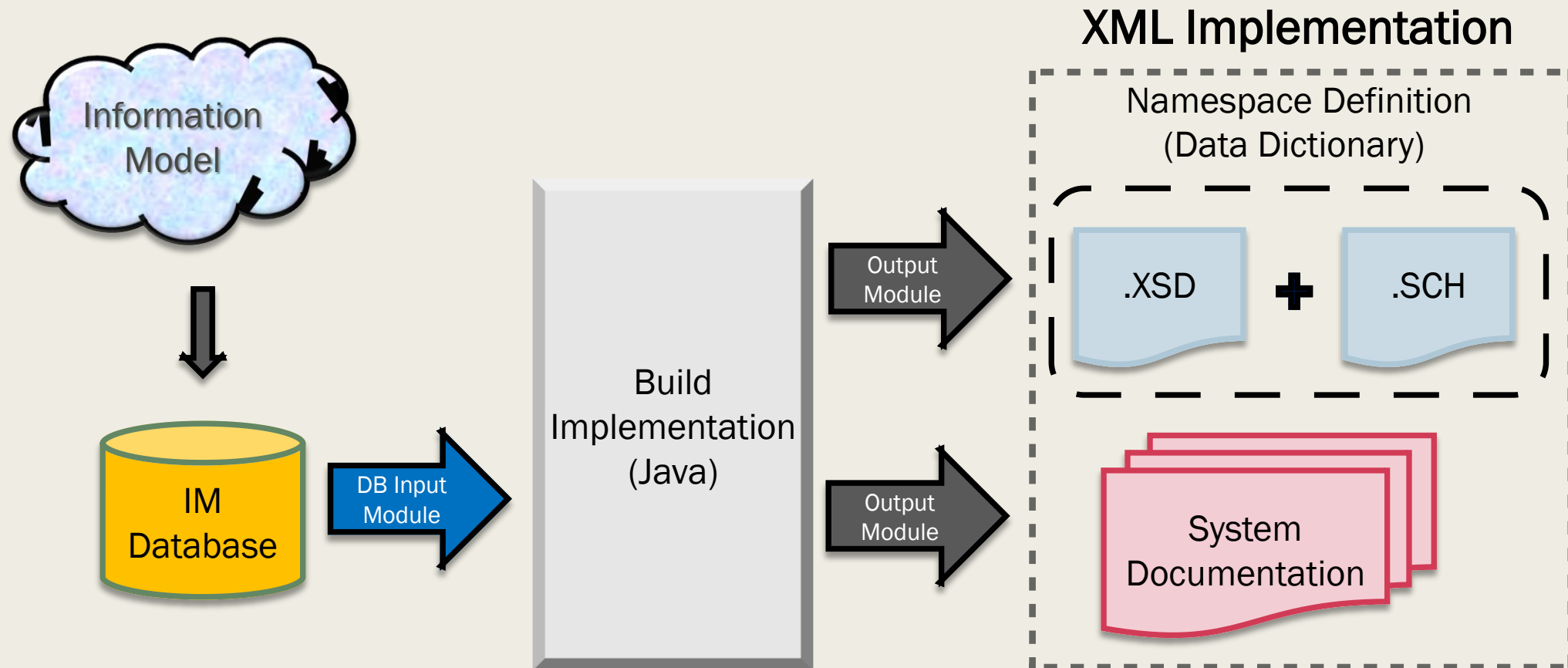# THE PDS4 *LDDTOOL*
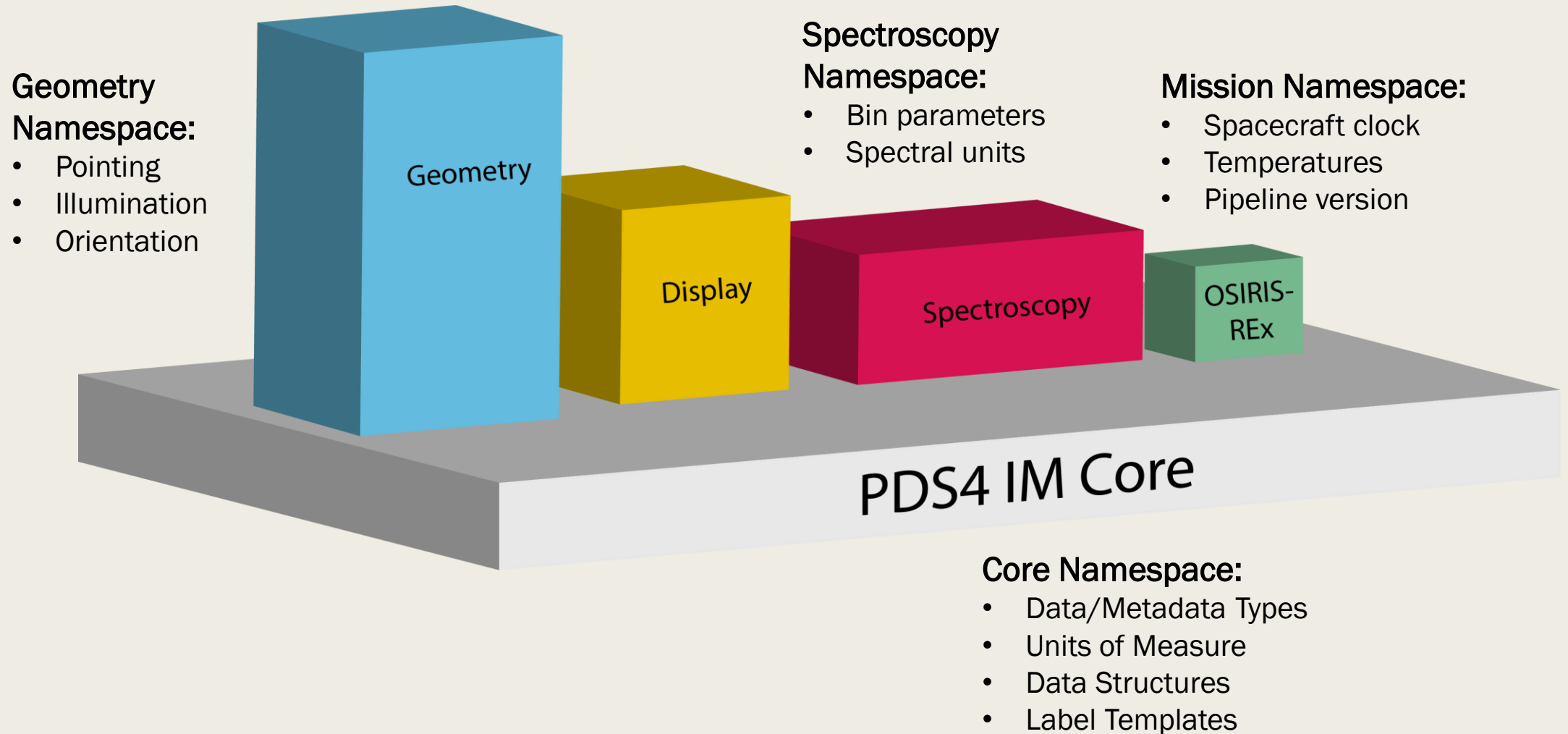
Information Modeling for Data Preparers

Anne Raugh, University of Maryland

John S. Hughes, Jet Propulsion Laboratory

Information Model Build Process

Core IM and Extensions

Geometry Namespace:
- Pointing
- Illumination
- Orientation

Spectroscopy Namespace:
- Bin parameters
- Spectral units

Mission Namespace:
- Spacecraft clock
- Temperatures
- Pipeline version

Geometry

Display

Spectroscopy

OSIRIS-REx

PDS4 IM Core

Core Namespace:
- Data/Metadata Types
- Units of Measure
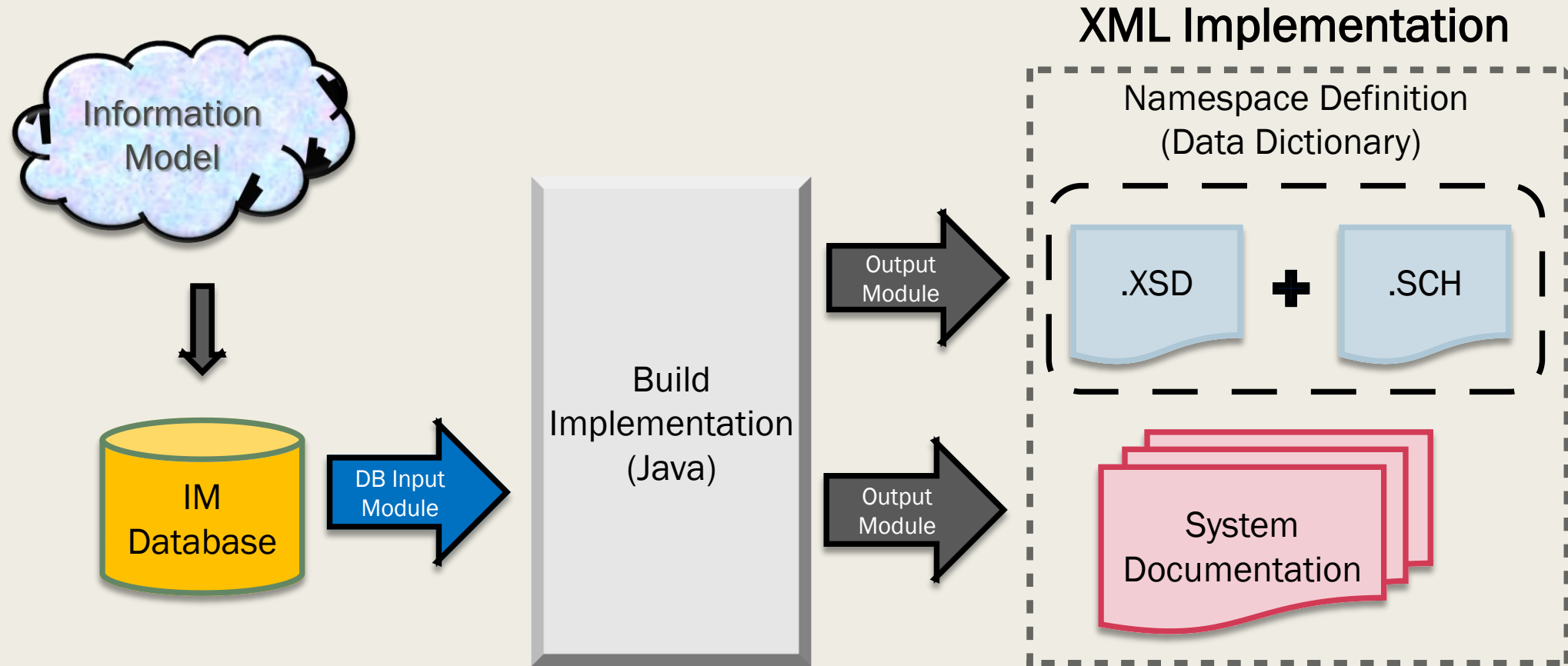- Data Structures
- Label Templates

Implementation Knowledge Stack

- Information modeling

- Object-oriented design

- XML editing and validation

- XML Schema Definition language (XSD)

- Schematron and XPath

- PDS4 core namespace content

- PDS4 constraints

- Documentation generation

To Automate Modeling for New Namespaces:

1. Extend the model to include a structure for defining model extensions in the PDS4 IM vernacular (*Ingest_LDD*)
   - ➤ *Using IM-defined data types, units*
   - ➤ *Applying IM constraints*
   - ➤ *Allowing namespace designers to implement via XML editing*
2. Make the build engine exportable to data preparers.
   - ➤ *LDDTool is the exported build engine with an XML input module.*
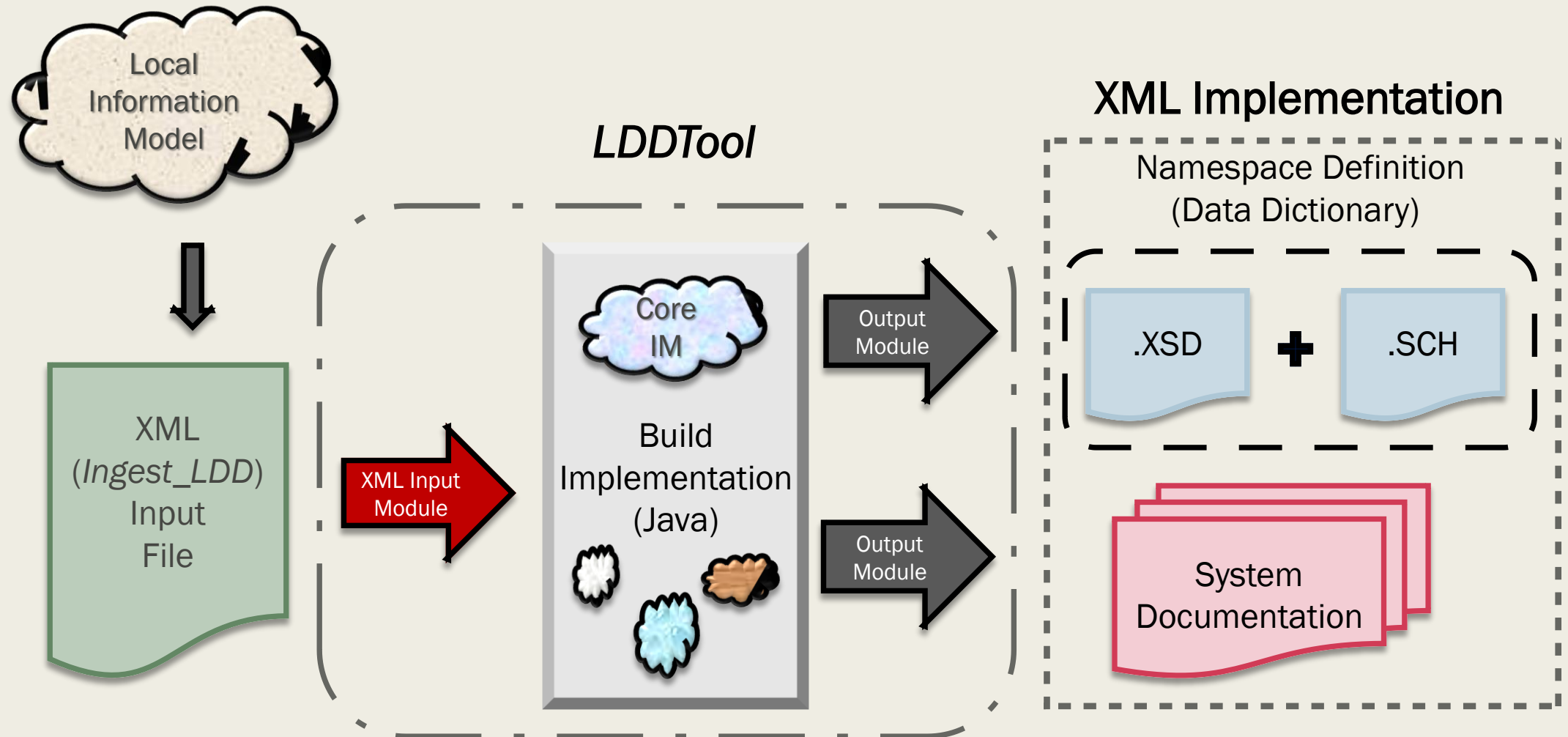
Core Namespace Build Process

Local Namespace Build Process
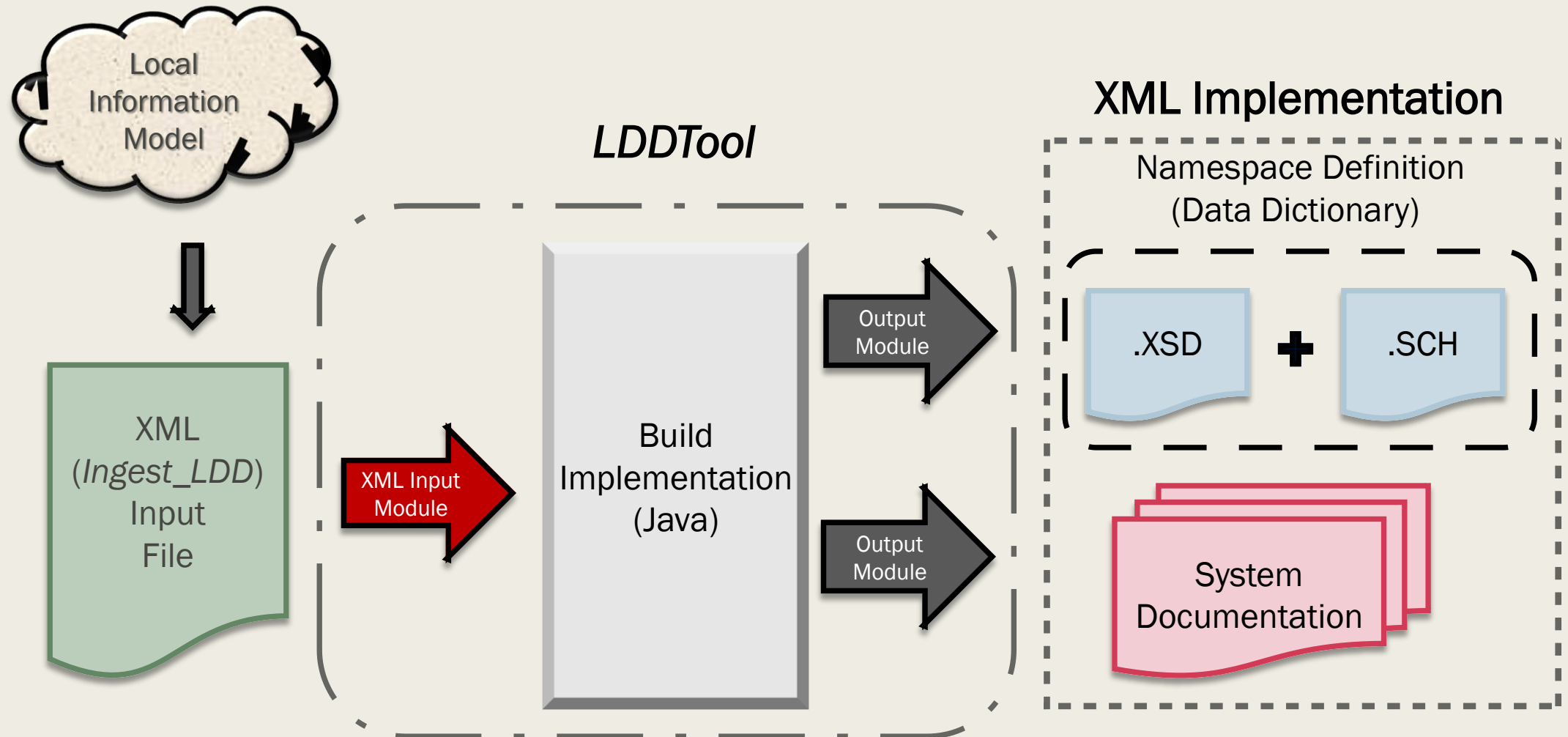
Local Namespace Build Process

Key Features

- *LDDTool* builds the entire information model plus extensions in memory – guaranteeing compatibility.

- *Ingest_LDD* structure and standard value lists ensure compliance with fundamental PDS4 design constraints.

- Namespace developers can work in XML using the same skills and techniques used to design and code PDS4 product labels.

Implementation Knowledge Stack

- Information modeling

- Object-oriented design

- XML editing and validation

- XML Schema Definition language (XSD)

- Schematron and XPath

- PDS4 core namespace content

- PDS4 constraints

- Documentation generation

Implementation Knowledge Stack

- ~~Information modeling~~

- ~~Object oriented design~~

- XML editing and validation

- ~~XML Schema Definition language (XSD)~~

- ~~Schematron and XPath~~

- ~~PDS4 core namespace content~~

- ~~PDS4 constraints~~

- ~~Documentation generation~~

With Many Thanks to…

- The PDS4 Data Design Working Group
- Our early adopters

Questions?