

Workshop on the Future of TransXML: Where Have We Been?

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Where Have We Been?

TransXML Content:

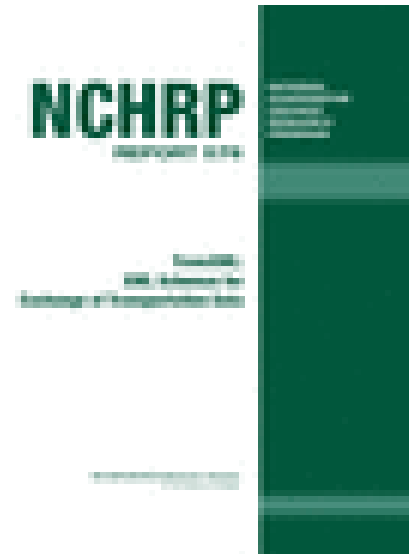
Overview of the original 2006 TransXML Project

What was the 20-64 TransXML Project

- Developed standard, public domain XML schemas for the exchange of transportation data
- Created a framework for the development, validation, dissemination, and extension of current and future schemas
- Initial focus was on four business areas:
 - Survey / roadway design
 - Transportation construction / materials
 - Highway bridge structures
 - Transportation safety

TransXML Technical Work Process

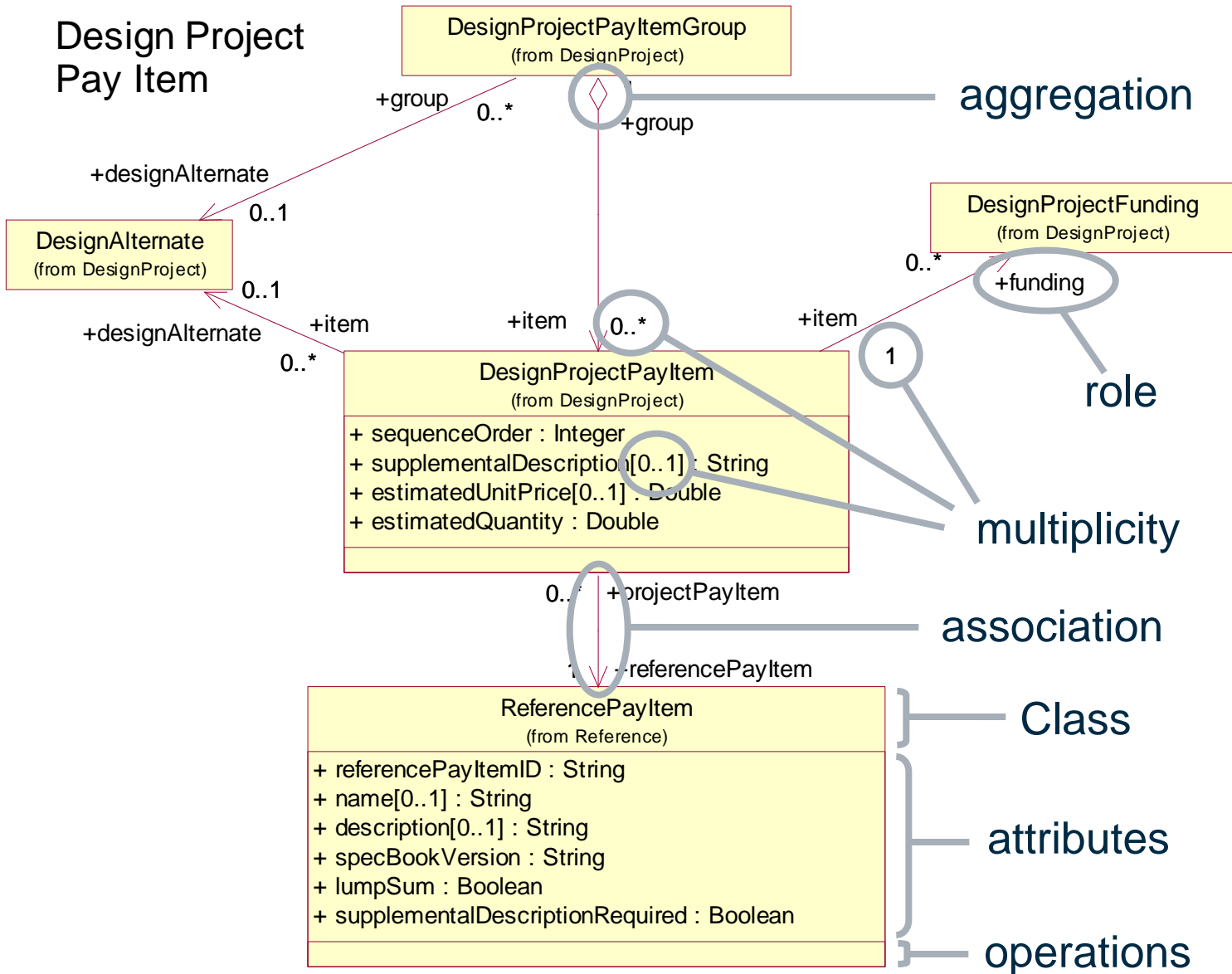
- Phase 1
 - Analyzed gaps and opportunities
 - Identified schemas and sample applications to develop
- Established a Framework: GML Experiment
- Phase 2
 - Identified concepts; modelled with UML
 - Developed XML Schemas (UML → GML)
 - Created sample applications
 - Proposed stewardship options
- Published as NCHRP Report 576
- Also on website www.transxml.com



Unified Modeling Language (UML)

- Used to create easy-to-read implementation-independent logical models
- Class diagrams depict concepts along with their attributes and associations with other concepts
- Proved extremely useful in communicating concepts and data details in order to achieve consensus before encoding
- Helped ensure consistency and harmonization between the schemas
- Should aid in the development and integration of future modifications as well as new schemas

Design Project Pay Item



Geography Markup Language (GML)

- Jointly developed by the Open Geospatial Consortium (OGC) and ISO TC211
- XML extension for geospatial applications
- Based on OGC / ISO feature model
- Provides:
 - standardized XML coding conventions
 - full OGC / ISO / SQL harmonized geometry model support
 - coordinate reference systems
 - linear referencing
 - TIN support
 - compatibility with CityGML, WxS, WaterML, etc.

XSD:

```
<xs:complexType name="PayItemType">  
  <xs:sequence>  
    <xs:element name="description" type="xs:string"/>  
    <xs:element name="quantity" type="MeasureType"/>  
  </xs:sequence>  
</xs:complexType>
```

XML:

```
<PayItem>1</PayItem>  
  <description>concrete sidewalk</description>  
  <quantity uom="feet">15</quantity>
```


Schemas by business area

Survey/Roadway Design

GRD: Geometric Roadway Design/Surface Model Information

DP: Design Project

AF: Area Features

Transportation Construction/Materials

BP: Bid Package

CP: Construction Progress

MST: Materials Sampling and Testing

PCS: Project Construction Status

Schemas by business area

Highway Bridge Structures

BDA: Bridge Design and Analysis

Transportation Safety

MMUCC XML: Crash Report

HISA: Highway Information for Safety Analysis

Common to all

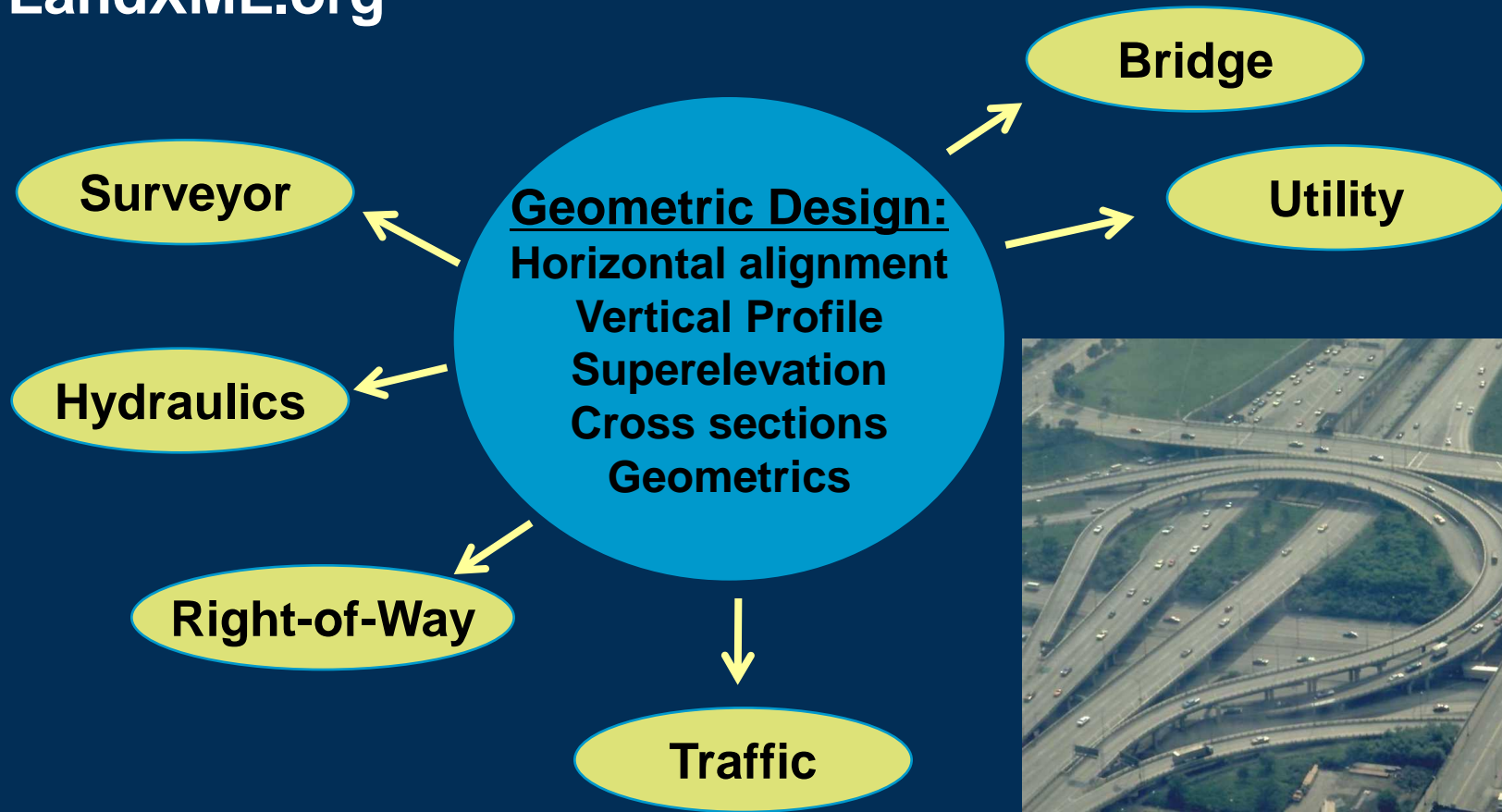
LR: Linear Referencing

REF: Reference

TXL: TransXML Base

Geometric Roadway Design (GRD)

- Exchanging Roadway Design Information Among Design Team Members
- UML model and recommended improvements to LandXML.org



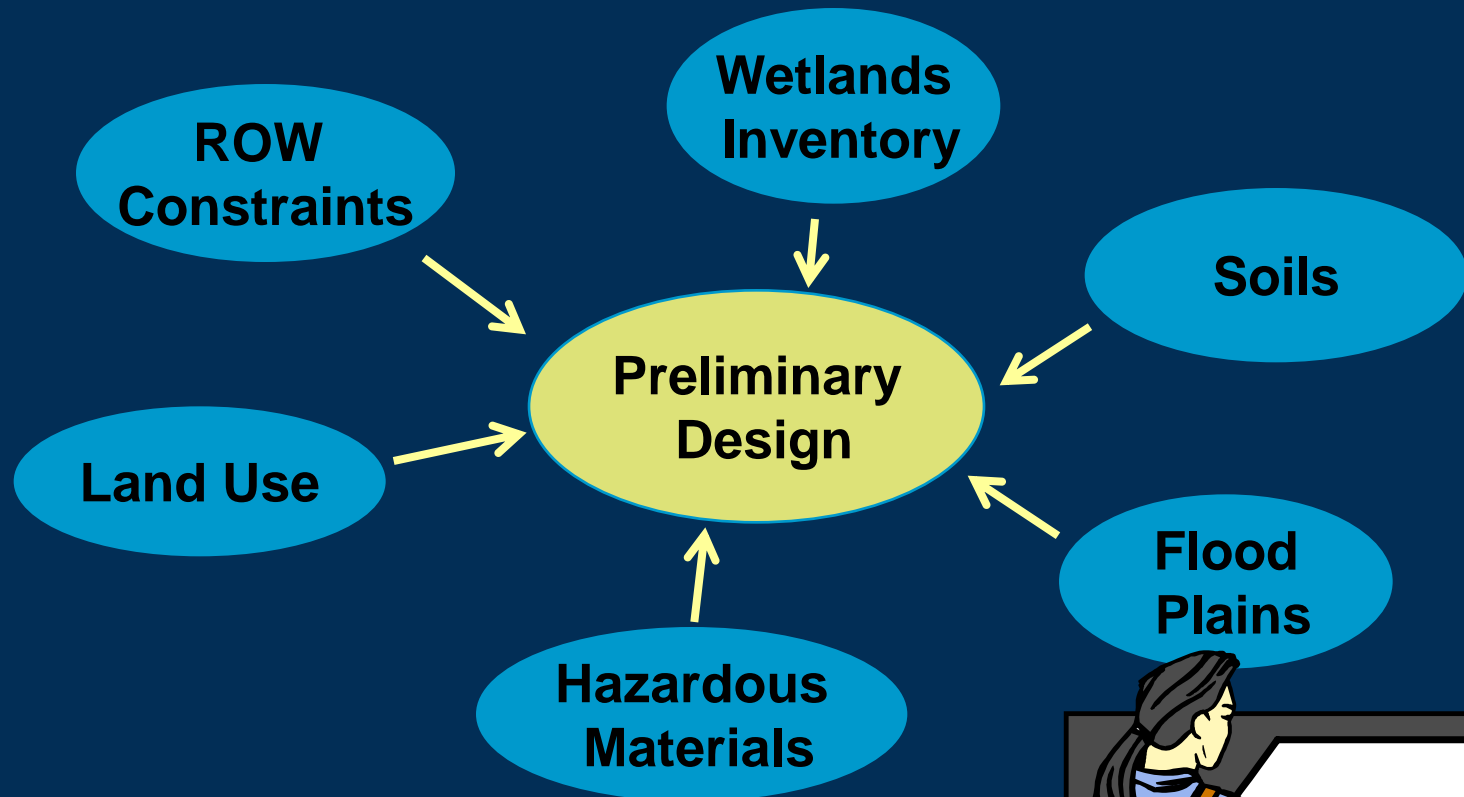
Support Schemas

- **TransXML Base (TXL)**
- **Reference (REF)**
 - Bid Items
 - Funding Sources
- **Linear Referencing (LR)**
 - ISO 19148 Linear referencing



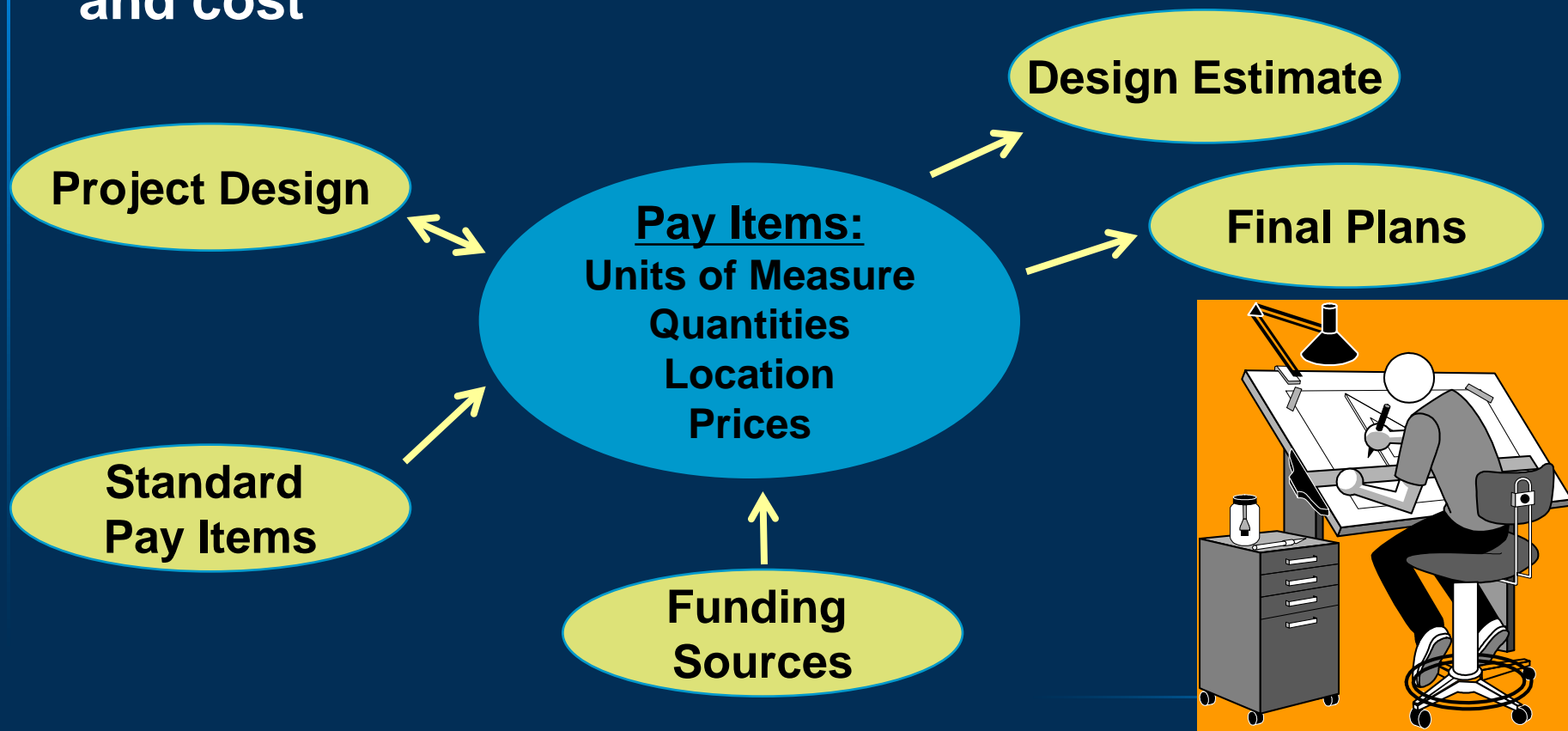
Area Features (AF)

- Area Feature Support (as per ISO TC211)



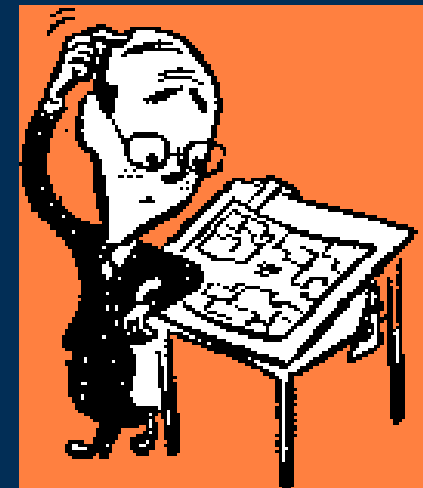
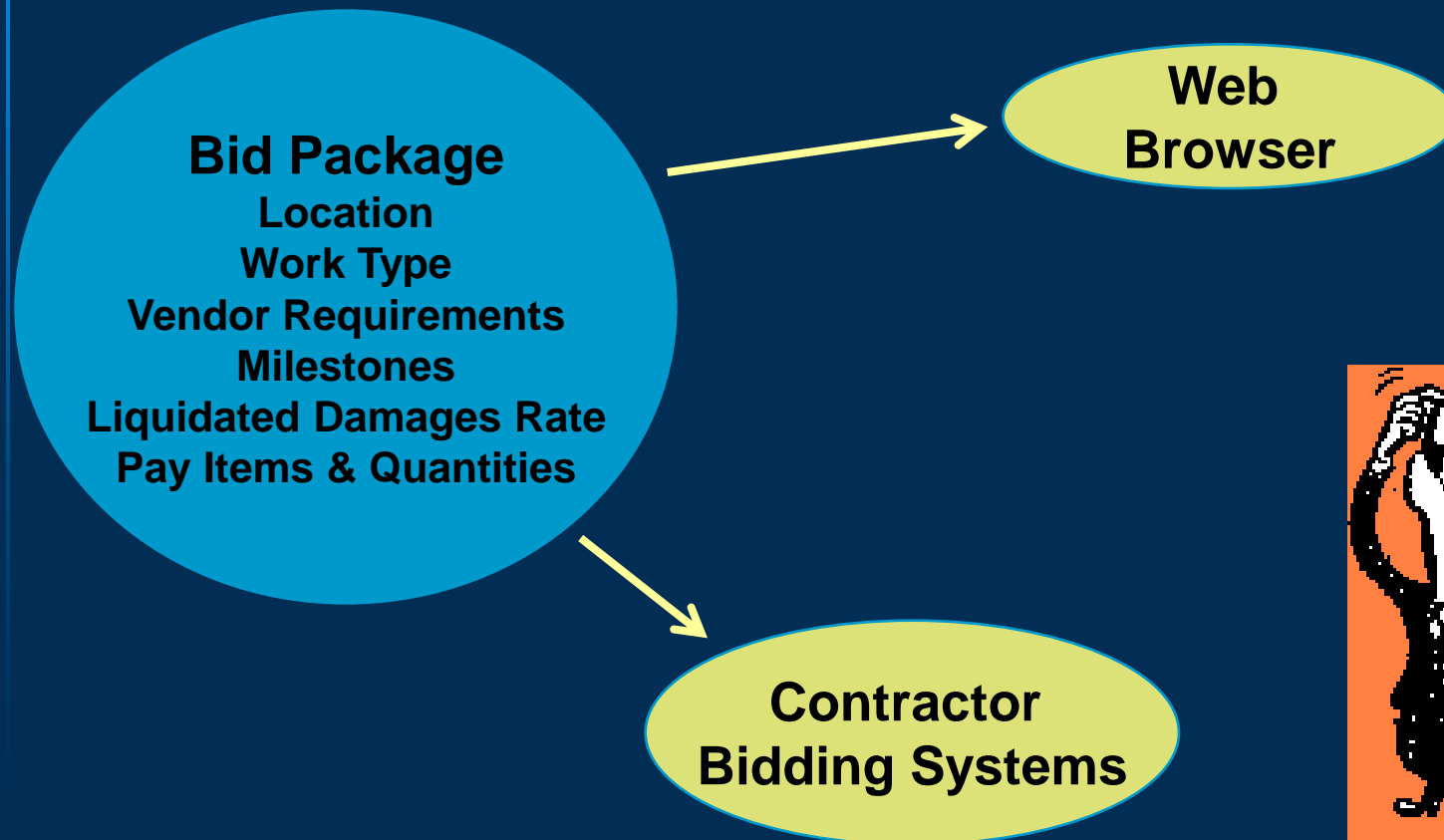
Design Project (DP)

- Pay Item Information from during Design to be passed on to Construction
- Expands aecXML Infrastructure, adding quantities and cost



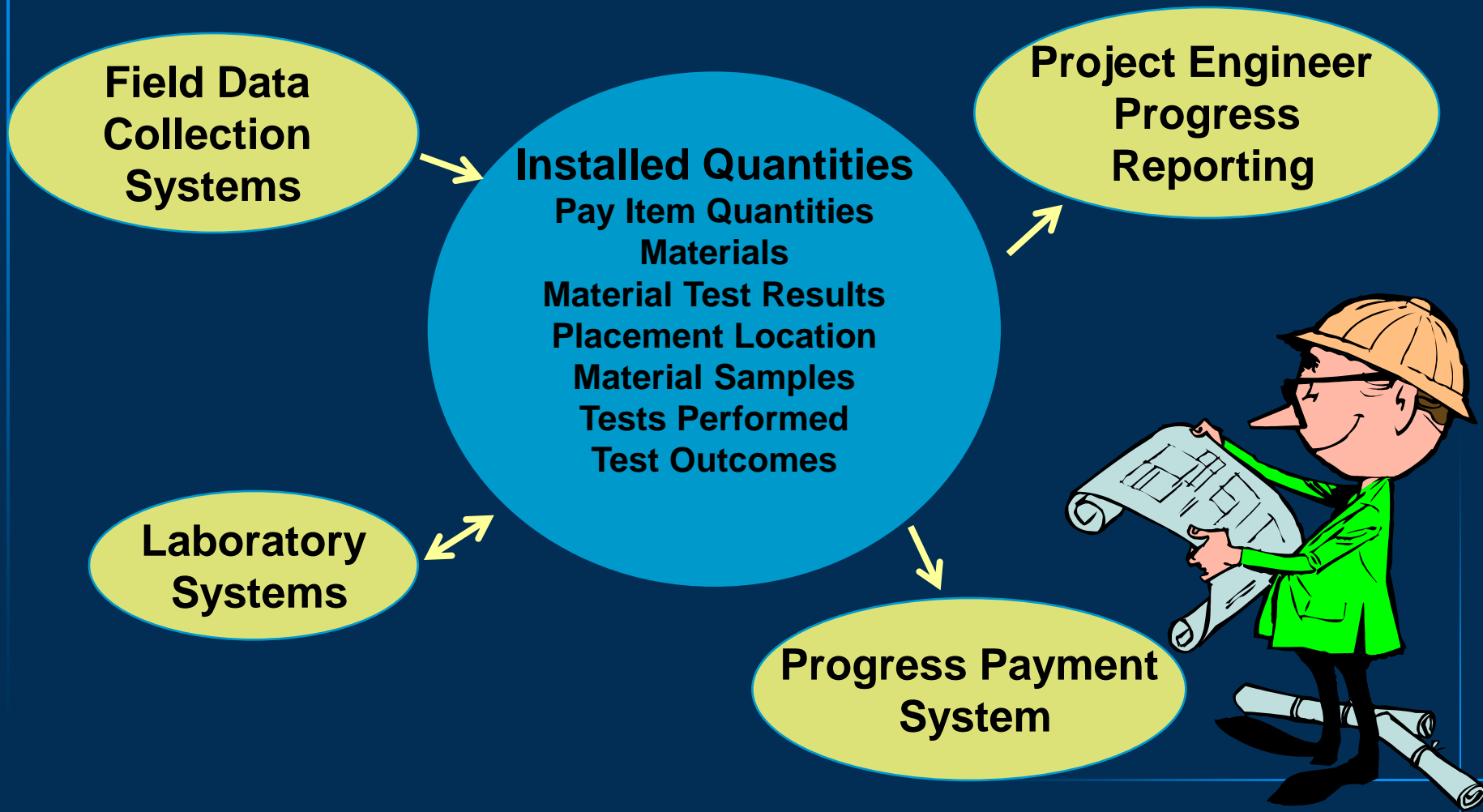
Bid Package (BP)

- Proposal Bid Package preparation for construction contract letting



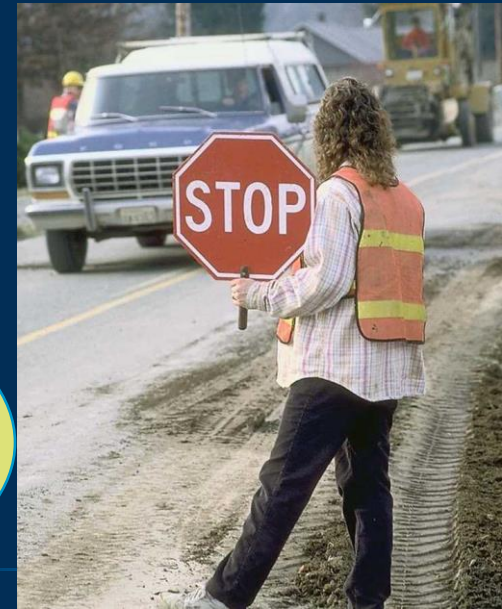
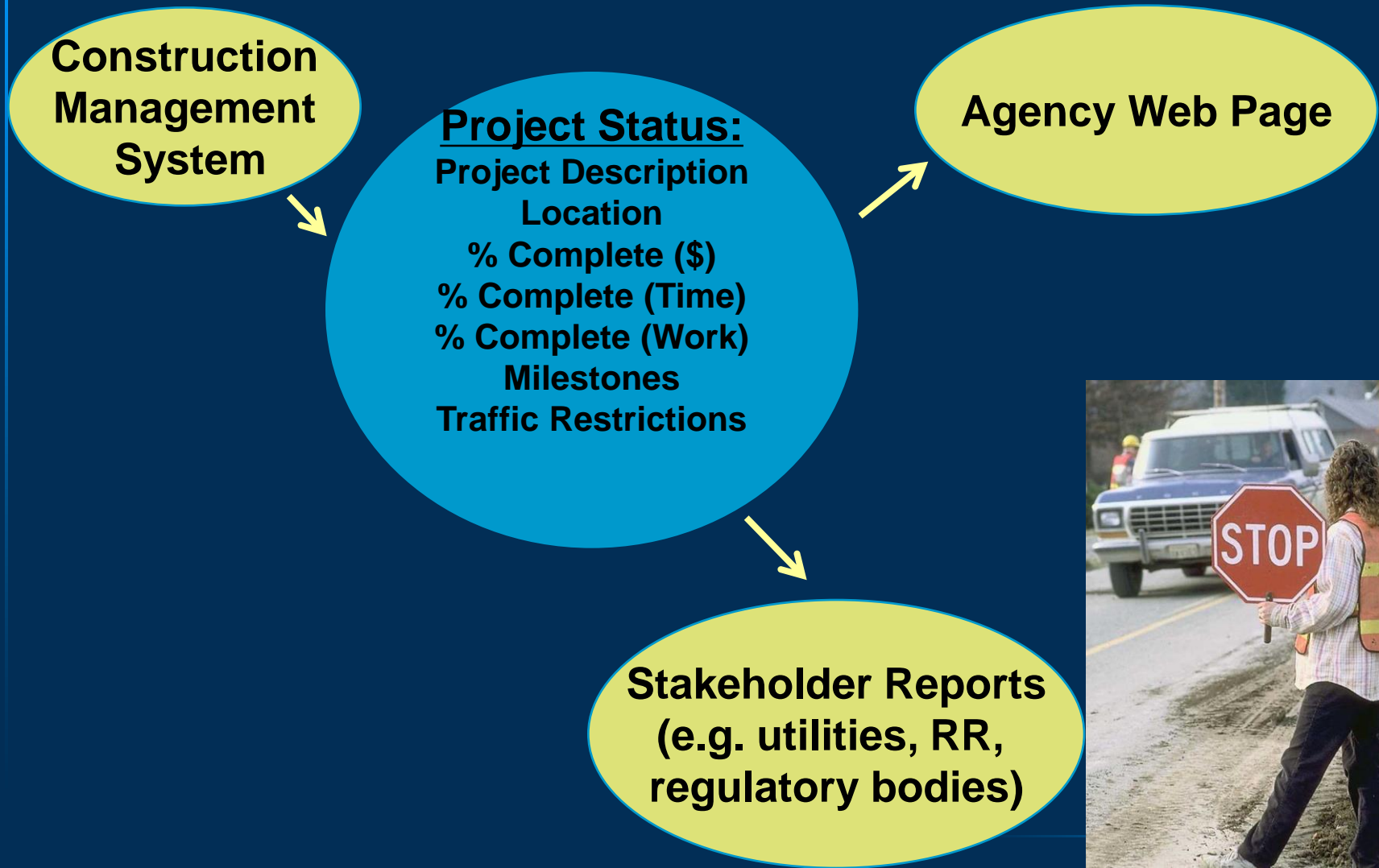
Construction Progress (CP) Materials Sampling and Testing (MST)

- Track Quantities & Materials Used and Tested



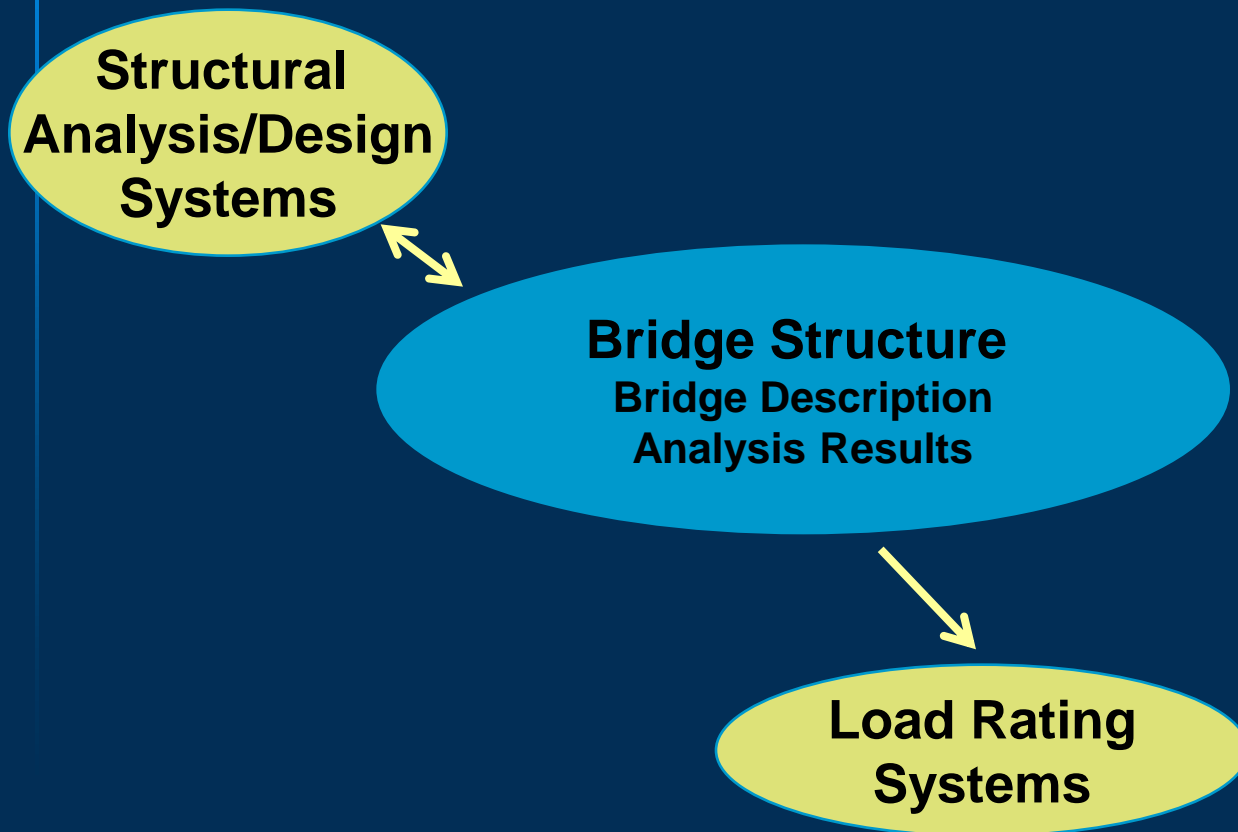
Project Construction Status (PCS)

- Publish Construction Status to Stakeholders



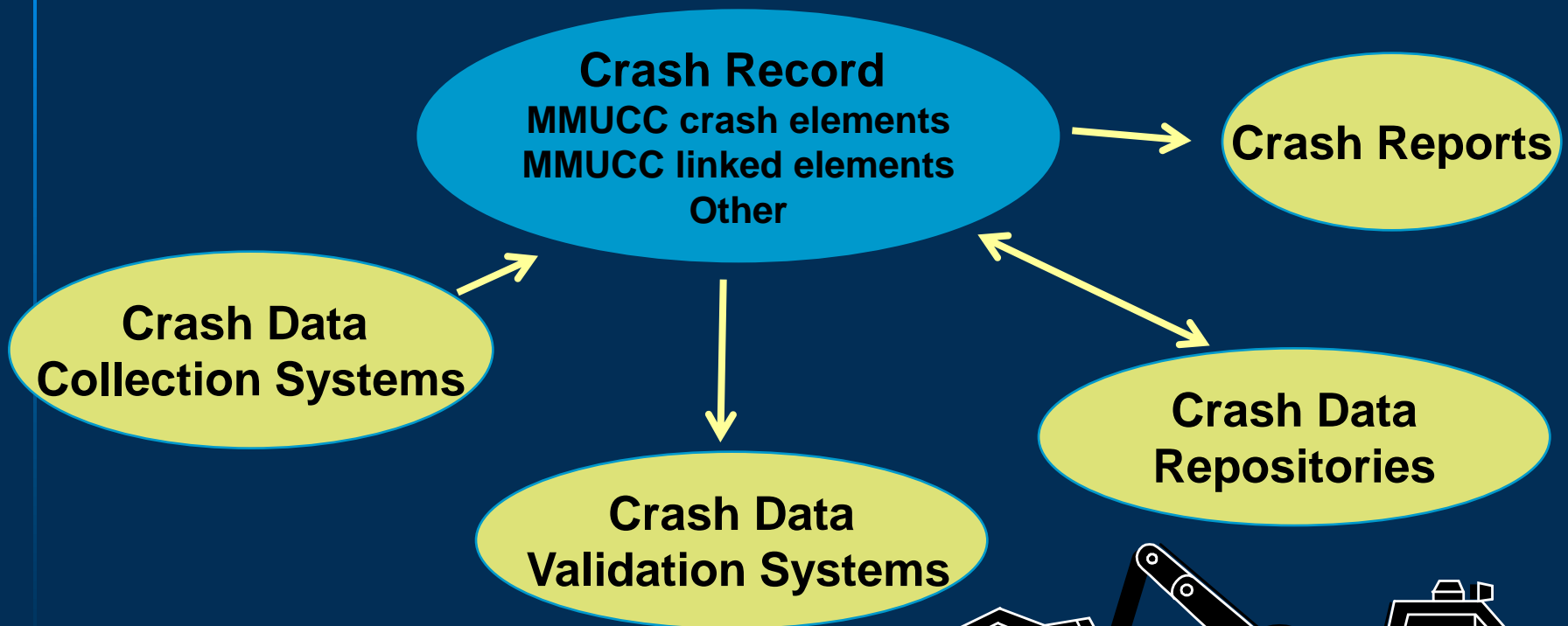
Bridge Design and Analysis (BDA)

- Enables transfer of bridge description information across Bridge structural analysis packages for comparative analysis

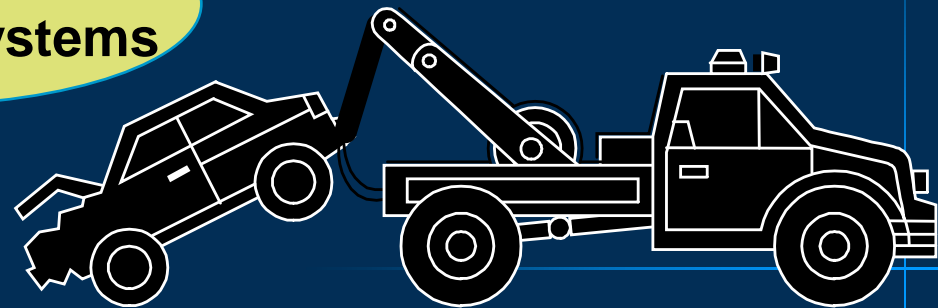


Crash Reports (MMUCC XML)

- For transferring information about highway crashes from police reports to other agencies for processing, archiving, and analysis

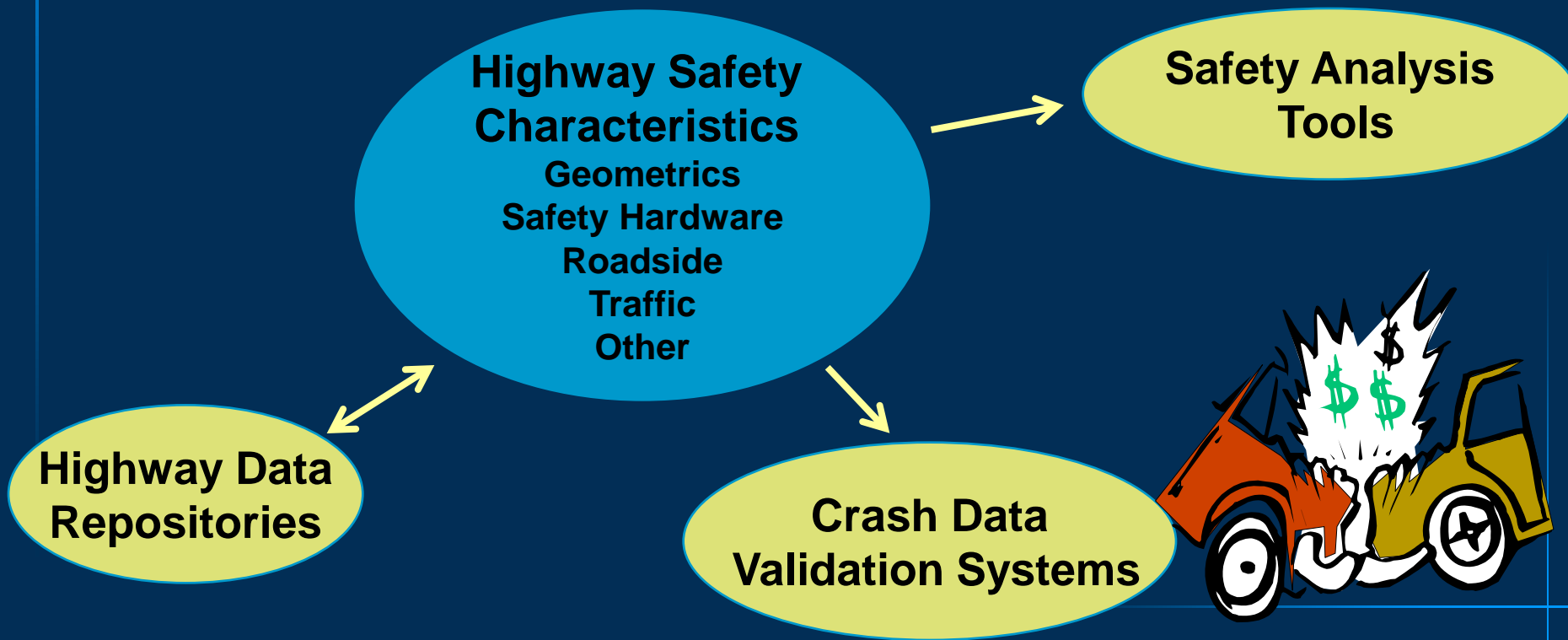


- Usurped by NHTSA
MMUCC XML schema



Highway Information Safety Analysis (HISA)

- Describes safety-related highway inventory items that relate to a specific incident location for integration with crash data to identify high accident locations, analyze the need for engineering countermeasures, or evaluate specific countermeasures proposed for a location, based on FHWA's SafetyAnalyst and TSIMS data dictionaries



Applications

- Import area features from GIS into CAD
- Retrieve pay items from a Master List; Select items for a project; Add quantities and costs
- Generate a Bid Package
- Generate a web page showing a Daily Construction Diary for a project for review of daily construction progress
- Produce a web page showing the sampling and testing activity for a material sample for review of the sampling and testing status and results
- Publish on a public web site a project construction status web page for the projects in a contract

(More) Applications

- Translate instance document created by one bridge analysis software package for input to another (pre-stressed concrete bridge: AASHTO Virtis to PennDOT LRFD)
- Merge two XML data files - one using the NHTSA MMUCC XML schema, and the other using a different schema such as those that might be used by a state or municipality
- Search through crash records stored using the NHTSA MMUCC XML schema and link these to related highway safety information

Acknowledgements

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 - Roadway Design/Survey (GRD, LR, TXL, AF, REF, DP)
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 - Construction/Materials (BP, CP, MST, CPS)
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 - Highway Bridge Structures (BDA)
Michael Baker Jr. Inc.
 - Transportation Safety (HISA)
Cambridge Systematics, Inc.
- Overall technical lead; GML encoding lead
Bentley Systems, Inc.
- Project, business lead
Cambridge Systematics, Inc.
- NCHRP Project Team, AASHTO, FHWA
- Stakeholders

