The Global Language of Business

Unique GS1 Identification

GS1 Architecture Finding

Release 1.0, Final, Sep 2022

Document Summary

Document Item	Current Value
Document Name	Unique GS1 Identification
Document Date	Sep 2022
Document Version	1.0
Document Issue	
Document Status	Final
Document Description	GS1 Architecture Finding

Contributors

Name	Organisation
John Terwilliger	Abbott Labs
Sue Schmid	GS1 Australia
Eugen Sehorz	GS1 Austria
Kevin Dean	GS1 Canada
Benjamin Couty	GS1 France
Jean-Christophe Gilbert (GUEST)	GS1 France
Nadi Gray	GS1 Global Office
Gena Morgan	GS1 US
Staffan Olsson	GS1 Sweden
Steven Keddie	GS1 Global Office
Robert Beideman	GS1 Global Office

Log of Changes

Release	Date of Change	Changed By	Summary of Change
1.0	Sep 2022	B Couty	Version approved at GS1 Architecture Group meeting in August 2022

Disclaimer

Table of Contents

1 Executive Summary

The goal of this Request for Finding (RFF) is to clarify the concept of unique GS1 identification that is used in the GS1 system and in many documents. The GS1 Architecture Group (AG) analysed the different rules and principles that define the way we allocate GS1 identification keys. For the purpose of illustrating these principles, an analysis of five GS1 key types has been made. Of the five, some identify classes of entities like trade items, some identify instances like logistic units, and GRAI, which has optional serialisation capacity may identify a class or instance of an asset, but is covered at the class level for the purpose of this Finding.

Two ways of looking at uniqueness were defined:

One identifier = one thing
One thing = one identifier

The analysis is summarised for a subset of GS1 identification key types below.

	One identifier = One thing	One thing = One identifier	Class or Instance
Trade Item (GTIN)	YES	NO	Class
Location/Entity (GLN)	YES	NO	Instance
Logistic Unit (SSCC)	NO (1 year rule)	YES	Instance
Returnable Asset (GRAI)	NO (no non-reuse rule)	NO	Class or Instance
Individual Asset (GIAI)	NO (no non-reuse rules)	NO	Instance

This finding provides a more complete understanding of "uniqueness" for these five GS1 identification key types as defined in the standards. It could assist the different groups and people working on the definition and/or implementation of the GS1 keys to avoid some mistakes. It could also help GS1 to improve guidelines and standard documents.

2 Request For Finding

In the GS1 community, there are different understandings of the terms "uniqueness" and "unique" that are used in the GS1 System to qualify a key.

It is necessary to clarify this concept of "unique GS1 identification" especially in the context of marketplace resellers but also in the development and implementation of services such as Verified by GS1 and the GLN Registry.

It's important to be sure that we speak with one voice.

To be more specific, several questions are raised around this concept of "unique GS1 Identification":

- Does it mean that for 1 GTIN value, there is only one trade item **AND** for one trade item, there is only one GTIN value? (e.g., one identifier=one thing AND one thing=one identifier)?
- What is the rationale to state in the GS1 General Specifications that the brand owner shall uniquely identify a trade item, if anybody else can identify the same item with another GTIN?
- Could an entity be identified by several GLNs?"

The AG shall stay away from the definition of rules to ensure unique GS1 identification and stay focused on defining the term.

Referenced documents for this Request For Finding:

- GS1 General Specifications - Release 22.0, Ratified, Jan 22
- GS1 Architecture Principles - Release 4.0, Approved, Jun 2020
- GTIN Management Standard - Release 1.0, Ratified, June 2016
- GS1 GLN Allocation Rules Standard - Release 3.0.1, Ratified, Aug 2021

3 Background of the request

The term "unique GS1 identification" is core to GS1's value proposition: "*The GS1 identification system provides the world a globally unique and unambiguous identification system for physical entities, parties, and relationships exchanged in the supply chain*." (GS1 General Specifications/1.3 Identification system policies).

For this reason, the GS1 System Architecture defines Unique GS1 identification as "A given GS1 identification key type value corresponds to one and only one entity within all specified application areas[1] for its lifecycle; two different entities within all specified application areas must have different values for each GS1 identification key type for its lifecycle. This applies to class and instance level identification." (GS1 System Architecture document).

This Finding uses the terms "one identifier" and "one thing". For the context of this Finding, a common understanding of the way these terms are used is required.

The term "*one thing*" means identified by one GS1 identification key type. This is important to understand as "one thing" may be identified by different GS1 identification key types. For example, a carton of product may be a trade item when it is sold then also a logistics unit when it is shipped. Within the GS1 system, these different use cases for identification (e.g., trade item identification versus logistic unit identification) require different GS1 identification key types. For a synopsis of GS1 identification key types, see GS1 General Specifications, Figure 1.4.8-1 and GS1 System Architecture, Table 4-1.

The term "*one identifier*" means one unique value (e.g., 123 not 124) for one identification key type (e.g., GTIN).

With this common understanding established, two ways of looking at uniqueness can be discussed.

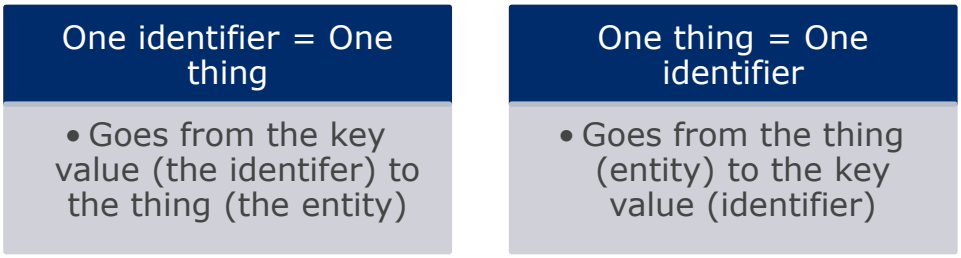

Figure 1: Ways of looking at uniqueness

For the concept on the left (One identifier=One thing), the GS1 system has key reuse rules which differ by GS1 identification key type. These reuse rules are based on expected lifecycles of the entities that are identified, and this is considered appropriate and coherent with the GS1 Architectural Principles. There are no gaps or issues identified within the GS1 General Specifications and GS1 System Architecture related to this concept.

This brings us to the second concept of uniqueness that must be discussed, the concept of One thing=One Identifier (identified by one GS1 identification key type with one, and only one, key value (e.g., 123 not 124) within an application area.

While the analysis of GS1 identification keys could span all of them, five keys have been assessed to illustrate the point of this RfF.

4 Uniqueness/GS1 keys

What the GS1 General Specifications and Architecture principles say:

The following statements apply to the full GS1 System:

[1] Application area (GS1 System Architecture document): A use case where some component of the GS1 system is used (e.g., for traceability, patient safety, last mile, eProcurement, consumer engagement).

1. *The GS1 identification system provides the world a globally unique and unambiguous identification system for physical entities, parties, and relationships exchanged in the supply chain* (GS1 General Specifications/1.3 Identification system policies)
2. *A GS1 identification key is a unique identifier for a class of objects (e.g., trade items) or an instance of an object (e.g., logistic unit)* (GS1 General Specifications/The GS1 identification system/1.4.7 GS1 identification key).
3. *The GS1 system is founded on identification keys whose values are unique within their designated application areas and which unambiguously identify business objects* (GS1 Architecture Principles)

AG Finding:

The three statements above further support the points expressed in section 3. In summary:

1. We have established that different types of things require different GS1 identification keys and are therefore identified by different identifier types.
2. We have established that, for the concept of "One identifier=One thing", the GS1 system has key reuse rules which differ by GS1 identification key type. Thus, the reuse rules should be consulted for each GS1 identification key. If a key may be reused, over time, one key may be used for more than one thing.
3. However, as we will see in the following sections, the GS1 system only supports the concept of "One thing=One Identifier" some of the time.

4.1 Trade Items (GTIN) at the class level[2]

4.1.1 "One identifier (GTIN) = One thing (Trade Item)" concept

What the GS1 General Specifications say:

Global Trade Item Numbers (GTINs) must be allocated uniquely (GS1 General Specifications/4.3 GTIN Rules/4.3.1 Management of uniqueness)

AG Finding:

This rule confirms the principle that "One Identifier = One Thing".

4.1.2 "One thing (Trade Item) = One identifier (GTIN)" concept

What the GS1 General Specifications and GTIN Management standard say:

1. *Each trade item that is different from another in design and/or content is allocated a unique identification number, which remains the same as long as it is traded. The same identification number is given to all trade items sharing key characteristics. Such numbers must be treated in their entirety throughout the supply chain* (GS1 General Specifications/ Trade Items/2.1.1 Introduction)
2. *A Global Trade Item Number (GTIN) is used to identify any item (trade item or service) upon which there is a need to retrieve predefined information and that may be priced or ordered or invoiced at any point in any supply chain. A separate, unique GTIN is required whenever any of the predefined characteristics of an item are different in any way that is relevant to the trading process* (GS1 General Specifications/4.3 GTIN Rules/4.3.2 Allocating the numbers)

[2] GTIN is covered at the class level as there are specific rules established for non-resuse. For trade item identification at the instance level using serialisation, no explicit rule exists in the GS1 General Specifications. This gap should be discussed by the appropriate GSMP group.

3. *If a company acquires a division of another company, but its GS1 Company Prefixes continue to be used in other divisions not acquired, then the acquiring company must change the Global Trade Item Numbers (GTINs) and Global Location Numbers (GLNs) for the acquired division within one year.* (GS1 General Specifications/Allocation/1.6.1 Acquisitions and mergers & 1.6.1.2 GS1 identification keys not transferred to acquiring company)
4. *The GTIN Management Standard represents the minimum GTIN changes that industry has decided upon. Brand owners may change the GTIN as often as they think is appropriate based upon their needs as well as the needs of their consumers and trading partners, considering the guiding principles defined in section 1.1."* (GTIN Management Standard/GTIN Management Standard and brand owner discretion (1.4))
5. There are some exceptions to the rules regarding responsibility described in GS1 General Specifications/4 Application rules and management practices/4.3 GTIN rules /4.3.3 Responsibility for allocating the Global Trade Item Number/4.3.3.2 Responsibility exceptions and non-branded items:
    - *Non-branded items: Items without a brand name and generic items (not private labels) are still assigned Global Trade Item Numbers (GTINs) by their manufacturer. As different manufacturers and/or suppliers may supply items that appear identical to the buyer (this could be a consumer as well as a retailer or manufacturer), it is possible that items that are apparently the same have different GTINs. Companies that trade in these items need to organise their computer applications (e.g., replenishment programs) to cope with this eventuality. Examples of items that sometimes have no brand are apples, plasterboard, candles, and drinking glasses. Examples for trade items that sometimes have no brand and are not intended for retail include salt, fragrances, and food cans.*
    - *Other exceptions: If the brand owner does not assign a GTIN, the importer or another intermediary can assign an item a temporary GTIN. This would imply that the importer takes on the role of the brand owner and could, for example, register the product in a data catalogue. This temporary GTIN may be used until a GTIN is assigned in the normal way. Alternatively, a retail organisation can assign an internal number to an item that does not yet have a GTIN assigned to it only if the item is used within its own stores.*

AG Finding:

1. Rules 1 and 2 above confirm the principle of "One thing (trade item) = One identifier (GTIN)".
2. Rule 3 above confirms that, for membership management reasons within GS1 (GCP management in the case of merger and acquisition…), the same trade item could be identified by more than one GTIN value.
3. Rule 4 specifies that the brand owner could decide to allocate multiple GTIN on its own initiative.
4. Rule 5 and the two sub-bullets show exceptions where a trade item could be identified by more than one GTIN value.

In conclusion, the "One thing (trade item) = One identifier (GTIN)" principle cannot be applied systematically for GTIN, but there is a limited number of exception cases. It should be left to the ID SMG whether the inconsistencies between these rules should be noted.

4.2 Location or Party (GLN)

4.2.1 "One identifier (GLN) = One thing (Location or Party)" concept

What the GS1 General Specifications and GS1 GLN Allocation Rules Standard say:

1. *The Global Location Number (GLN) provides a global supply chain solution by uniquely identifying parties and locations that are involved in business transactions.* (GS1 GLN Allocation Rules Standard, Release 3.0.1, Ratified, Aug 2021)
2. *The GLN is a globally unique and unambiguous GS1 identification key that can identify of any type of party or location used in business processes. The use of Global Location Numbers (GLNs) is driven by the exact role of each party and/or location within a given business process*. (General Specifications/2.4 Parties and locations)

AG Finding:

These 2 rules confirm the principle that "One Identifier = One Thing".

4.2.2 "One Thing (Location or Party) = One Identifier (GLN)" concept

What the GS1 General Specifications say:

1. *A separate, unique GLN is required to be allocated whenever there is a need to distinguish one party and/or location from another. (e.g., each store location is required to have a separate GLN to identify the physical locations).* (General Specifications/GLN rules/4.6.1 Allocating Global Location Numbers/4.6.1.1 Allocation general rule)
2. *GLNs SHALL be allocated by the party that defined the party/location in support of their business operations.* (General Specifications/GLN rules/4.6.1 Allocating Global Location Numbers/4.6.1.1 Allocation general rule)
3. *The below defines which party is responsible for allocating the GLN to a legal entity, function, physical location, or digital location. If a GLN is used to identify a combination of legal entity, function, physical location and/or digital location, all applicable rules SHALL apply*.
   - **Legal entity**: Allocating a GLN to a legal entity is the responsibility of the legal entity itself or another legal entity that is part of the same organisation. If multiple legal entities within an organisation have licensed GS1 Company Prefixes, the parties SHOULD coordinate GLN allocation.
   - **Function**: The organisation identifying their own, internal functions to support their business operation is responsible for allocating GLN.

   When representing itself as a legal entity or function in transactions, an organisation SHALL only use GLNs which the organisation has licenced. This means that an organisation SHALL NOT use another organisation's GLN to represent itself as a party.
   - ***Physical location**: The owner or primary user(s) of the physical location is responsible for allocating the GLN.*
     - *When a party allocates a GLN to a location they do not own, that party SHOULD inform the owner and/or primary users of the location.*
     - *Parties SHALL use a GLN allocated by their own organisation, the owner of the location, or a primary user that is a business partner directly involved in a specified transaction. A party SHALL NOT use a GLN allocated by an organisation that does not directly relate to their business relationships.*
   - ***Digital location**: The owner or primary user(s) of the digital location is responsible for allocating the GLN.*

   (General Specifications/GLN rules/4.6.1 Allocating Global Location Numbers/4.6.1.1 Allocation general rule)
4. ***Note**: The owner is the organisation that has the legal or rightful title to the physical or digital location. A primary user is an organisation that directly transacts with a physical or digital location. There may be multiple primary users associated to a single location.*

Example: an owner would be the organisation that has legal ownership of a mall. A primary user would be the organisation that is leasing a space within the mall for their retail store.

When allocating a GLN, an organisation SHOULD:

1. *Verify that the party and /or location is not already identified by a GLN.*
2. *Associate master data for the identified party/location to the GLN.*
3. *Communicate the GLN and associated date to trading partners in a timely manner.*

A company may assign a GLN to a physical location of which it is not the owner or primary user. This can be useful in cases where the same location is used for multiple purposes (e.g., a store is also used as receiving location for a mobile clinic) (General Specifications/GLN rules/4.6.1 Allocating Global Location Numbers/4.6.1.1 Allocation general rule)

5. *When a party/location needs to be identified by a GLN, the organisation defining the party/location in support of their business operations SHALL allocate the GLN. (General Specifications/GLN rules/4.6.1 Allocating Global Location Numbers/4.6.1.2 Party/location without Global Location Number)*
6. *If a company acquires a division of another company, but its GS1 Company Prefixes continue to be used in other divisions not acquired, then the acquiring company must change the Global Trade Item Numbers (GTINs) and Global Location Numbers (GLNs) for the acquired division within one year. (GS1 General Specifications/Allocation/1.6.1 Acquisitions and mergers & 1.6.1.2 GS1 identification keys not transferred to acquiring company)*
7. *Each company or organisation that is a member of a GS1 Member Organisation may use GLNs to identify locations under the terms of its membership. Contact details for all GS1 Member Organisations are available on the GS1 website, www.gs1.org. (GS1 General Specifications/2.4 Locations and parties/2.4.1 GLN definition)*

AG Finding:

1. The latest version of the Gen Specs Section 4.6.1 (Jan. 2022) improved the GLN allocation rules as it relates to the principle "One thing = One Identifier" the identification of "Legal entity", "Function", "Physical location" or "Digital location".
2. The first rule above confirms the principle of "One thing (location or party) = One identifier (GLN)".
3. Rule 2 above "*GLNs SHALL be allocated by the party that defined the location in support of their business operations"* explains that, in some case, the same location could have several GLNs which could be perceived as contradictory with the "One Thing = One Identifier" principle. An example of this is a shared facility where multiple parties may define GLNs for the facility as a "ship to" location for their organisation.
4. In the third block of rules, for "Physical location", it is still possible to assign different GLNs for the same physical location (*The owner or primary user(s) of the physical location is responsible for allocating the GLN ... There may be multiple primary users associated to a single location*).But, the sentence "*When a party allocates a GLN to a location they do not own, that party SHOULD inform the owner and/or primary users of the location*" encourages users to respect the owner or primary user rule.
5. In the fourth block of rules, the rule "*When allocating a GLN, an organisation SHOULD: 1 Verify that the party and /or location is not already identified by a GLN…"* also encourages users to respect the "One Thing = One Identifier" principle.
6. Rule 5 above confirms that if the party/location is not identified by a GLN, the user of that party/location can allocate the GLN ("*in support of their business operations")*, which confirms that sometimes the principle "One thing = One Identifier" may not be respected.
7. Rule 6 above also confirms that, for membership management reasons within GS1 (GCP management in the case of merger and acquisition…), the same location or party (division of the company) could be identified by more than one GLN value.

In conclusion, the rules confirm that the same location could be identified by more than one GLN value. We can conclude that the "One thing (party or location) = One identifier (GLN)" principle cannot be applied systematically for GLN.

4.3 Logistic units (SSCC)

4.3.1 "One identifier (SSCC) = One thing (Logistics Unit)" concept

What the GS1 General Specifications say:

1. *The SSCC ensures that logistic units are* ***identified with a number that is unique worldwide*** (GS1 General Specifications/2 Application standards/2.2 Logistic units)
2. *An individual Serial Shipping Container Code (SSCC) is a unique number, which remains the same for the life of the logistic unit to which it is assigned. When assigning an SSCC, the rule is that an individual SSCC number must not be reallocated within one year of the shipment date*

from the SSCC assignor to a trading partner. However, prevailing regulatory or industry organisation specific requirements may extend this period. (GS1 General Specifications/4 Application rules and management practices/4.4.1 Allocating Serial Shipping Container Codes/4.4.1.1 General Rules)

AG Finding:

These first and second rules and recommendations confirm the principle of "One identifier (SSCC) = One thing (logistic unit)" but, due to the reuse possibility, for a defined period of time.

4.3.2 "One thing (Logistics Unit) = One identifier (SSCC)" concept

What the GS1 General Specifications say:

*An individual Serial Shipping Container Code (SSCC) is a **unique number**, **which remains the same for the life of the logistic unit** to which it is assigned. When assigning an SSCC, the rule is that an individual SSCC number must not be reallocated within one year of the shipment date from the SSCC assignor to a trading partner. However, prevailing regulatory or industry organisation specific requirements may extend this period.* (GS1 General Specifications/4 Application rules and management practices/4.4.1 Allocating Serial Shipping Container Codes/4.4.1.1 General Rules)

AG Finding:

In conclusion, the rules confirm the principle of "One thing (logistic unit) = One identifier (SSCC)".

4.4 Returnable Assets (GRAI)

4.4.1 "One identifier (GRAI) = One thing (Returnable Asset)" concept

What the GS1 General Specifications say:

1. *The latter (the GRAI) is assigned to uniquely identify, together with the GS1 Company Prefix, a particular kind of asset. The GRAI remains the same for all identical returnable assets. Although consecutive numbering is recommended, the structure is left to the discretion of the assigning company. An optional serial component may be used to distinguish individual assets within a given asset type.* (GS1 General Specifications/2 Application standards/2.3 Assets/2.3.1 GRAI)
2. *Asset identifiers must not be used for any other purpose and must remain unique for a period well beyond the lifetime of the relevant records. If a company assigns asset identifiers to trade items supplied to its customers, the company must ensure that the asset identifiers are never reused.*

   All issuers of asset identifiers must ensure that asset identifiers (GRAIs, GIAIs) allocated for medical devices/equipment used for treatment of a patient SHALL never be reused. (GS1 General Specifications/4 Application rules and management practices/4.5 Rules for GS1 asset identifiers/4.5.1.2 Lead time in reusing GS1 asset identifiers)

AG Finding:

These rules and recommendations are supportive of the principle of "One identifier (GRAI) = One thing (Returnable Asset)" principle for returnable assets. But, because there is no reuse rule defined for GRAI, we cannot confirm the principle of "One identifier (GRAI) = One thing (Returnable Asset)"

4.4.2 "One thing (Returnable Asset) = One identifier (GRAI)" concept

What the GS1 General Specifications say:

1. *The latter (the GRAI) is assigned to uniquely identify, together with the GS1 Company Prefix, a particular kind of asset. The GRAI remains the same for all identical returnable assets. Although consecutive numbering is recommended, the structure is left to the discretion of the assigning company. An optional serial component may be used to distinguish individual assets within a given asset type.* (GS1 General Specifications/2 Application standards/2.3 Assets/2.3.1 GRAI)

2. *If a company sells an asset to another company, then the asset identifier SHOULD ideally be replaced by another Global Individual Asset Identifier (GIAI) or Global Returnable Asset Identifier (GRAI) within one year or be removed from the asset* (GS1 General Specifications/Allocation/1.6.1 Acquisitions and mergers & 1.6.1.2 GS1 identification keys not transferred to acquiring company)

AG Finding:

In conclusion, the rules above confirm that the principle of "One thing (returnable asset) = One identifier (GRAI) cannot be applied.

4.5 Individual Asset (GIAI)

4.5.1 "One identifier (GIAI) = One thing (Individual Asset)" concept

What the GS1 General Specifications say:

1. *This element string (the GIAI) identifies a particular physical entity as an asset. It must not be used for other purposes and must be unique for a period well beyond the lifetime of the relevant asset records. Whether or not the assigned Global Individual Asset Identifier (GIAI) may remain with the asset when changing hands depends on the particular business application. If it remains with the asset, it SHALL never be reused.* (GS1 General Specifications/2 Application standards/2.3 Assets/2.3.2 GIAI)
2. *Asset identifiers must not be used for any other purpose and must remain unique for a period well beyond the lifetime of the relevant records. If a company assigns asset identifiers to trade items supplied to its customers, the company must ensure that the asset identifiers are never reused. All issuers of asset identifiers must ensure that asset identifiers (GRAIs, GIAIs) allocated for medical devices/equipment used for treatment of a patient SHALL never be reused. Also, GIAIs that are marked directly on safety critical components and parts, such as used in rail, SHALL never be reused*. (GS1 General Specifications/4 Application rules and management practices/4.5 Rules for GS1 asset identifiers/4.5.1.2 Lead time in reusing GS1 asset identifiers)

AG Finding:

These rules confirm that the principle "One identifier (GIAI) = One thing (Individual Asset)" should generally apply, at least "*for a period well beyond the lifetime of the relevant asset records"*. But, because there is no reuse rule defined for GIAI, we cannot confirm the principle of "One identifier (GIAI) = One thing (Returnable Asset)"

4.5.2 "One thing (Individual Asset) = One identifier" (GIAI) concept

What the GS1 General Specifications say:

1. *This element string (the GIAI) identifies a particular physical entity as an asset. It must not be used for other purposes and must be unique for a period well beyond the lifetime of the relevant asset records. Whether or not the assigned Global Individual Asset Identifier (GIAI) may remain with the asset when changing hands depends on the particular business application. If it remains with the asset, it SHALL never be reused.* (GS1 General Specifications/2 Application standards/2.3 Assets/2.3.2 GIAI)
2. *If a company sells an asset to another company, then the asset identifier SHOULD ideally be replaced by another Global Individual Asset Identifier (GIAI) or Global Returnable Asset Identifier (GRAI) within one year or be removed from the asset* (GS1 General Specifications/Allocation/1.6.1 Acquisitions and mergers & 1.6.1.2 GS1 identification keys not transferred to acquiring company)

AG Finding:

In conclusion, the rules above confirm that the principle of "One thing (returnable asset) = One identifier (GRAI) cannot be applied.

4.6 Summary of Findings

The previous analysis and conclusions are summarised below.

	One identifier = One thing	One thing = One identifier
Trade Item (GTIN)	YES	NO
Location/Entity (GLN)	YES	NO
Logistic Unit (SSCC)	NO (1 year rule)	YES
Returnable Asset (GRAI)	NO (no non-reuse rules defined)	NO
Individual Asset (GIAI)	NO (no non-reuse rules defined)	NO

5 Next steps

Based on these findings regarding the interpretation of "uniqueness", the GS1 Architecture Group suggests the following actions:

1. Review by the ID SMG of the Finding to determine whether or not improvements are needed in the standards (e.g., clarity of the "life of a logistics unit" meaning, confirm that the GS1 General Specifications present an example(s) regarding multiple GLNs for one physical location, for example the same physical location may be identified by multiple GLNs by different parties who have different master data and/or context for the locations use, reuse of identification keys such as GIAI and GRAI)
2. Document that explains the principles of identification (framework that can be done by the AG) that can serve as reference for all GSMP groups that will work on identification subjects.