any financial transaction, in this case a swap in its many forms and (3) the ability to timely update the data when corporate reorganizations occur. Data aggregation is the mantra, not just the standardization and labeling of the identification pieces of the transaction, but also the standardization and labeling of the component data elements of the transaction (what is referred to as data harmonization).

Final recommendations for the LEI, UPI and UTI where issued in 2016 for EU countries. Unfortunately the recommendations allows lapsed LEIs to be used (see ESMA/2016/1451, Final Report Guidelines on transaction reporting, order record keeping and clock synchronization under MiFID II, https://www.esma.europa.eu/sites/default/files/library/2016-

1451_final_report_on_guidelines_mifid_ii_transaction_reporting.pdf at page 26, October 10, 2016). This is in direct contradiction to the ROC's directive not to permit use of lapsed LEIs (see http://www.leiroc.org/publications/gls/lou_20151105-1.pdf , at page 26, Nov. 5, 2015). No equivalent US recommendations have yet been issued in the US, deferring instead to the initiatives still underway within the IOSCO-CPMI global deliberation and consultation process.

Privacy Issues

Finally the FSB has recognized that many sovereign governments have privacy laws protecting the identity of beneficial owners of companies registered in their jurisdictions from public disclosure. It is an impediment to the use of the GLEIS for systemic risk analysis if the individual LEIs registered in such countries cannot be rolled up to their ultimate parent entity.

> *"In particular, the FSB recommends the rapid development of the standards for LEI reference data on ownership and corporate hierarchies, as these data are essential to achieve one of the key objectives of risk aggregation for the global LEI system. The FSB consequently recommends that work is taken forward urgently to develop proposals and, if necessary, global standards for additional reference data on the direct and ultimate parents of legal entities to address the current operational constraints that prevent timely and effective data aggregation."*
>
> *"The next step in this work will need to address the challenge that some jurisdictions may not, at least immediately, be able to share such information due to confidentiality and privacy restrictions. That will also affect where such data can be stored in the global LEI system (locally or centrally). Ideally, legal and technical arrangements can be put in place to enable sharing of confidential information amongst the global financial community, although this warrants additional scrutiny."*
>
> **FSB Report Global Legal Entity Identifier for Financial Markets**
> **8 June 2012**

It can be assumed that in the absence of wholesale changes in individual country privacy laws a technical solution must be found. One such solution proposed publically by FIG and the FSB is the use of masking or encryption algorithms. In FIG's proposal this would be done at registration time for the LEI's parent prefix. This would permit disclosure of the LEI but masking its ultimate parent and, thus, allowing risk aggregation to be accommodated without public disclosure. Another approach, albeit a temporary one, is the GLEIF's assignment of a LEI-like substitute, the PNI for the initial ultimate parent/immediate parent pilot. During the pilot is will not make any PNI public nor any associated reference data.

> *"TRs sending aggregate-level data or data in anonymized form to the central aggregator could mitigate most of the confidentiality issues identified"*
>
> *"If a method can be found where anonymized data can be sent to the central entity with duplicates already removed, this may alleviate some of the legal challenges related to privacy, blocking or secrecy in the setting up of the central aggregator."*
>
> **Feasibility Study on Aggregation of OTC Derivatives Trade Repository Data**
> **Sept. 19, 2014**
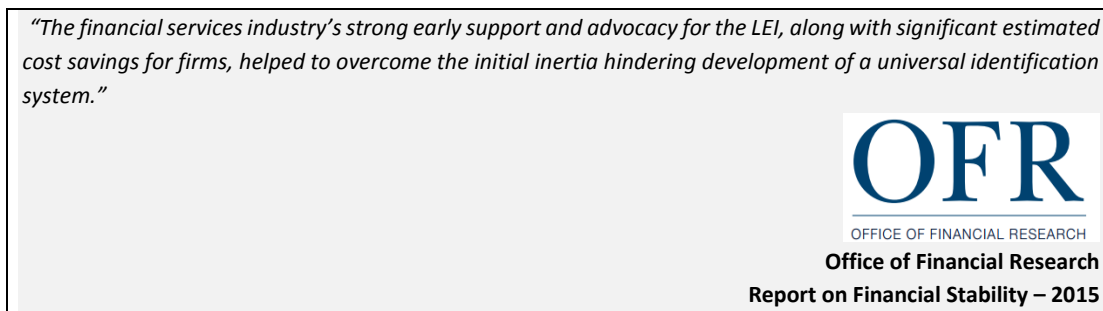
The Central Operating Unit

With the GLEIS launched and LOUs issuing LEIs it is still not understood how the GLEIF will approach the final design of the GLEIS nor when the Board will be prepared to take on other decisions after the immediate parent/ultimate parent pilot. At this same time neither the technical core of the federated GLEIS nor the required virtual data base, a virtual composite of all the separate LEI registries kept by contributing LOUs and conforming to an "Internet-like' federation, has been designed.

GLEIF is now maintaining an interim concatenated data base of the 29 LEI registries. There is no separate validation of duplicates, no validation of component data elements, and no validation of corporate reorganizations that have reference data implications. Further, there is not yet a mechanism for aggregating financial transactions up through their controlling parent entity using the LEIs nor is there a mechanism to update LEIs undergoing corporate events that change ownership and/or control of each LEI. Finally, the static once a year validation of the LEIs in the GLEIS may need to be replaced by near real-time updating and availability of LEIs in the final GLEIS.

Promises Made

With the accepted dysfunctional implementation of data standards, including the use of the LEI in data aggregation, in regulators' first use with swaps data repositories, lessons have been learned in (see Thomson Reuters, ESMA calls EMIR a success, but its communications depict an incomplete regime (https://www.complinet.com/editor/article/preview.html?ref=191542, Feb 17 2017).

It would also be important to fulfill the promise of cost savings (see below) made to the industry from implementation of a universal identification system that supported the first regulator, the OFR, to embrace the LEI initiative.

> *"The financial services industry's strong early support and advocacy for the LEI, along with significant estimated cost savings for firms, helped to overcome the initial inertia hindering development of a universal identification system."*
>
> **OFR**
> OFFICE OF FINANCIAL RESEARCH
> **Office of Financial Research**
> **Report on Financial Stability – 2015**

Consideration of modifications to the LEI standard to allow it to be used directly in data aggregation before extending its use further is more of a specification consideration than an implementation consideration. Such further consideration as first proposed by IOSCO-CPMI (CPSS and IOSCO, 2012, "Report on OTC derivatives data reporting and aggregation requirements - final report, annex 3," January, http://bit.ly/2iMKu7Y, at reference 111 page 65), in a similar approach as FIG's alternate LEI described earlier should be considered. It would fulfill the promise first made to the members of the global financial

industry by individual regulators in the US who first embraced the LEI concept. That promise was to assure the LEI passes the rigors of industry acceptance.

"The plans to create and adopt a standard LEI must pass the rigors of industry acceptance and be viable and reasonable in its implementation. Throughout all of this and future analysis, iterative implementation must be considered wherever possible. Although this point is more of an implementation consideration than a specification consideration, moving this standard forward in a meaningful way through iterative rollouts, implementation, and acceptance will provide benefit to industry more quickly and enable proper modifications to the standard"

Creating a Linchpin for Financial Data: The Need for a Legal Entity Identifier

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December 10, 2010

Financial InterGroup's Opinion

With uncertainty as to how hierarchies are to be maintained, how LEIs are to be managed that undergo corporate actions, and how LEIs in privacy jurisdictions are to be accommodated in the GLEIS, it may be presumptuous to assume the GLEIS is yet 'industrial strength' and fit for all intended purposes. In fact, it might be that the code itself would need to be modified so issued LEIs can be further 'transitioned' into permanent LEI codes with a capability to aggregate data while taking these yet to be decided factors into consideration.

> *"Because it is critical that these LEIs seamlessly transition into permanent LEIs once the global system is up and running, the ROC has worked to ensure that they meet regulatory needs, are consistent with one another, and are fully compliant with LEI data quality standards."*
>
> **OFR**
> OFFICE OF FINANCIAL RESEARCH
> **Office of Financial Research**
> **US Treasury**
> **2013 Annual Report**
> **Released 17 December 2013**

With all this uncertainty and work yet to be done one wonders what the rush is to turn on the GLEIS for anything other than the OTC derivatives regulatory system. The CFTC's LEIs began their issuance nearly four and a half years ago, long before they were given permission to do so by the ROC. The EU's swaps derivatives regime's first instance of the LEI's use has been underway for nearly two years. The LEIs have not yet been useful in unique swaps identification, there are suspected duplicates and almost one-third of the half million LEIs issued have lapsed. They are not yet the primary code used as the identifying code in construction of the UTI in reporting to the CFTC. Instead an existing CFTC code is mandated.

> *"In order to ensure uniqueness across all reportable transactions, a Unique Trade Identifier (UTI) is comprised of two parts:*
> *1. a UTI Prefix that is unique to the party generating the UTI; and*
> *2. a Transaction Identifier*
>
> *Since the USI Namespace is only available to those who register with the CFTC, not all trading counterparties are going to have one. Counterparties should first look to use the CFTC USI Namespace as the UTI prefix. If a Party does not have a CFTC USI Namespace, and needs to generate a UTI for global reporting, use characters 7-16 of the global LEI as the 10 character UTI prefix ….. If a party obtains an LEI from an LOU which is generating sequentially, it is possible that characters 7-16 of the LEI may be duplicated across multiple LEI recipients."*
>
> **ISDA**
>
> **Unique Trade Identifier (UTI):**
> **Generation, Communication and Matching**
> **2 October, 2014**

The UTI is now being proposed as a suffix constructed from the LEI as a prefix - a shortened (hashed) LEI of 10 characters is already being used in the US.

"Since the LEI is unique to each legal entity, it is well positioned to ensure that the UTI which is generated is unique. However, our strong preference would be that the LEI be used in the construction of the UTI Prefix, in the form of a 10 character algorithmic derivation"

ISDA

Joint Response to CPMI-IOSCO's Consultative Report on the Harmonization of the Unique Transaction Identifier (UTI)
September 30, 2015

The Japanese use of the BIC (SWIFT banking code) for its Swaps Trade Repository needs to be reconciled with its future use of the LEI. Singapore's use of the Markit Red code for reference entities must also be reconciled with its future use of the LEI. Relationships of each parent company's multiple LEIs must be organized to allow for data aggregation.

"As the global LEI system expands, one of its most important uses is to help regulators and market participants understand and document complex corporate structures or hierarchies. Some of the largest multinational banks have thousands of legal entities, many with similar names, operating around the Globe. Data about the relationships among corporations' legal entities can show networks of control, ownership, liability, and risks, giving financial regulators deeper insights into how financial market participants are connected to each other. "
"The OFR is helping a working group established by the LEI Regulatory Oversight Committee examine ways to add corporate hierarchy information to the global LEI database. "

OFR
OFFICE OF FINANCIAL RESEARCH

Office of Financial Research,
Annual Report 2014
Nov. 30, 2014

For now the current activity of inputting, collecting and cleansing legal entity data is an end unto itself. This is yet to produce the high quality single data source for unambiguous and universal legal entity definition that regulators and the industry desire. Might it, therefore, be best to first continue to improve data quality and the lapsed rate?

The current intent of the ROC is for LOUs to accept self-registered data from financial market participants, validate that data against business registries and other 'public and private sources' of this data and then issue a LEI after confirming and registering the data (currently name and address, headquarters location, legal status and business registry code). However, in many jurisdictions the business registry is not timely updated with as much as a half year between the filing of the registration and the updating of the business registry. The other sources of the new registry information is likewise not timely nor accurate, especially as it is obtained second hand, not from direct registration sources which would be the self-registering LEI requester. Further, some jurisdictions require a registrant for a LEI to be first registered in the business registry which is then used to validate the LEI registration. The use of the business registry and other sources, therefore, are neither timely nor do they provide a double check on accuracy. It is also an expensive process to buy/obtain data feeds of directories and other source information in order to perform a potentially meaningless validation.

In many jurisdictions it is required to have a professional designated as the registration agent for entries destined for the business registry, i.e. a lawyer, accountant and such other trusted and approved agents. Perhaps a better way would be to have a trusted second source validate inputs to the LEI registry from the originating source document itself.

With such validation at source it only remains to stand up the remaining component parts of the GLEIS in some logical order. First to make sure the LEI is fit for purpose for aggregating data for swaps transactions; then for other markets; and thereafter, to implement steps to meet the longer term goal of aggregating financial transaction and risk data for systemic risk analysis. Ultimately the GLEIS should be used exclusively in both financial institution systems and regulatory systems, thus replacing over time all proprietary codes for identifying financial market participants.

As of this writing the incomplete status of both the regulatory regime, the swaps regime in particular, and the GLEIS design has permitted multiple commercial interests, some of whom are entrepreneurial risk-takers, to take first mover advantage while regulators have admittedly rubber-stamped applications and let competitive forces reign. While free markets do call for competition and innovation, haven't we already learned our lesson that without proper regulation, in the end, the peoples' interests may not be well served. Taxpayers and shareholders may end up losers through bailing out overindulging financial institutions and underperforming politicians.

The attempt to implement a new risk regime comes at a time when possibilities are not constrained by communication and information processing technology. Today, the technology is ahead of our ability to utilize it. Big Data initiatives proliferate and the Distributed Ledger Technology of the Blockchain is being touted as the most significant technology since the Internet. Their potential uses are being held back by a combination of entrenched cultures, legacy systems morass, and wariness of the rancor between regulators and industry. However, how constraining the environment is, a system is built by one line of programming code at a time within an approved master plan. We may have prematurely initiated the global identification system and its operational processes for this most sophisticated network without a plan or a proper set of rules to build it to specification. We may have incorrectly allowed first movers to

become standards setters, best practices of the past to dictate our future, and concepts of code construction to be too narrowly defined by borrowing ideas of identity from other implementations that have no need for data aggregation.

The LEI is the first of what we have called the "Barcodes of Finance". In its first use it is a pillar for transacting swaps in a computerized transaction environment. It is the <u>glue</u> that will make this possible, yet very few understand its significance. That is because it constitutes 'plumbing', and C-suite executives are not inclined to go rummaging in the basement. Reporters who write for influential publications like the WSJ don't get too close to the LEI either. After all it is plumbing. We should not tempt fate by prematurely rolling out a system of such global significance without following the known rules of building complex information systems.

Note*: The opinions expressed are solely those of FIG.*

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