Unleashing the Power of Data Interoperability

Niels P. la Cour & Alexander Stepanov
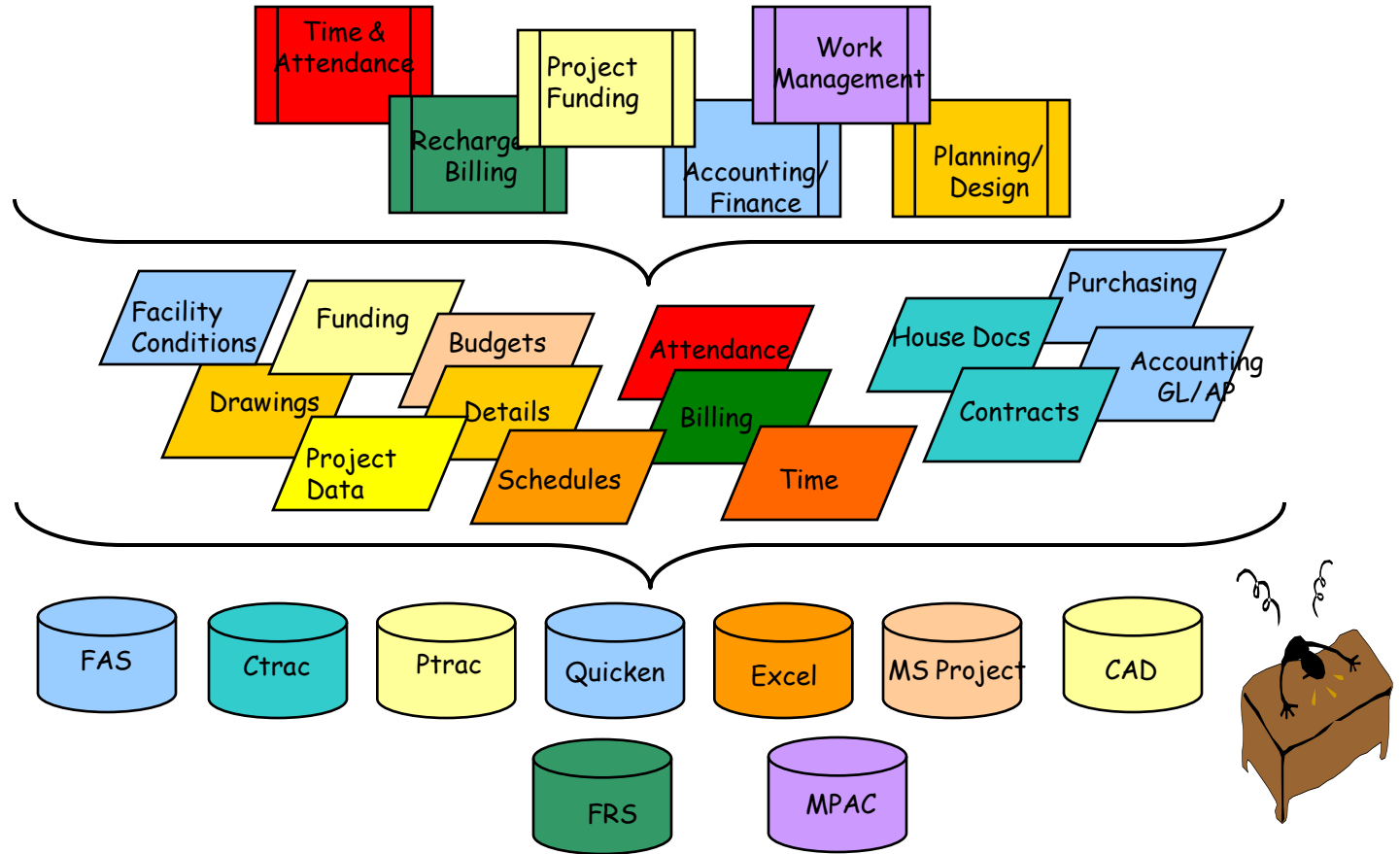UMass Amherst

I. UMass Amherst at a Glance

- ❖ 26,360 Students

- ❖ 5,200 Employees

- ❖ 10+ Million square feet

- ❖ 200+ Major Buildings (main campus)

- ❖ 1,450 acre campus

- ❖ Top Level Research Institution
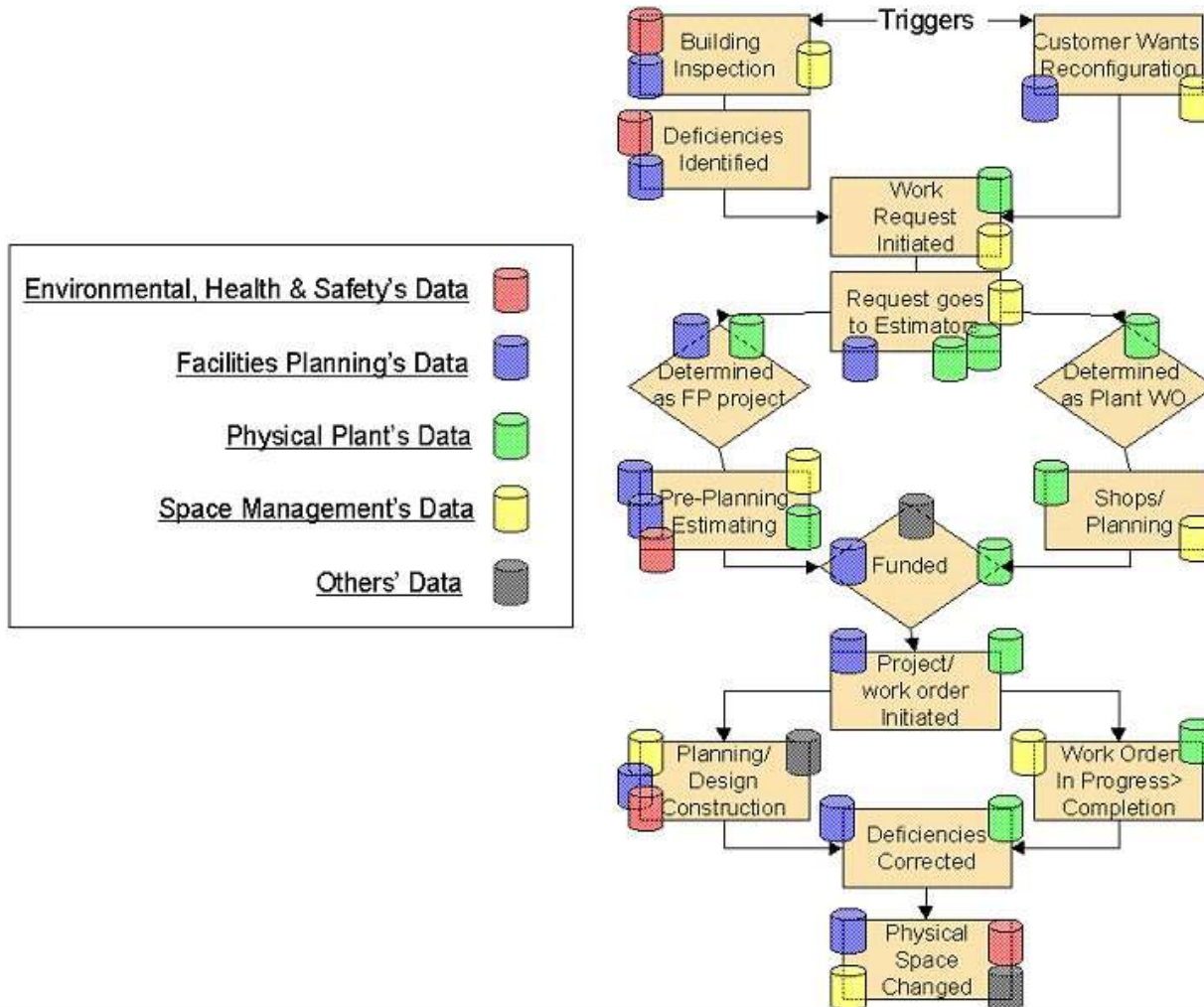
I. Compartmentalized Data

Processes

Time & Attendance
Project Funding
Work Management
Recharge/Billing
Accounting/Finance
Planning/Design

Available Data

Facility Conditions
Funding
Budgets
Attendance
Purchasing
House Docs
Accounting GL/AP
Drawings
Details
Billing
Contracts
Project Data
Schedules
Time

Databases Accessed

FAS
Ctrac
Ptrac
Quicken
Excel
MS Project
CAD
FRS
MPAC

I. Compartmentalized Data (b)

I. Solution Vision

- Create Enterprise Information Systems
- Eliminate Data Redundancy
- Keep Data Up-to-date
- Maintain Workflows and Data Ownership
- Data Interoperability is HUGE!!

II. Short Overview of Data InterOp. Extension

- Extract – Transform – Load (ETL) tool
- Extension for ArcGIS
- Supports ~75 input formats
- ~50 output formats
- Autodesk, ESRI file formats
- Databases: ArcSDE, schema mapper
- Visual development, debugging and testing
- "Model builder" for data manipulation
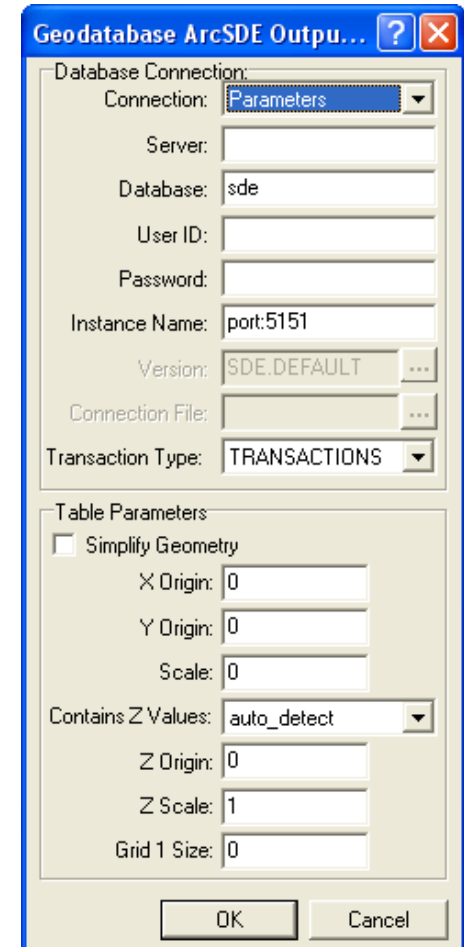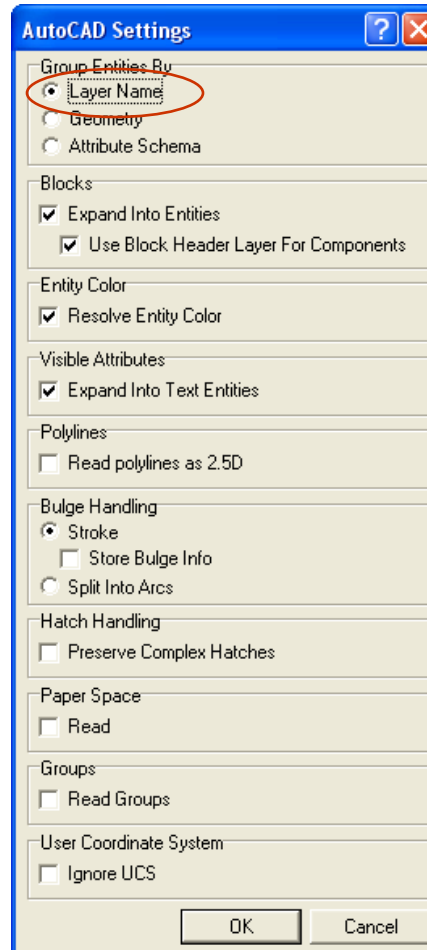- Data operations as "tools" in Toolboxes

II. Data InterOp: Format Gallery
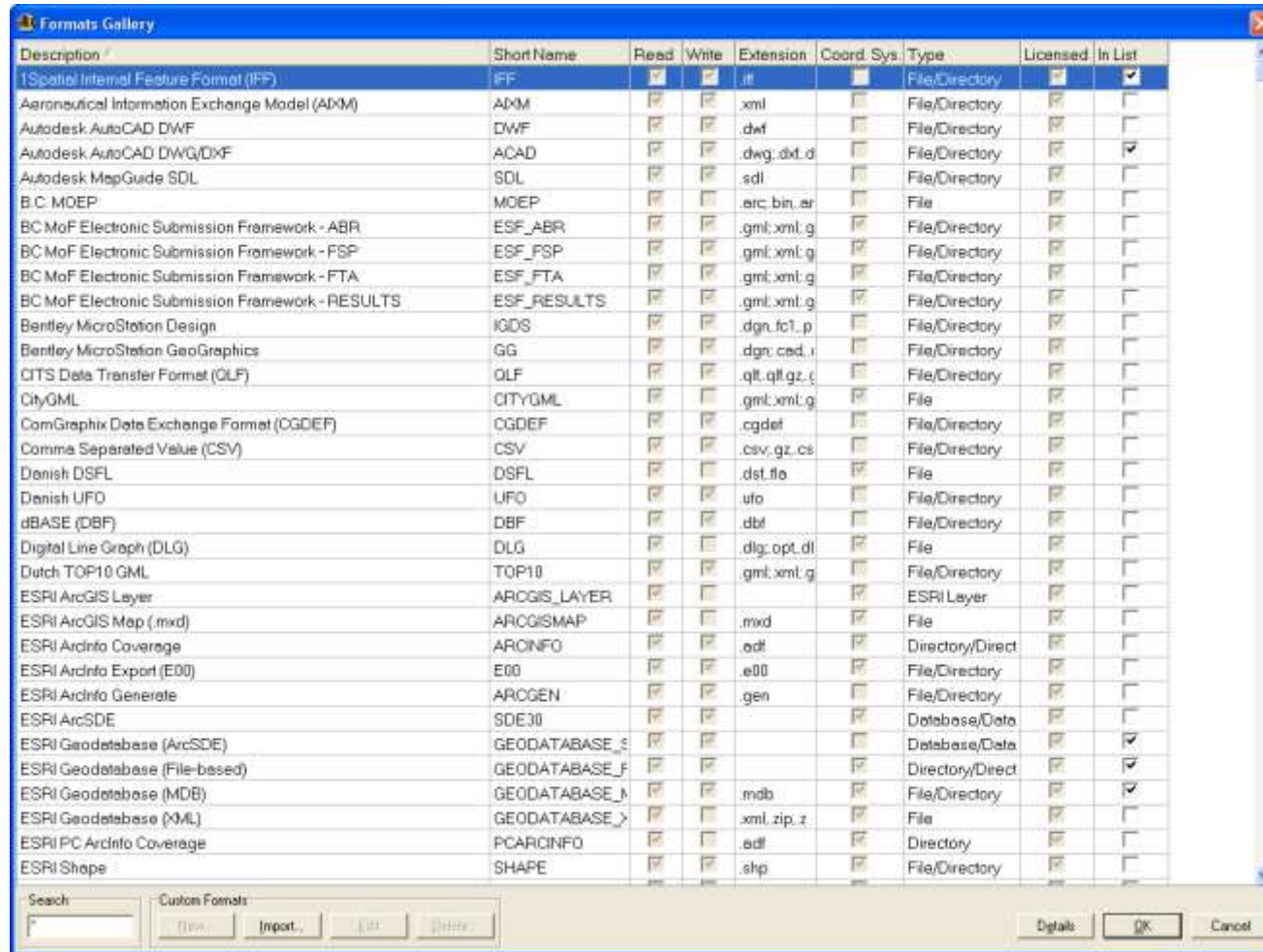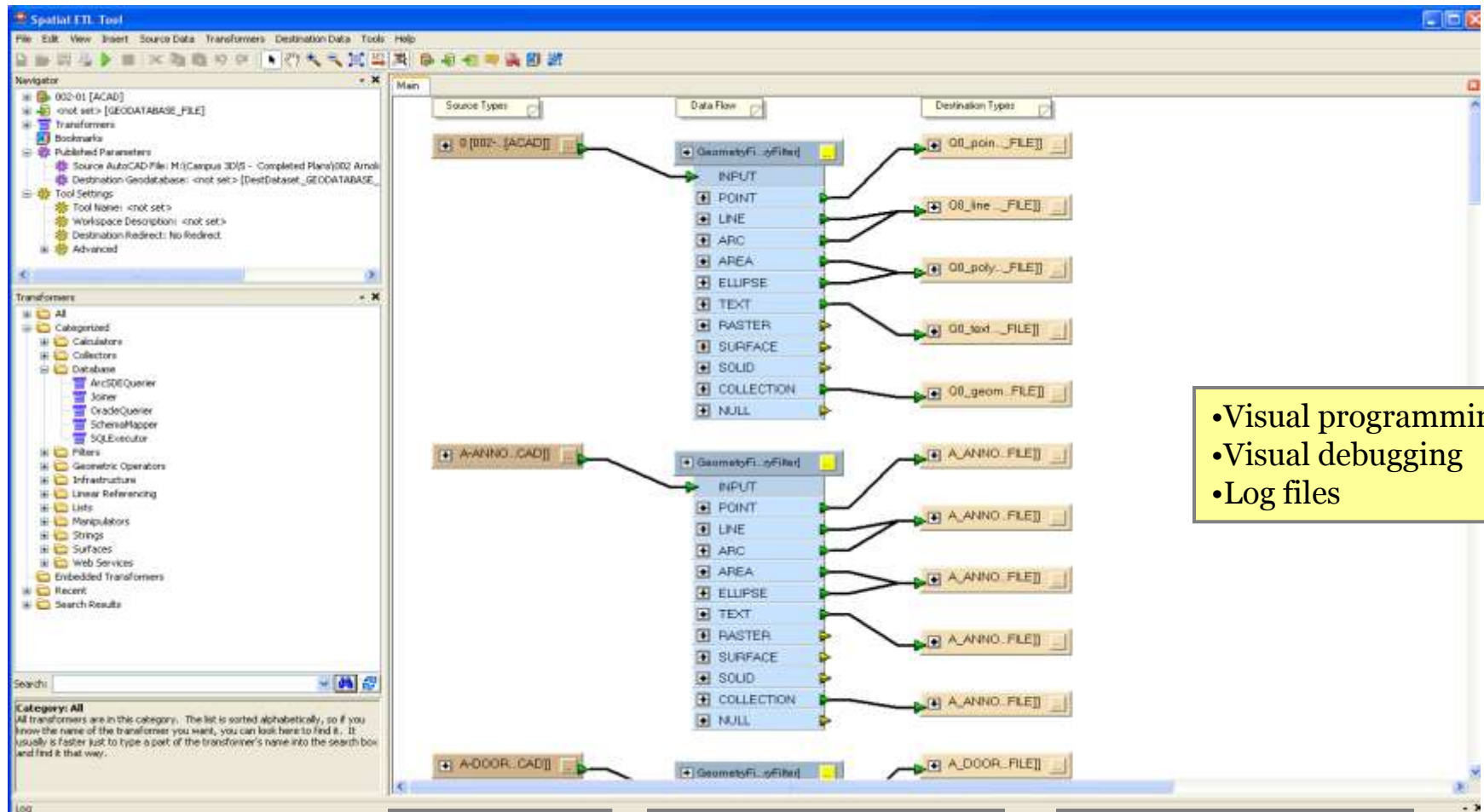
II. Data InterOp: Format Gallery

Extensive support for CAD files

Support for ArcSDE Services

DBMS support

II. Data InterOp WorkBench

• Visual programming
• Visual debugging
• Log files

Sources (*E*)   Transformation (*T*)   Destinations (*L*)

II. Library of transformers

•Visual block
•Input-Output
•Properties
•Connectors

III. Examples

- Campus 3D Model
- Generating reports with Data InterOp and Crystal Reports
- Uploading data into ArcSDE
- Managing color schema and symbology layers

III. Example 1: Campus 3D model

•Campus as a complex system

•Interior vs. exterior environment
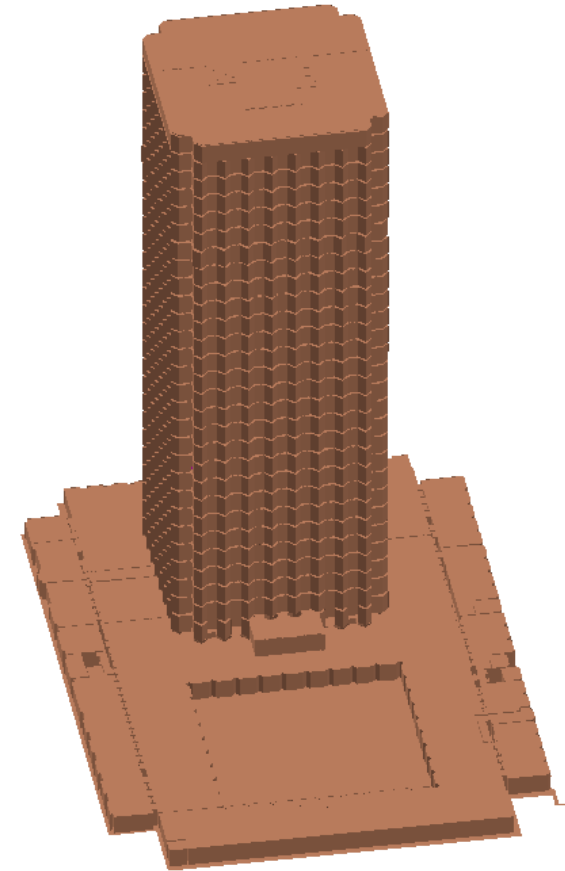
•Importance of homogenous information layer

III. Example 1: Campus 3D model
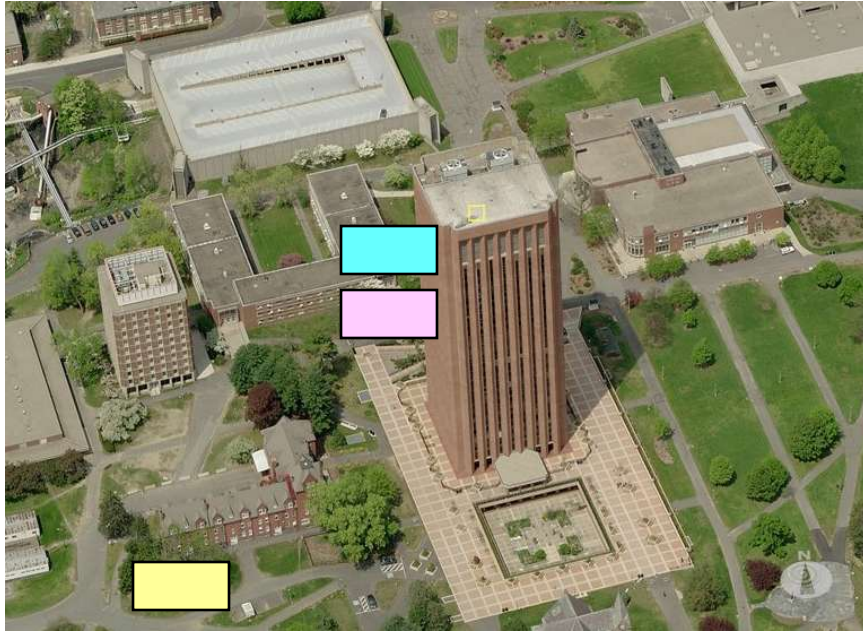
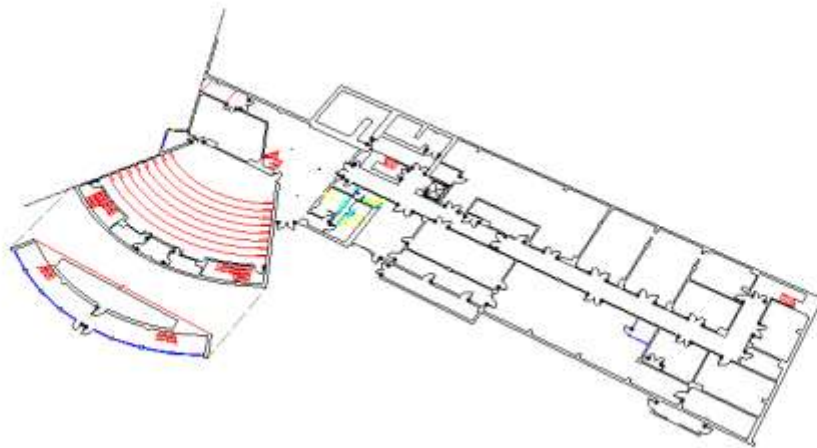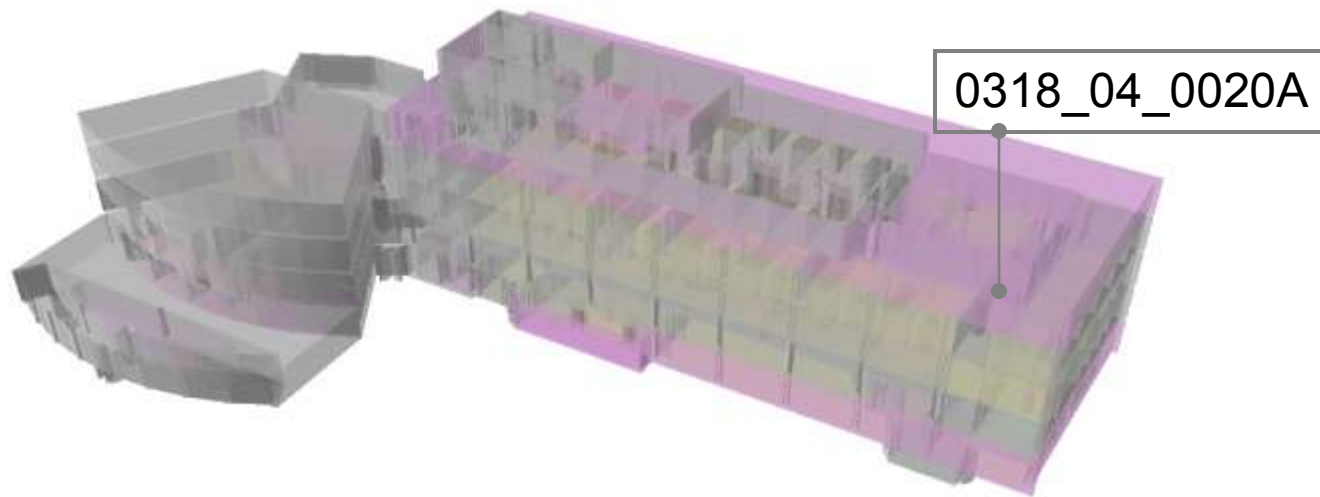
Existing campus-wide GIS layers (exterior environment)

Space Management Database (SQL Server ~30,000 records)

AutoCAD Floor Plans (~700 floor plans, > 20 layers each)

Spatial DB (ArcSDE)
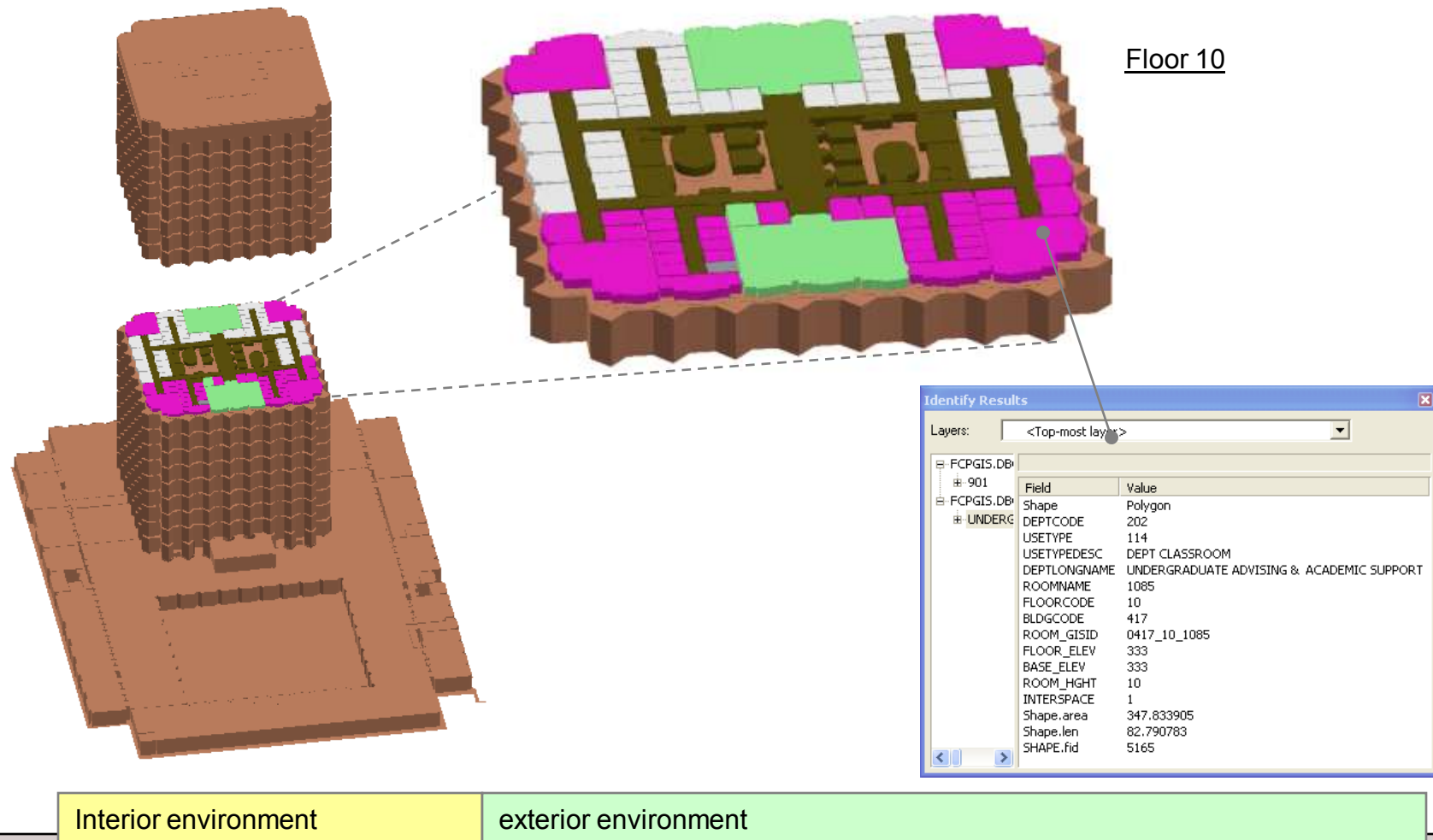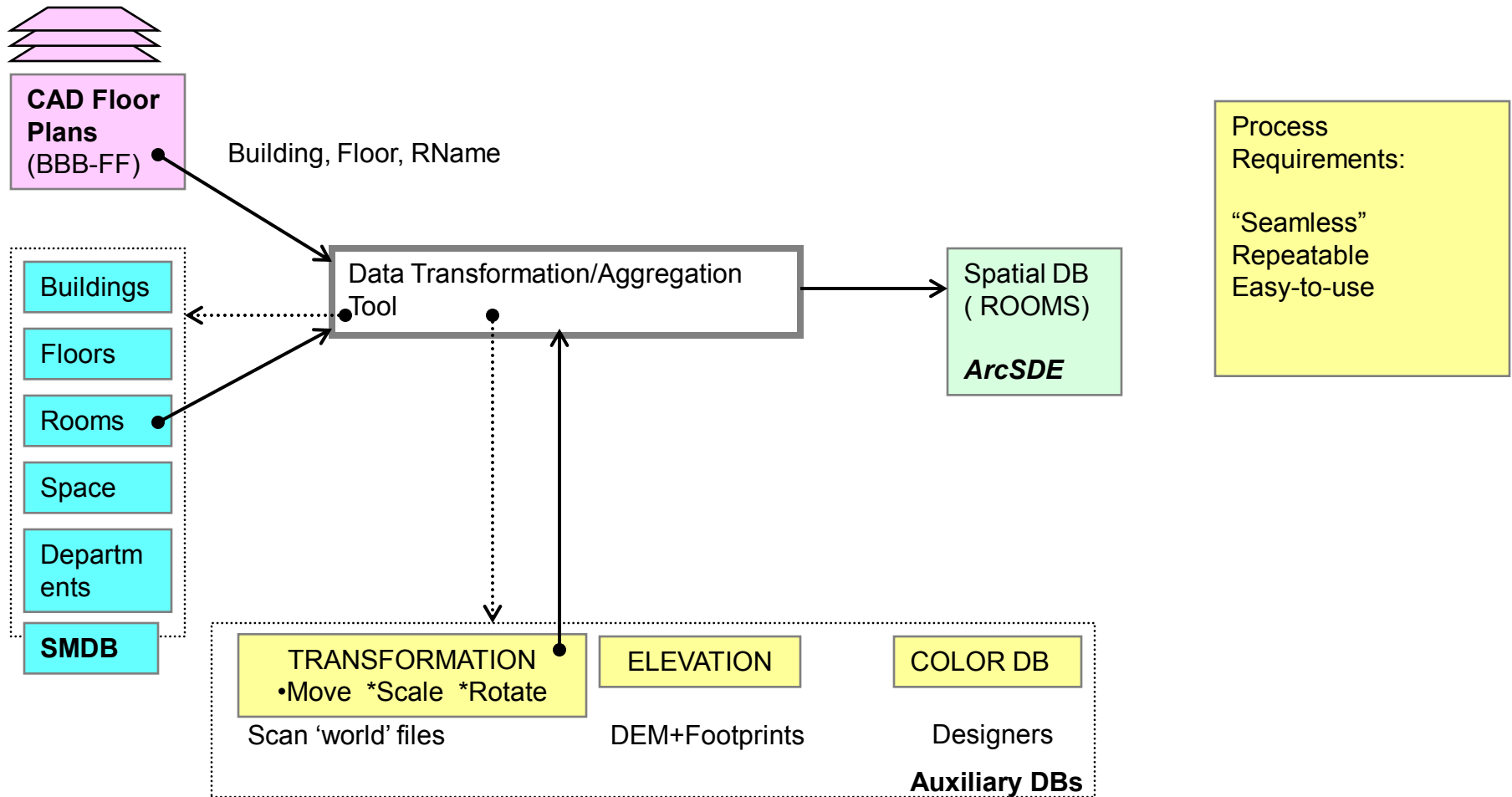
III. Example 1: 3D representation of rooms

0318_04_0020A

Spatial database is a collection of ***rooms***, which are registered in physical space and have unique "global" campus ID.
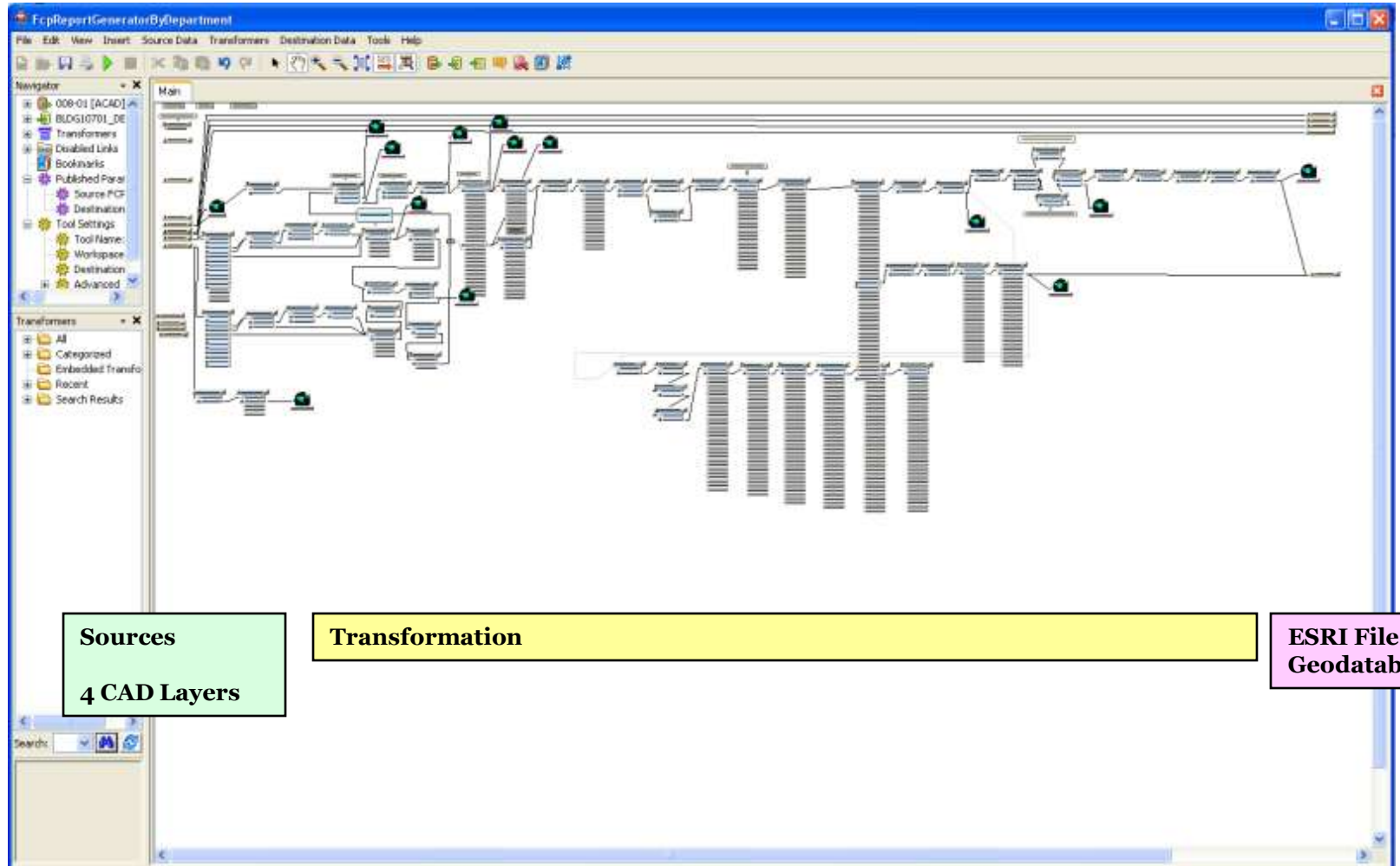
Connection to the enterprise DB

III. Example 1: Campus 3D model

Floor 10

Identify Results	
Layers:	<Top-most layer>

Field	Value
Shape	Polygon
DEPTCODE	202
USETYPE	114
USETYPEDESC	DEPT CLASSROOM
DEPTLONGNAME	UNDERGRADUATE ADVISING & ACADEMIC SUPPORT
ROOMNAME	1085
FLOORCODE	10
BLDGCODE	417
ROOM_GISID	0417_10_1085
FLOOR_ELEV	333
BASE_ELEV	333
ROOM_HGHT	10
INTERSPACE	1
Shape.area	347.833905
Shape.len	82.790783
SHAPE.fid	5165

Interior environment	exterior environment

III. Campus 3D tool: Conceptual Diagram

CAD Floor Plans (BBB-FF)

Building, Floor, RName

Buildings

Floors

Rooms

Space

Departments

SMDB

Data Transformation/Aggregation Tool

Spatial DB (ROOMS)

ArcSDE

Process Requirements:

"Seamless" Repeatable Easy-to-use

TRANSFORMATION
•Move *Scale *Rotate

ELEVATION

COLOR DB

Scan 'world' files

DEM+Footprints

Designers

Auxiliary DBs

III. Campus 3D tool: Implementation

III. Report Generation

III. Report Generation : Conceptual Diagram
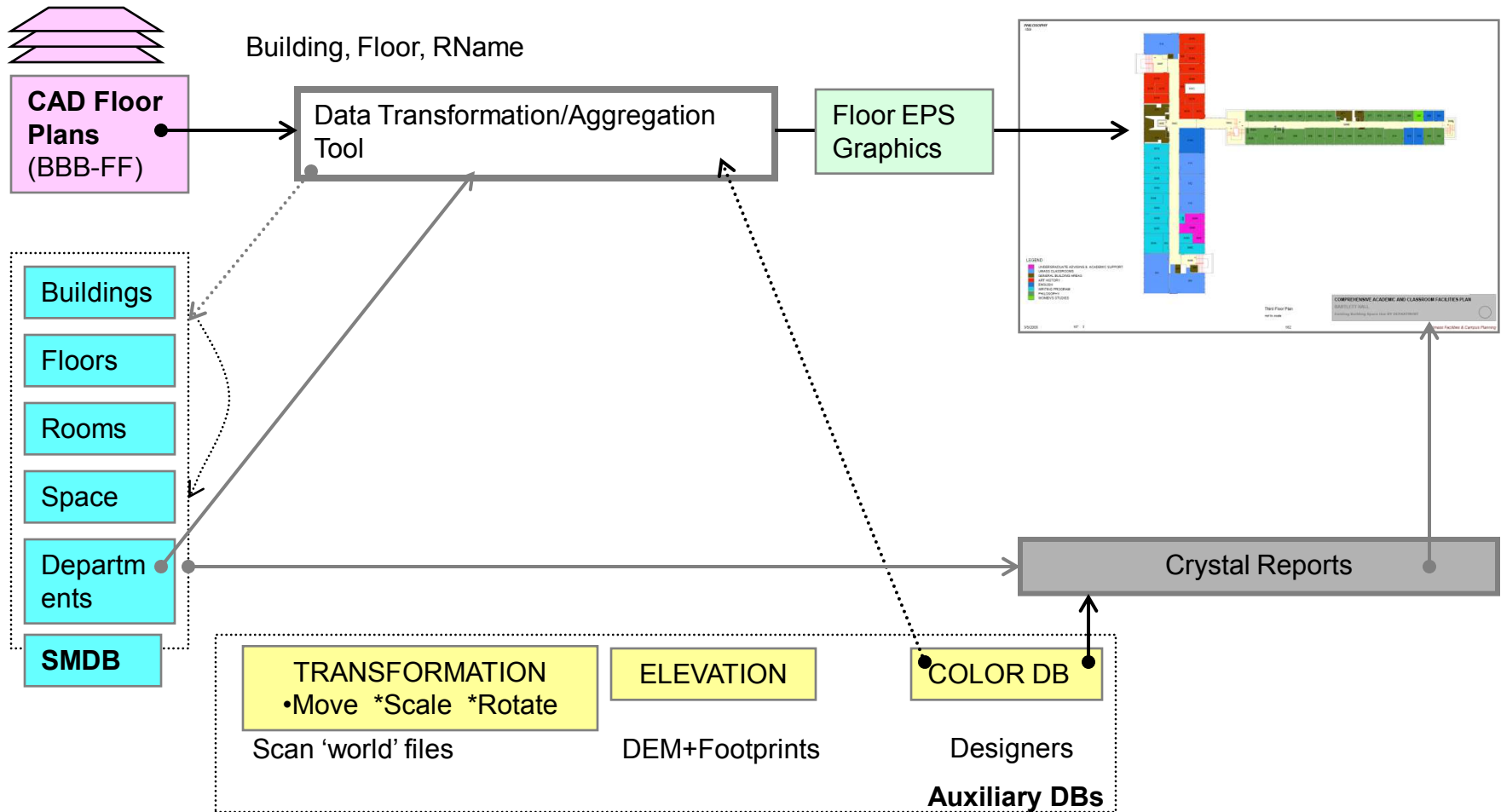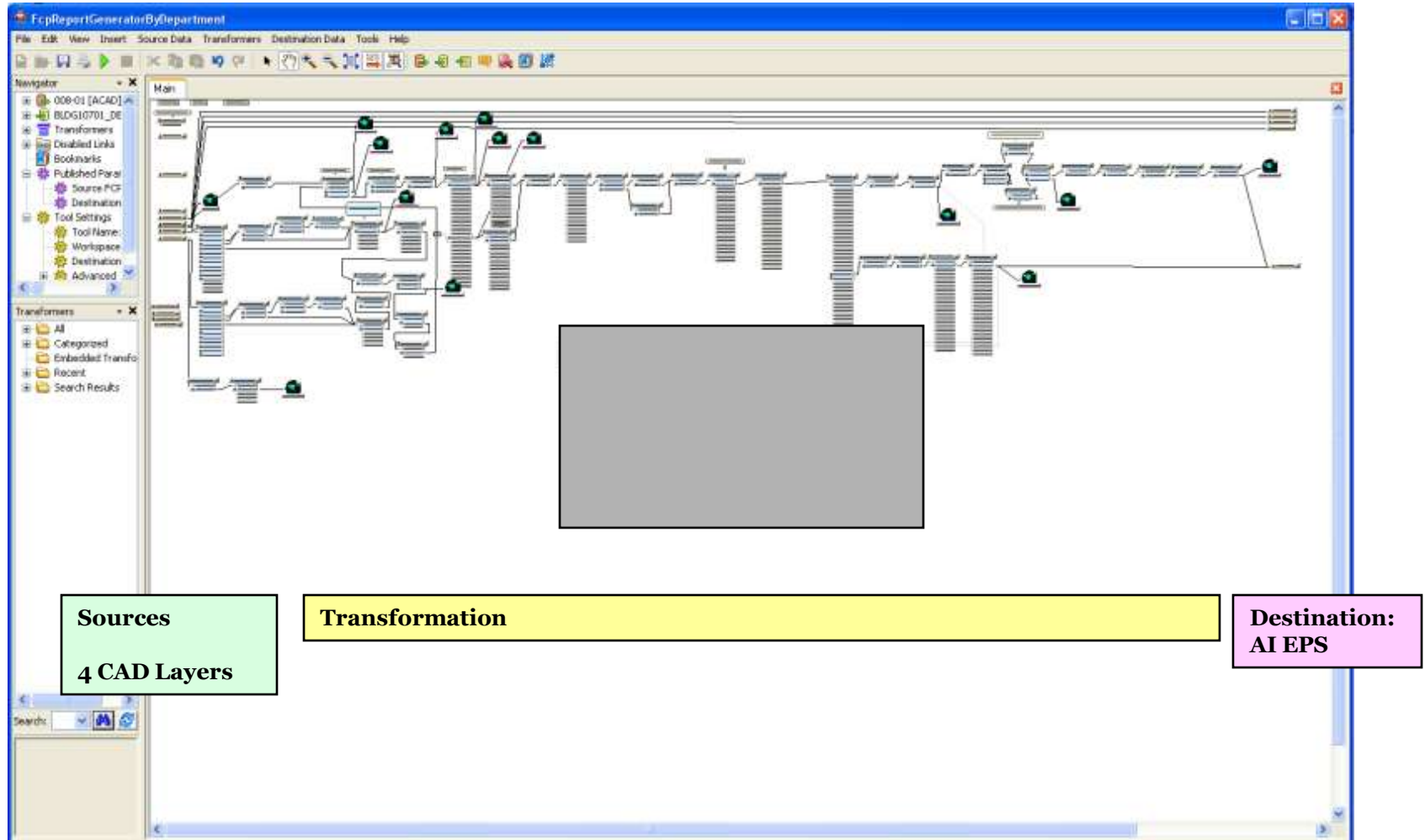
CAD Floor Plans (BBB-FF)

Building, Floor, RName

Data Transformation/Aggregation Tool

Floor EPS Graphics

Buildings

Floors

Rooms

Space

Departments

SMDB

TRANSFORMATION
•Move *Scale *Rotate

Scan 'world' files

ELEVATION

DEM+Footprints

COLOR DB

Designers

Auxiliary DBs

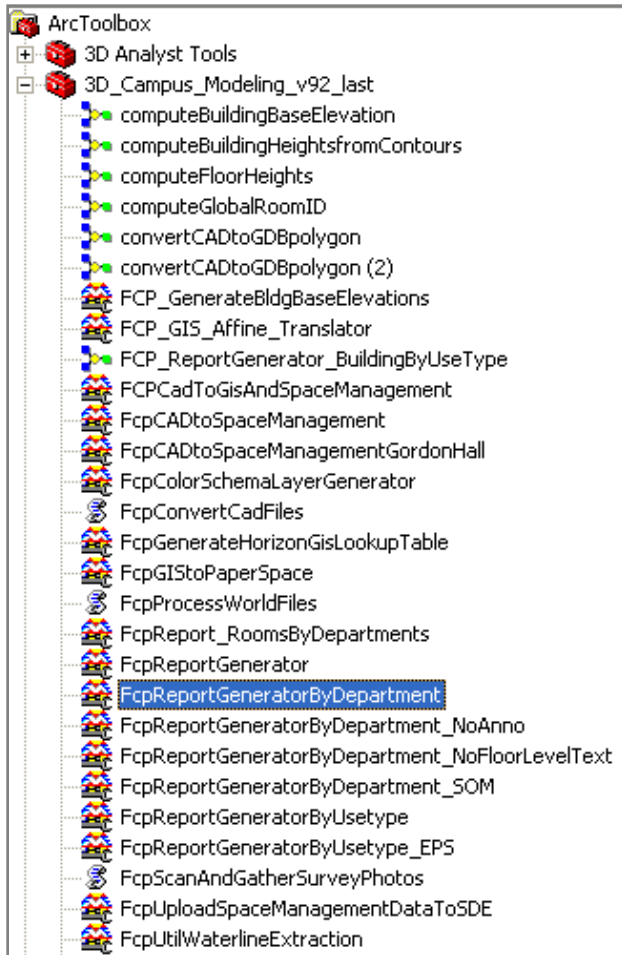Crystal Reports

III. Report Generating: Implementation

III. Report Generating: Implementation
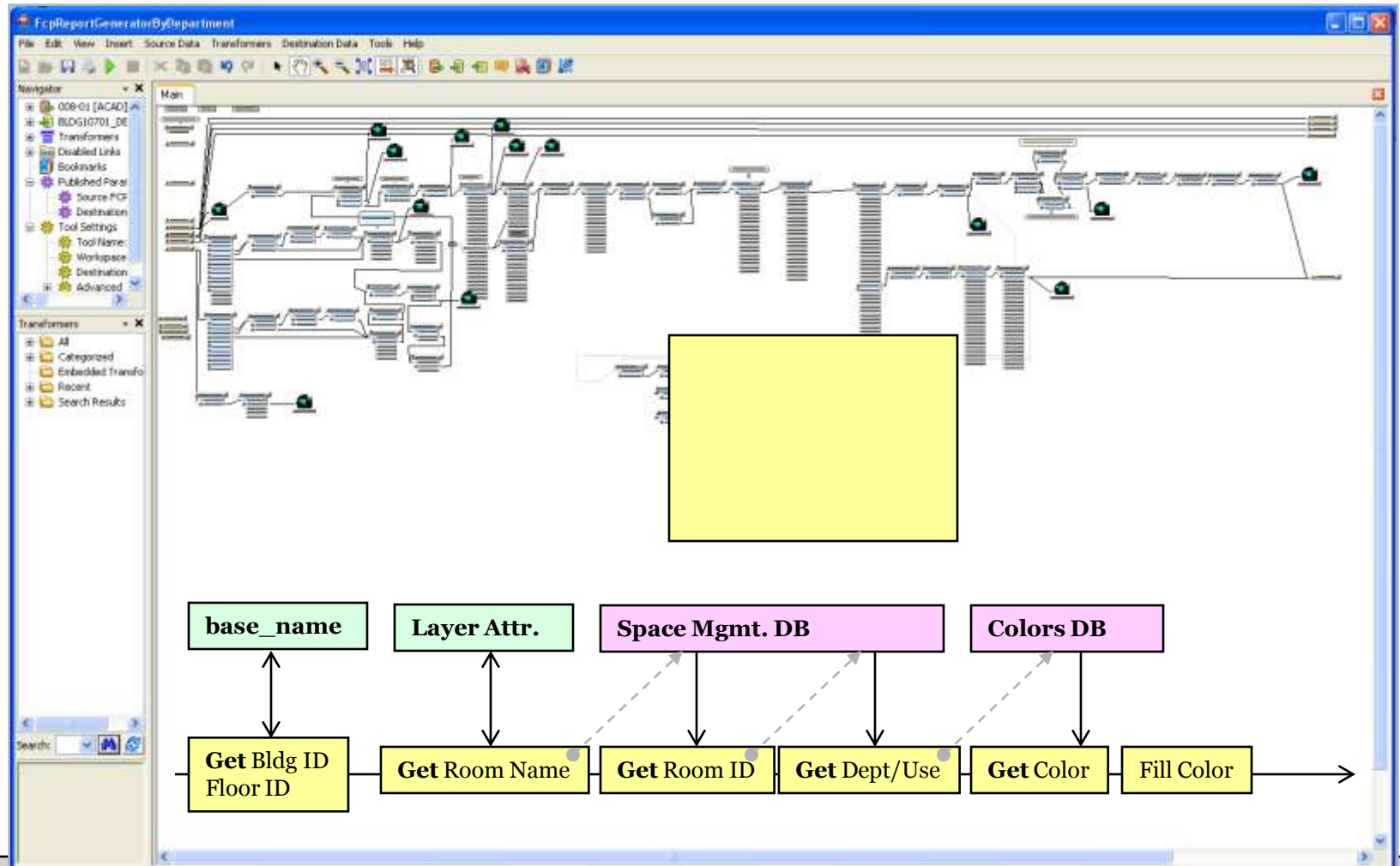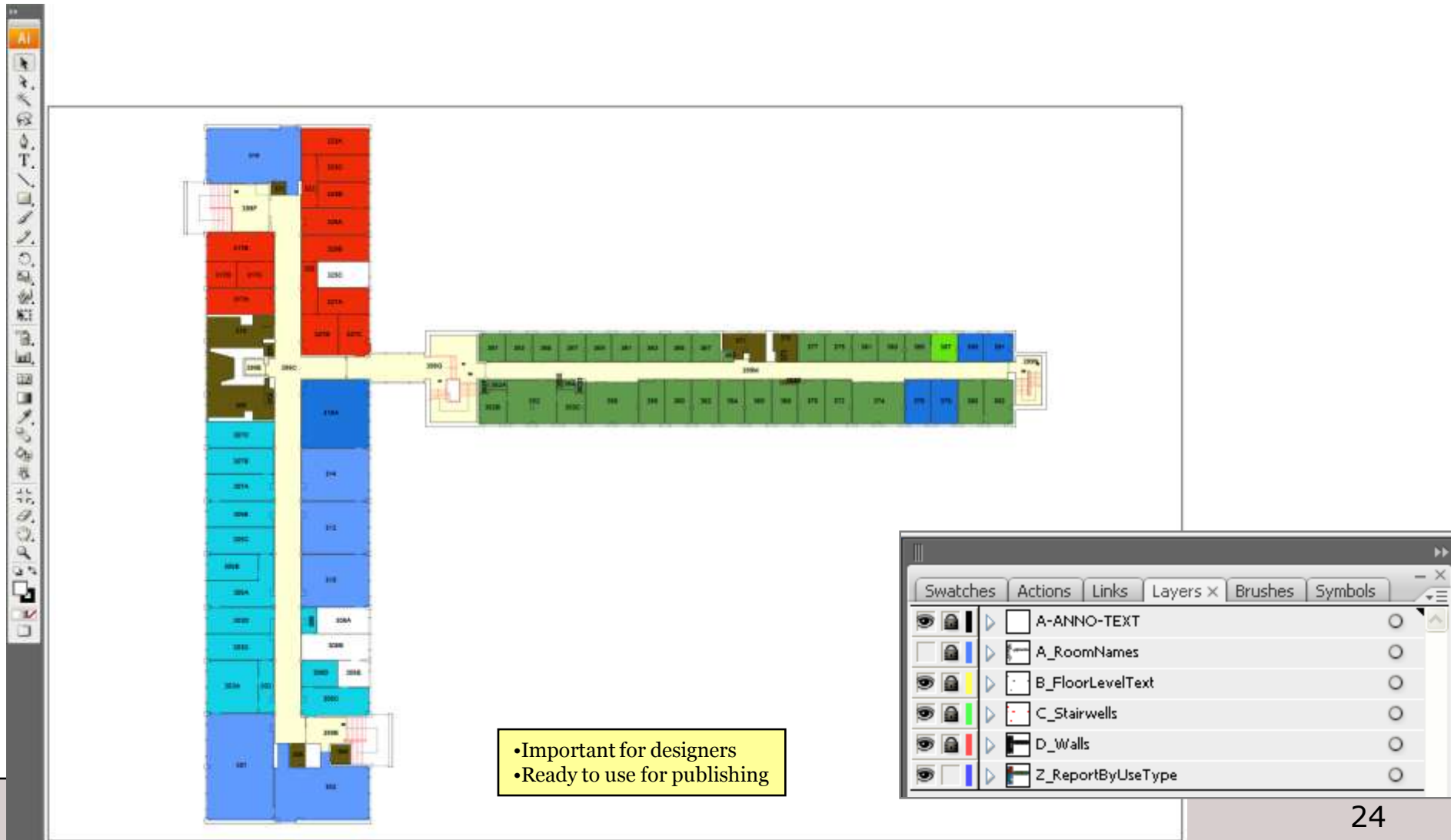
III. Report Generating:
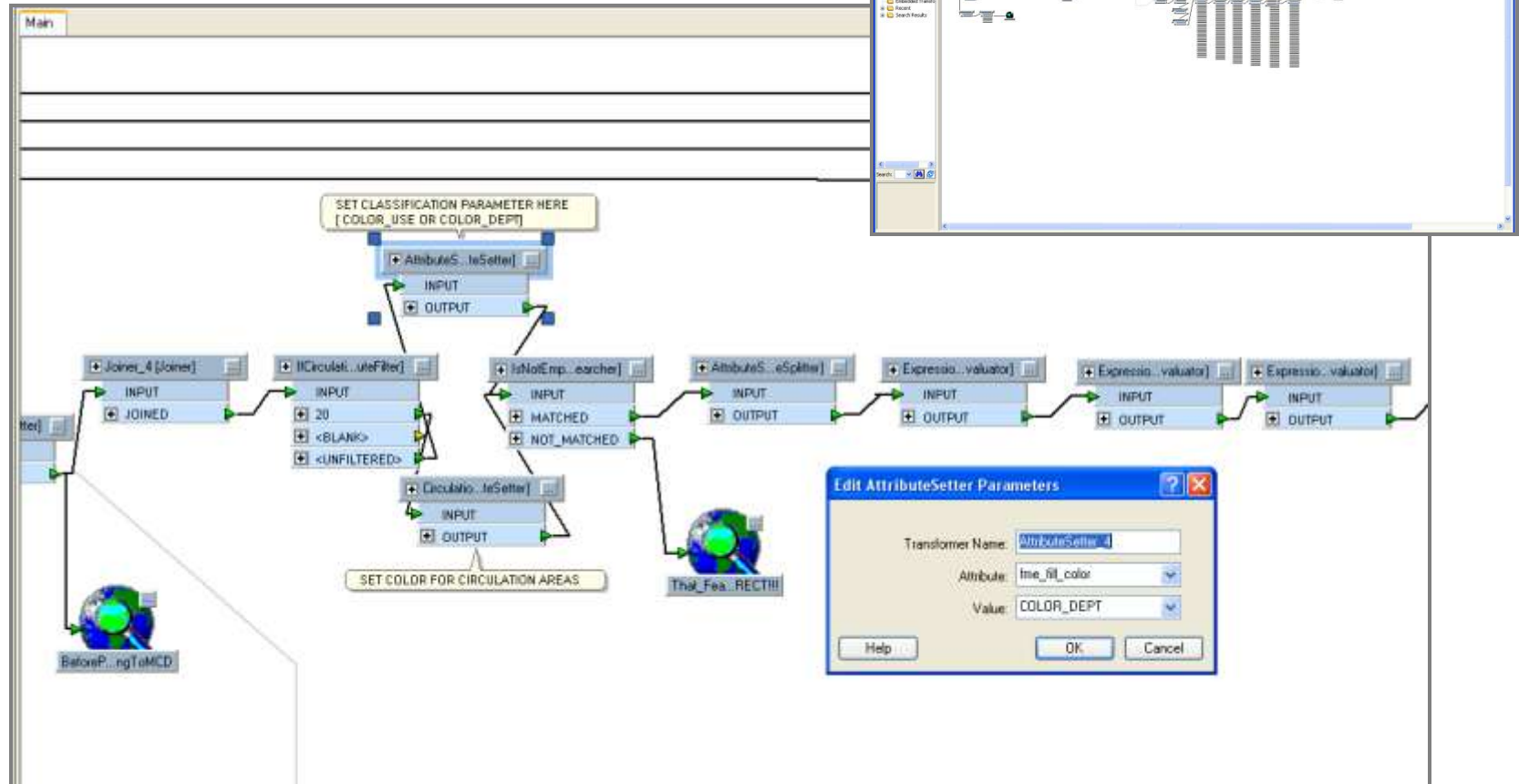
III. Report Generating: User's viewpoint
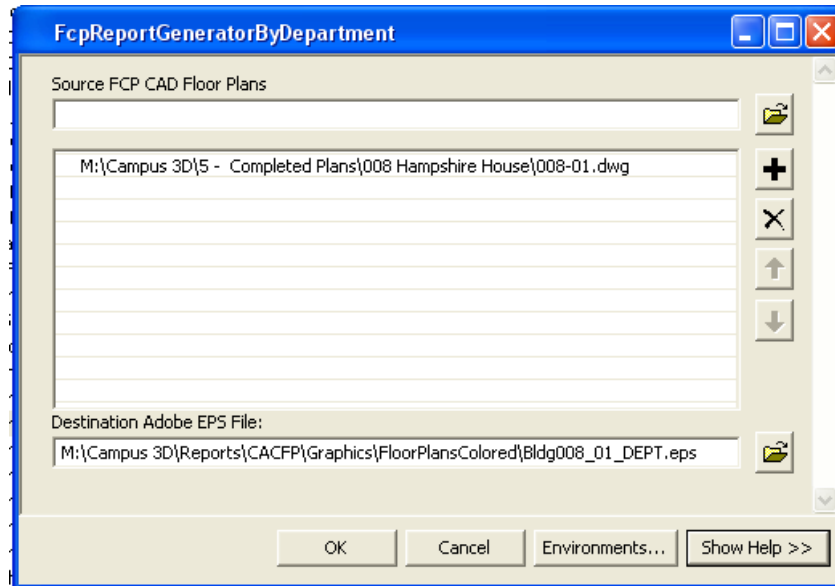
- •"Regular" tool in a Toolbox
- •Batch mode
- •Centralized location
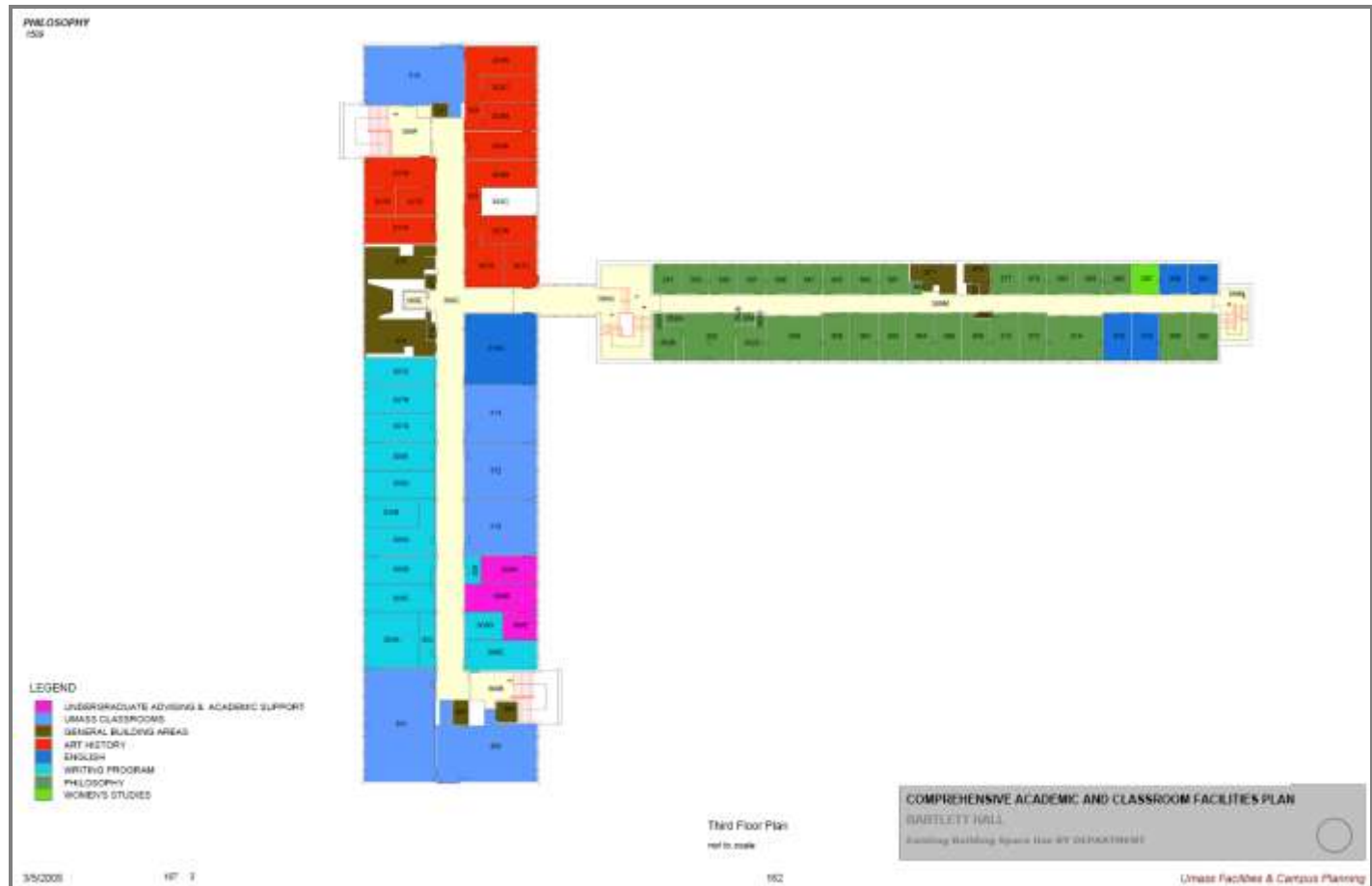- •Shared by users

III. Report Generating: EPS vector graphics

- •Important for designers
- •Ready to use for publishing

Swatches | Actions | Links | Layers × | Brushes | Symbols

- A-ANNO-TEXT
- A_RoomNames
- B_FloorLevelText
- C_Stairwells
- D_Walls
- Z_ReportByUseType

24

III. Report Generating
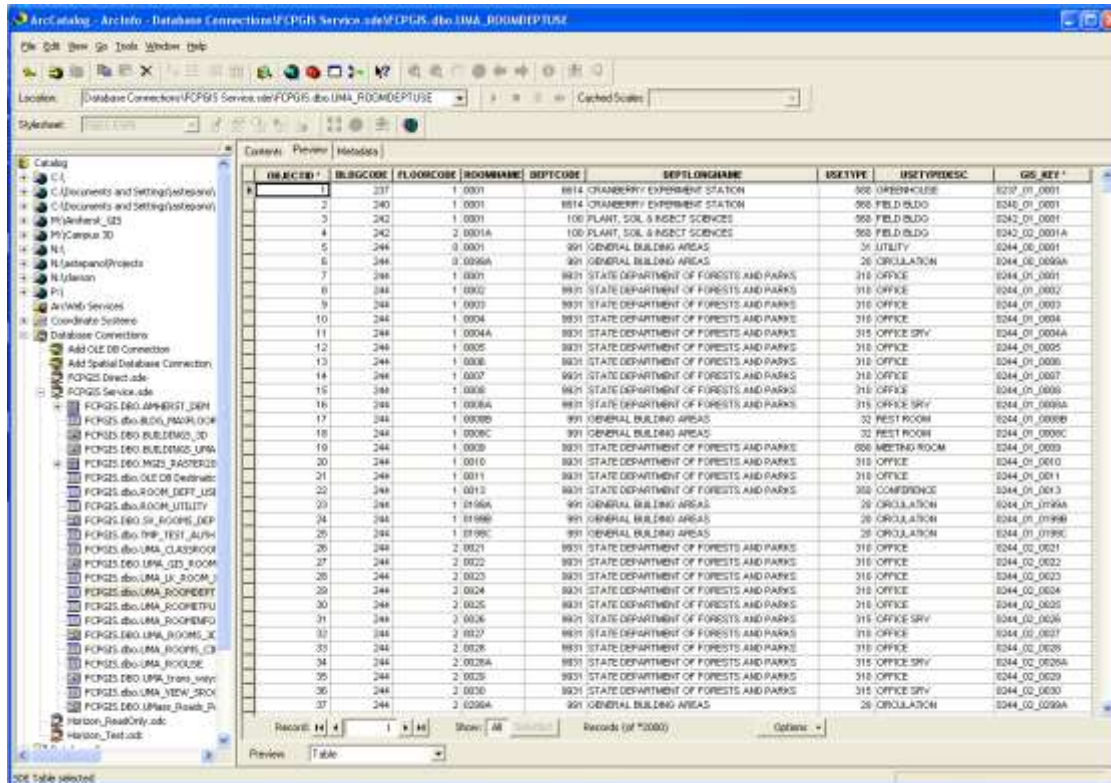
III. Example: Data Upload and Symbology Management
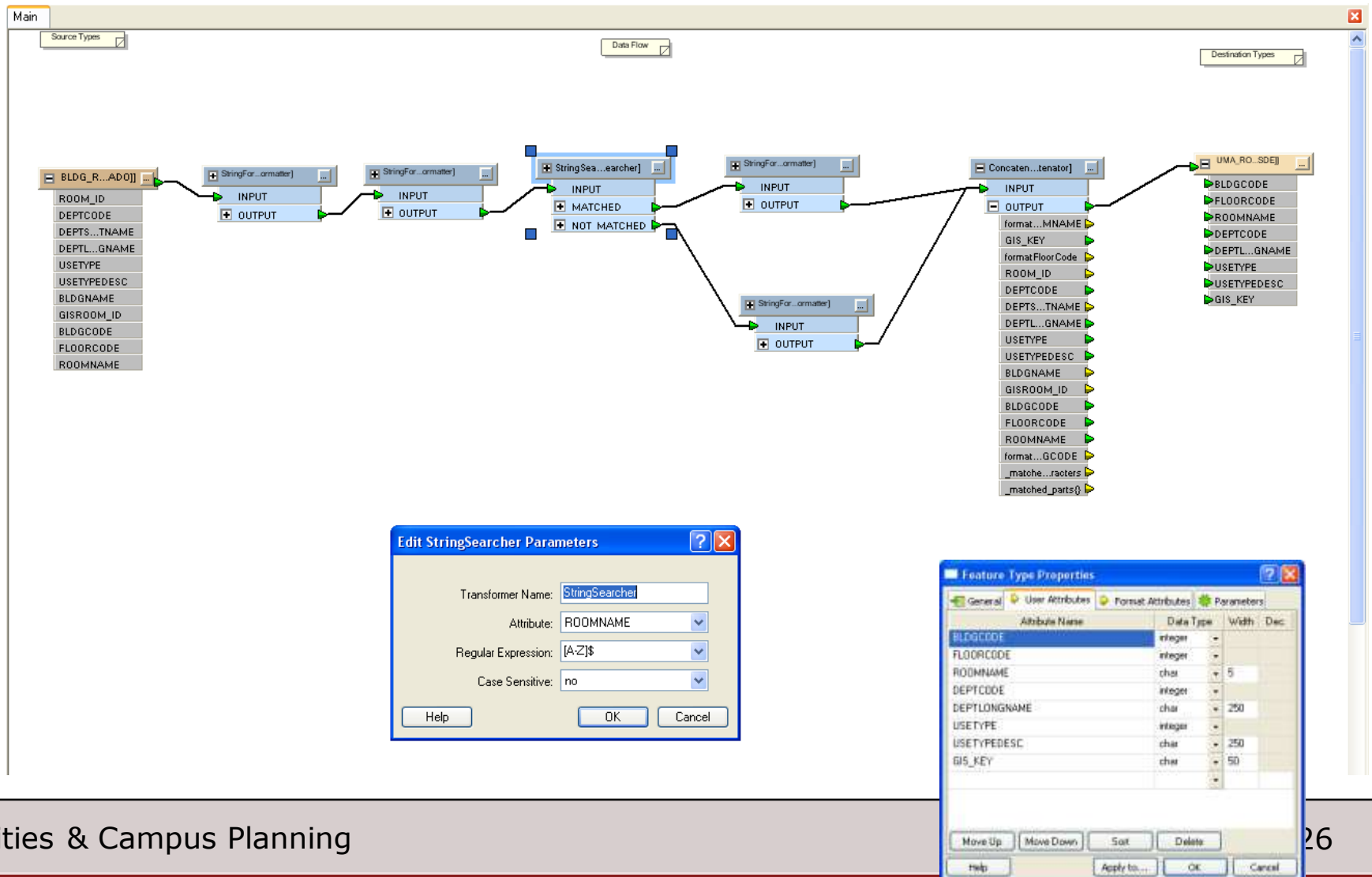
III. Example: Loading data into ArcSDE

OBJECTID *	BLDGCODE	FLOORCODE	ROOMNAME	DEPTCODE	DEPTLONGNAME	USETYPE	USETYPEDESC	GIS_KEY *
1	237	1	0001	6614	CRANBERRY EXPERIMENT STATION	580	GREENHOUSE	0237_01_0001
2	240	1	0001	6614	CRANBERRY EXPERIMENT STATION	560	FIELD BLDG	0240_01_0001
3	242	1	0001	100	PLANT, SOIL & INSECT SCIENCES	560	FIELD BLDG	0242_01_0001
4	242	2	0001A	100	PLANT, SOIL & INSECT SCIENCES	560	FIELD BLDG	0242_02_0001A
5	244	0	0001	991	GENERAL BUILDING AREAS	31	UTILITY	0244_00_0001

Facilities & Campus Planning

Future Development

Batch Processing and Scheduling
to automate workflows completely

Summary

- DataInterOp extension allows us to aggregate and maintain up-to-date campus-wide spatial database *without* changing existing work processes (work flows).

    - Set of shared tools and documentation
    - Flexibility in data manipulation
    - Minimum of import/export operations

Data Interoperability Extension

Q&A