

# Law Enforcement Information Sharing Program Exchange Specifications

LEXS 311



August 22, 2007

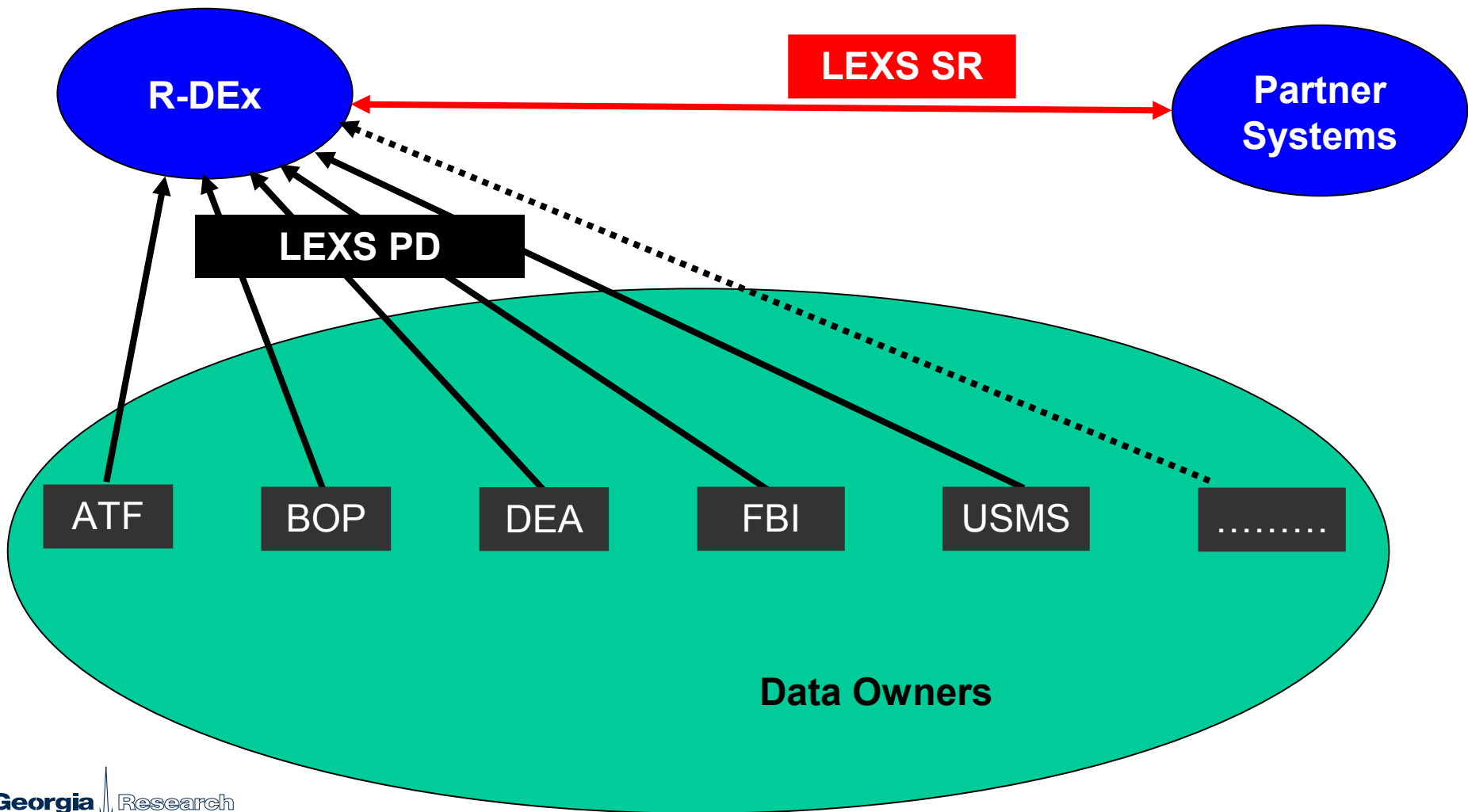


# What is LEXS?

- A **family of IEPDs** for information sharing
  - Publication & Discovery (LEXS-PD)
    - For publishing and updating data from a source to a consumer
    - Used for data sources publishing to R-DEx, N-DEx and other information sharing systems
  - Search & Retrieval (LEXS-SR)
    - For system-to-system federated searches (including link analysis) and result drill-downs
    - Used for interconnections between R-DEx and partner systems (LInX, ARJIS, T-DEx, etc.)
- A **generic paradigm** for information sharing – the “*data item*”
  - Focused on “connecting the dots” (data fusion and entity analytics)
  - Single interface for heterogeneous data (e.g., investigative files, call logs, watch lists)
  - Supports needs of computers and humans
    - Structured data for automated processing
    - Unstructured data and display instructions for humans
- An **extensible framework** for creating interoperable IEPDs
  - Example: N-DEx “extends” LEXS to support incident-specific data, yet R-DEx will be able to process and display N-DEx data *without system modification*.
  - Significant mitigation of IEPD Consistency and Polyglot problems
- Originated from Law Enforcement needs, but designed for **broad audience**



# Application of LEXS: R-DEx & Partner Systems





## How do NIEM and LEXS relate?

- LEXS is **compliant** with NIEM
  - All schemas are based on NIEM building blocks
  - Follows NIEM Naming and Design Rules (NDR)
  - In many ways, like any other NIEM IEPDs
- LEXS helps expand NIEM **acceptance and use**
  - All LEXS IEPDs are NIEM IEPDs
  - Addresses some unresolved problems
  - LEXS is a NIEM *innovator* providing first *confirmation* (diffusion)
- Eventually, much of LEXS structure may **become part** of NIEM
  - New *content* will be submitted as part of IEPD lifecycle
  - Message *structure* may provide benefit to NIEM community



# Problem #1: The “IEPD Consistency” Problem

## Definition:

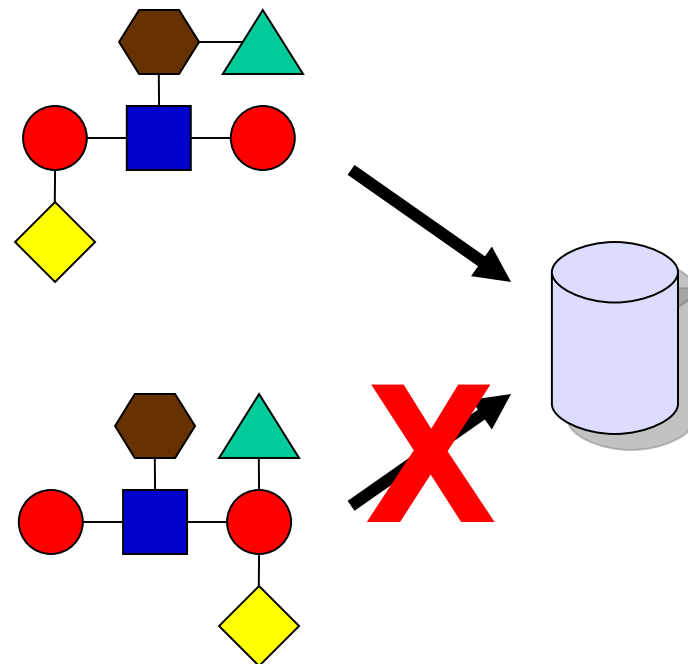
Two groups *independently* developing IEPDs for the *same purpose* may (nay, *will*) create *incompatible* IEPDs.

## Result:

*Small-scale* interoperability between *coordinating* partners, but not large-scale interoperability between independent community members (i.e., the *ultimate promise of standards*)

## Mitigations:

- Top-down standards: requires “center of mass”
- Formal standards: long, arduous process
- Consensual standards: hard to gather and govern enough participants to “tip”





## Problem #2: The “Polyglot” Problem

### Definition:

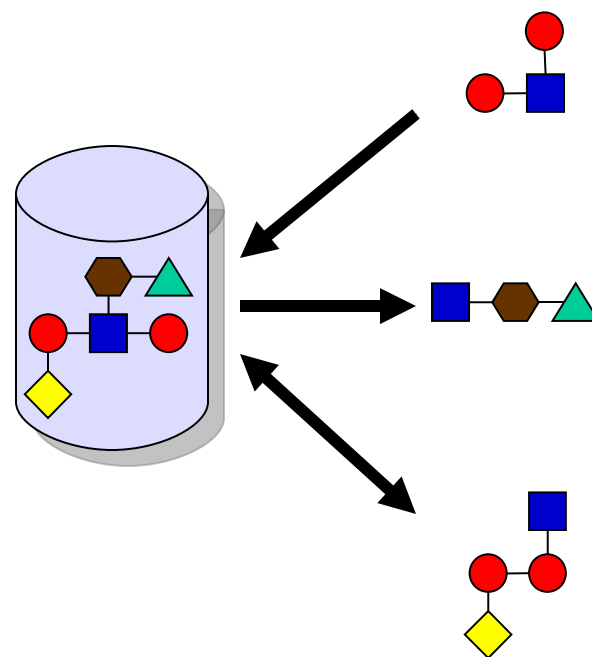
An organization that exchanges data with **multiple partners** must simultaneously support multiple **distinct IEPDs**.

### Result:

Cost and expertise are **limiting factors** in the attempt to create **robust, rich networks** of information exchange – instead, sharing is **disjoint** and/or **shallow**

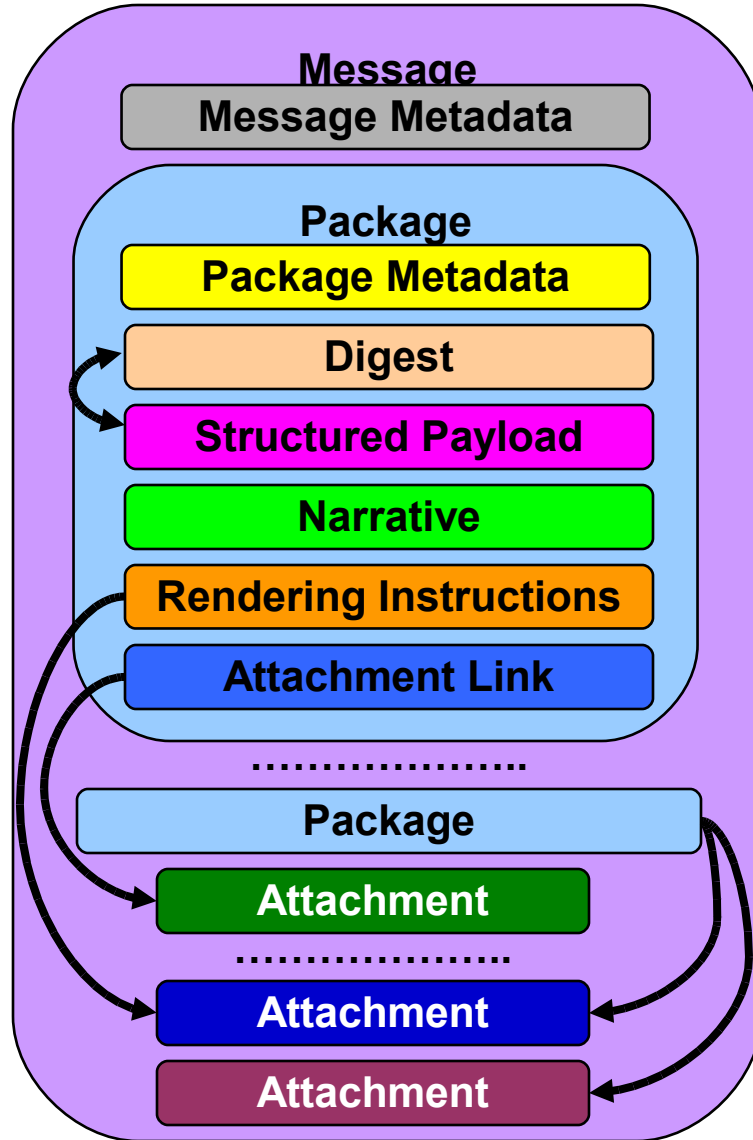
### Examples:

- OCDETF Fusion Center: 18 separate interfaces, limited structured data
- State fusion centers will need to:
  - Combine data from local systems
  - Share data horizontally with other state systems
  - Pass data up to national systems





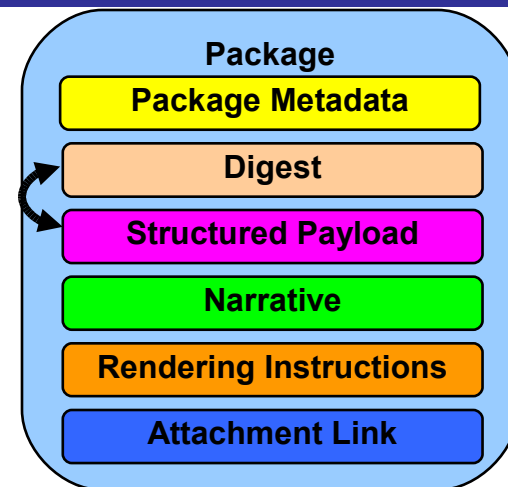
# LEXS 3.1 Structure





# LEXS Data Item Structure

- Package
  - Package Metadata
    - Identification, contact information, etc.
  - Digest
    - Standardized structured entities, roles, and associations
    - Foundation of run-time interoperability
  - Structured Payload
    - Based on independently created schemas
    - Can be ignored if not recognized/understood/implemented by consumers
    - Provides framework for extensibility
  - Narrative
    - Unstructured (text) data
  - Rendering Instructions
    - XSLT or pre-rendered (e.g., PDF) attachments
    - Can reference content in un-recognized structured payloads
    - Foundation of interoperable display (human understanding)
  - Attachment Link
    - Semantically rich associations (e.g., facial image, SMT image)





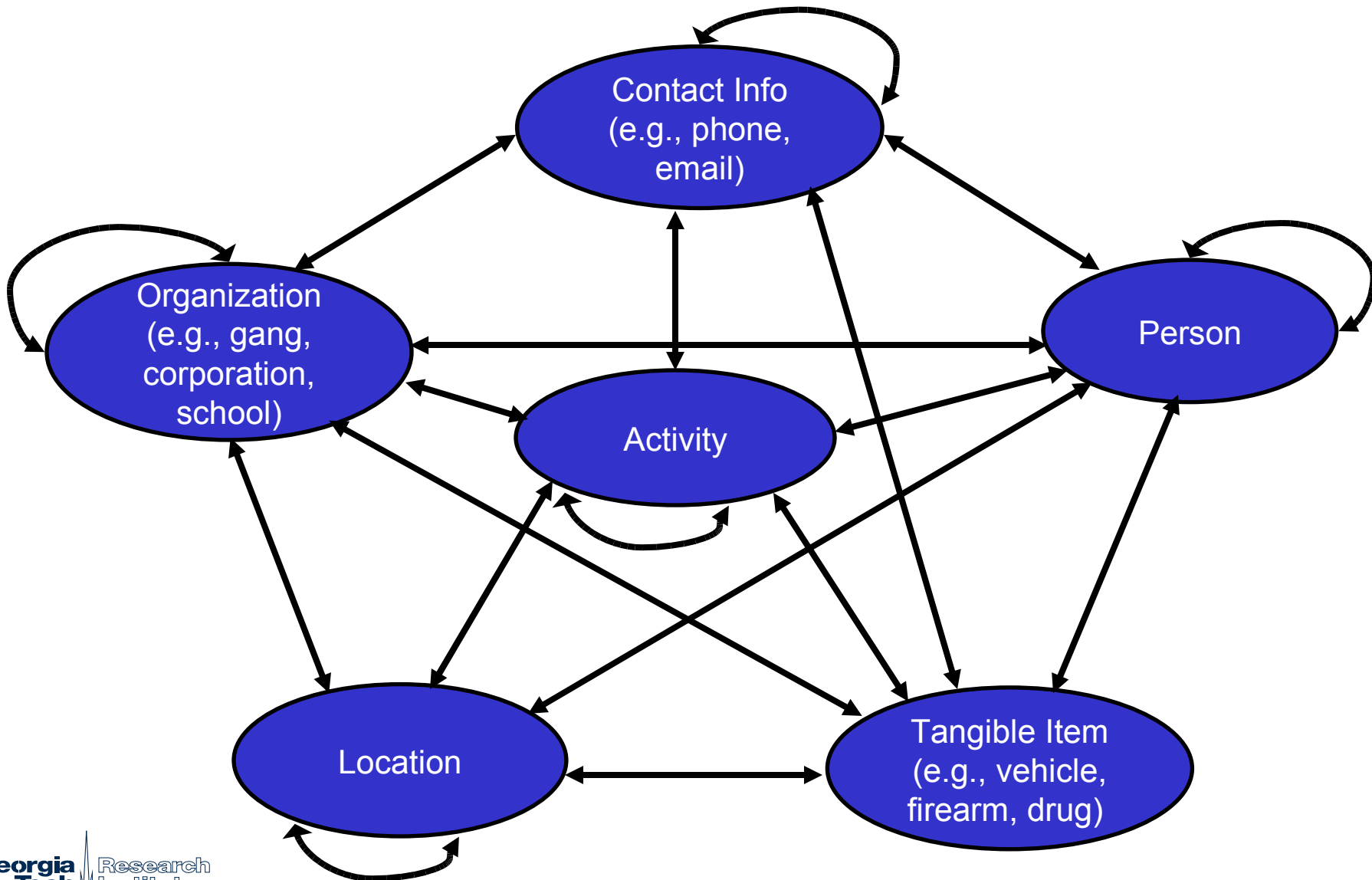


## LEXS 3.1 Digest Entities and Roles

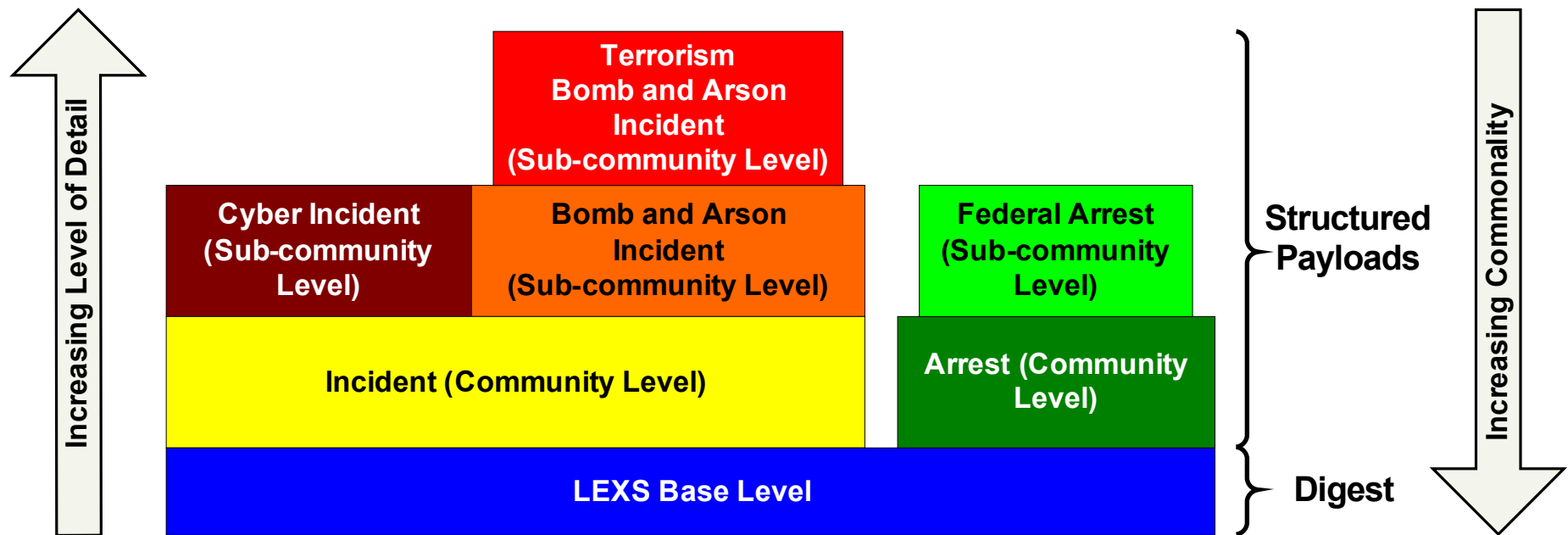
- Activity
  - Person
  - Location
  - Organization
  - Telephone Number
  - Email Address
  - Tangible Item
  - Aircraft
  - Vessel
  - Vehicle
  - Drug
  - Firearm
  - Explosive
  - Substance
- Enforcement Official, Subject, Victim, Witness, Missing Person, Judge, etc.
- Criminal Organization, Vehicle Brander, Subject, Victim, etc.
- Weapon, Property
-



# LEXS 3.1 Digest Entities and Associations



# LEXS Extensibility





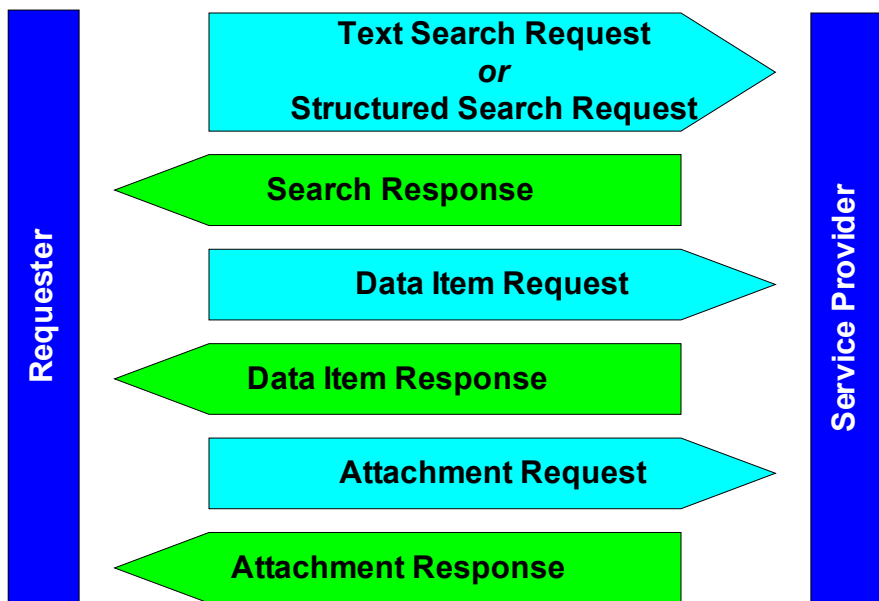
# LEXS Extensibility Example

```
<lexs:Message>
  <lexs:MessageMetadata> ---- </lexs:MessageMetadata>
  <lexs:Package>
    <lexs:PackageMetadata> -----</lexs:PackageMetadata>
    <lexs:Digest>
      -----
      <lexsdigest:EntityPerson>
        <lexsdigest:Person s:id="Sub2">
          -----
          </lexsdigest:Person>
        </lexsdigest:EntityPerson>
      -----
    </lexs:Digest>
    <!--===== Data from another community =====-->
    <lexs:StructuredPayload>
      <lexs:StructuredPayloadMetadata>
        <lexs:CommunityURI>http://somewhere.gov/XYZ/1.0</lexs:CommunityURI>
        <lexs:CommunityDescription>XYZ group</lexs:CommunityDescription>
        <new:Person>
          <nc:PersonNamePrefix>Dr.</nc:PersonNamePrefix>
          <lexslib:SameAsDigestReference lexlib:ref="Sub2"/>
        </new:Person>
      </lexs:StructuredPayload>
      -----
    </lexs:Package>
  </lexs:Message>
```

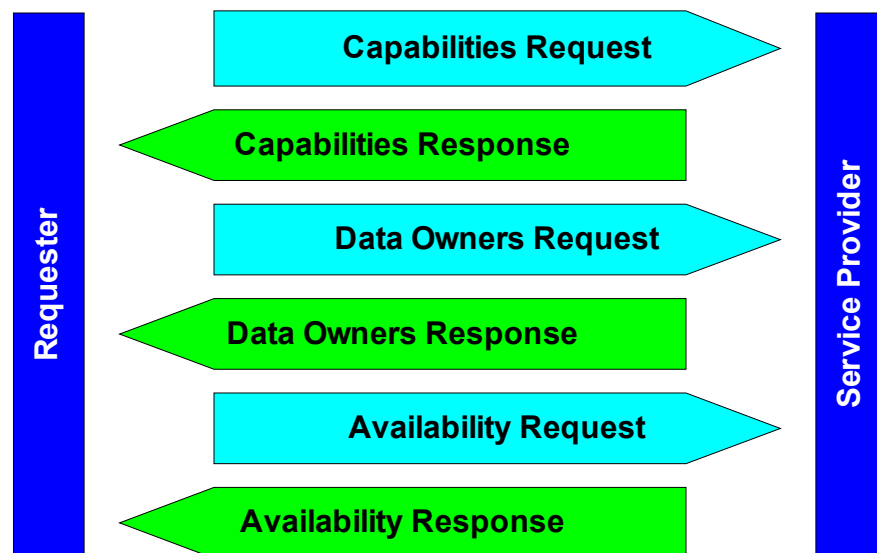


# LEXS SR Requests and Responses

## Data Oriented Messages



## Service Provider Oriented Messages





## LEXS Text Search Capabilities

- Search on all terms using AND
  - John AND Doe
- Search on any terms using OR
  - John OR Doe
- Mix and match AND with OR
  - (John AND (Doe OR Smith))
- Exact phrase
  - “John Doe”
- Wildcards
  - John AND Do\*



## LEXS Structured Search Capabilities

- Can include digest and structured payload terms
- Wildcards
  - PersonSurName = Do\*
- Fuzzy search
  - Defined by responder, may be soundex, metaphone, etc.
- Date and numeric ranges
  - PersonBirthDate between 1/1/1970 and 1/1/1975
- Multiple values for a single field
  - PersonGivenName Janet or Janice or Jennifer



## Indicating Entities Are or May Be the Same

- A and B *are* the same person and same entity record in *different* data items
- A and C are *suspected* to be the same person but the information was captured in different entity records in *different* data items
- A and D are *different* people and *different* entity records

A
<b>Name: John Doe</b>
<b>SS#: 087-67-8945</b>
<b>SourceID: ATF-SID-765</b>
<b>LogicalID: ATF-LID-700</b>

B
<b>Name: John Doe</b>
<b>SS#: 087-67-8945</b>
<b>SourceID: ATF-SID-765</b>
<b>LogicalID: ATF-LID-890</b>

C
<b>Name: John Dione</b>
<b>SS#: 087-67-8935</b>
<b>SourceID: ATF-SID-789</b>
<b>LogicalID: ATF-LID-700</b>

D
<b>Name: John Doe</b>
<b>SS#: N/A</b>
<b>SourceID: ATF-SID-888</b>
<b>LogicalID: ATF-LID-901</b>





## LEXS 3.1 Wrap-up

- Based on NIEM 2.0
- Supports publish and search
- Supports structured and unstructured (text) data
- Mitigates IEPD consistency and polyglot problems
- Flexible search capabilities
- Originated from Law Enforcement needs, but designed for broader audience