



NCHRP PROJECT 20-5 - **SYNTHESIS TOPIC 38-02**

IT BEST PRACTICES FOR PROJECT DESIGN AND CONSTRUCTION

Prepared by

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For Presentation to

AASHTO Highway Subcommittee on Construction

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AASHTO
**Construction
Conference**
2007



MISSISSIPPI



NCHRP SYNTHESIS TOPIC 38-02 IT BEST PRACTICES FOR PROJECT DESIGN AND CONSTRUCTION

Agenda

0. Scope of the Project
1. Literature Review
2. Survey of IT practices by Functional Area
3. Selected case studies
4. Data Flow Process diagrams
5. Summary



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IT BEST PRACTICES FOR PROJECT DESIGN AND CONSTRUCTION

0. Scope of the Project

- The synthesis series reports on **current knowledge and practice**, in a compact format.
- **Each report in the series** provides a compendium of the best knowledge available on those measures found to be the most successful in resolving **specific problems**.

Synthesis of Highway Practice 38-02
IT Best Practices for Project Design and Construction



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IT BEST PRACTICES FOR PROJECT DESIGN AND CONSTRUCTION

0. Scope of the Project

- **Problem: Electronic data** generated during different phases of the project delivery lifecycle are **not always complete, consistent, preserved, fully understood, transmitted to customers, or otherwise meet the needs of the users.**
- **Objective: Identifying existing best practices** (e.g., procedures, guidelines, software types, hardware, and human factors) for the seamless **sharing of information** throughout all phases of the project delivery process is the focus of this report.



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0. Scope of the Project

- Does your state **successfully transfer data** from one phase to another?
 - Names of engineering software packages used in one or more phases of the project delivery lifecycle
 - When they are used
 - How they integrate into the next phase and/or the overall project delivery lifecycle

- **Identify gaps in integration** and those that have solved the integration gap challenge.
 - Effective and persistent use of data “enters it once, uses it over and over”
 - Data sharing problems and gaps
 - Current applications and published case studies of the use of interoperability
 - Current research in interoperability



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0. Methodology

1. Literature Review
 - DOT Information Technology
 - Interoperability
2. Survey of IT practices by Functional Area
3. Selected case studies
4. Data Flow Process diagrams



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1. Literature Review

- **DOT Information Technology**
- **Interoperability**



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2. Survey of IT practices by Functional Area

Submit by Email

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INFORMATION TECHNOLOGY for PROJECT DESIGN and CONSTRUCTION

NCHRP SYNTHESIS 38-02
INFORMATION TECHNOLOGY for PROJECT DESIGN and CONSTRUCTION

SECTION 1: IT for PLANNING FUNCTION

INTRODUCTION/BACKGROUND

The National Cooperative High report) of successful transportation functions and to contractors. This brief initial survey should focus on areas: Planning, Design, Procurement survey portions to the appropriate

The entire scope of the study can be found at <http://www.trb.org/TRBNet/Project38-02>

What U.S. State is your DOT? Official Functional Unit Name:

Name of Survey Respondent: Respondent's Job Title:

Respondent's email address: Respondent's phone number:

IN WHICH FORMAT IS DATA PRIMARYLY RECEIVED FROM OTHER UNITS?

- Most always digital-Most never paper
- Frequently digital-Seldom via paper
- Approximately equal amounts of digital & paper
- Frequently paper-Seldom digital
- Most always paper-Most never digital

IN WHICH FORMAT IS DATA PRIMARYLY PROCESSED/GENERATED INTERNALLY?

- Most always digital-Most never paper
- Frequently digital-Seldom via paper
- Approximately equal amounts of digital & paper
- Frequently paper-Seldom digital
- Most always paper-Most never digital



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2. Survey of IT practices by Functional Area

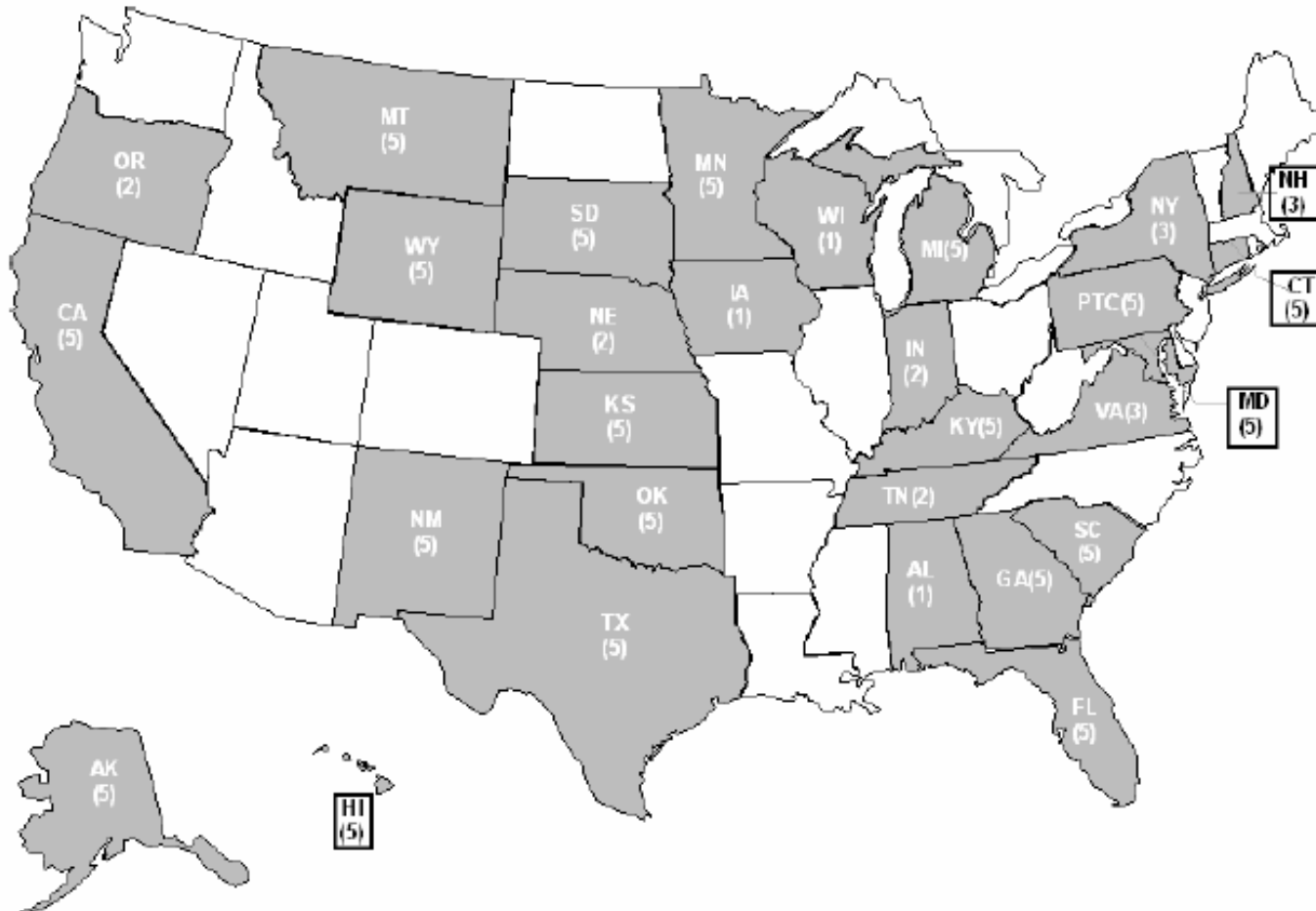
Identified 5 DOT 'Functional Areas'

- ❖ **PLANNING**
- ❖ **DESIGN**
- ❖ **PROCUREMENT**
- ❖ **CONSTRUCTION**
- ❖ **OPERATIONS & MAINTENANCE**



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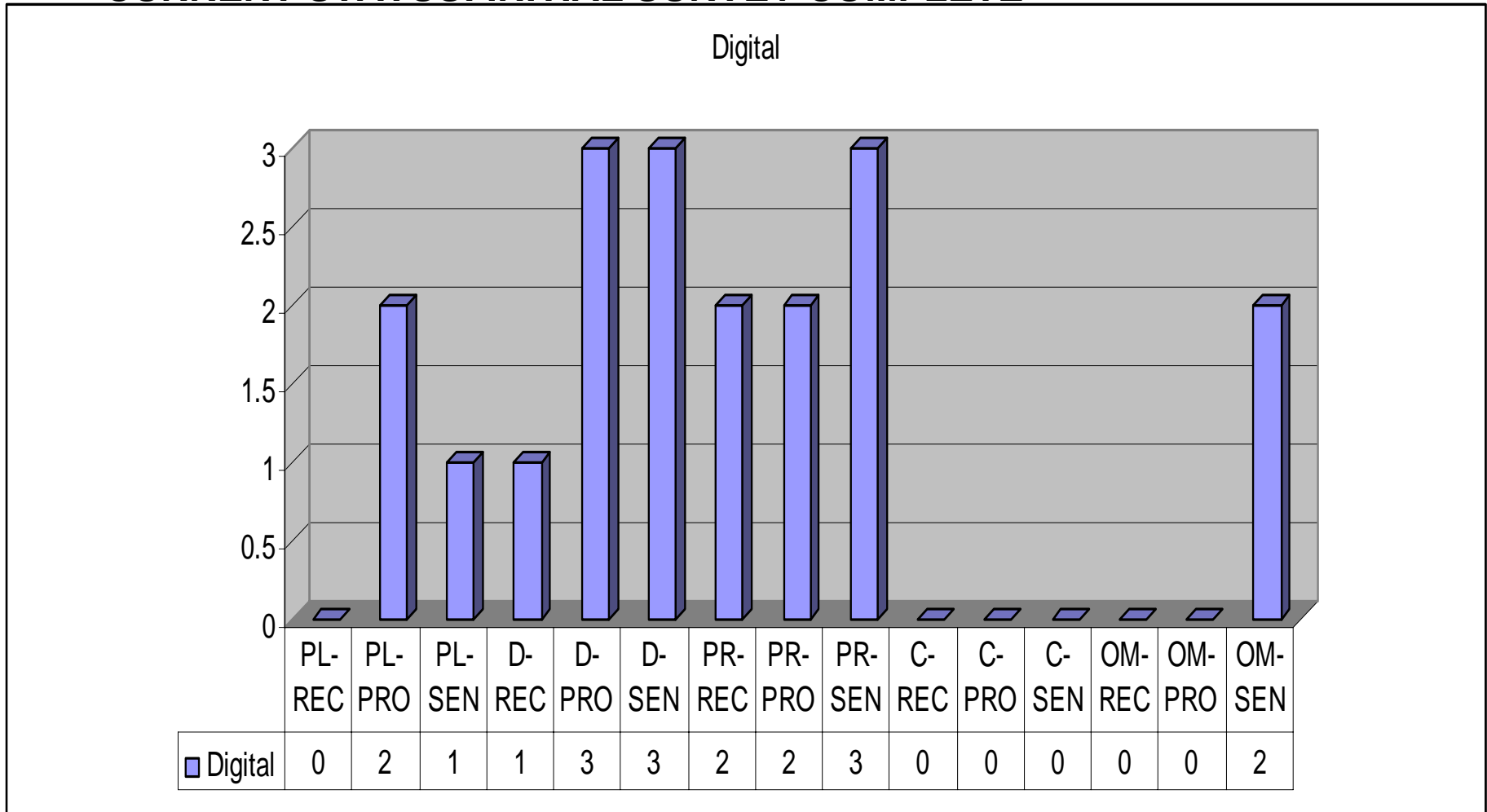
2. Survey of IT practices by Functional Area





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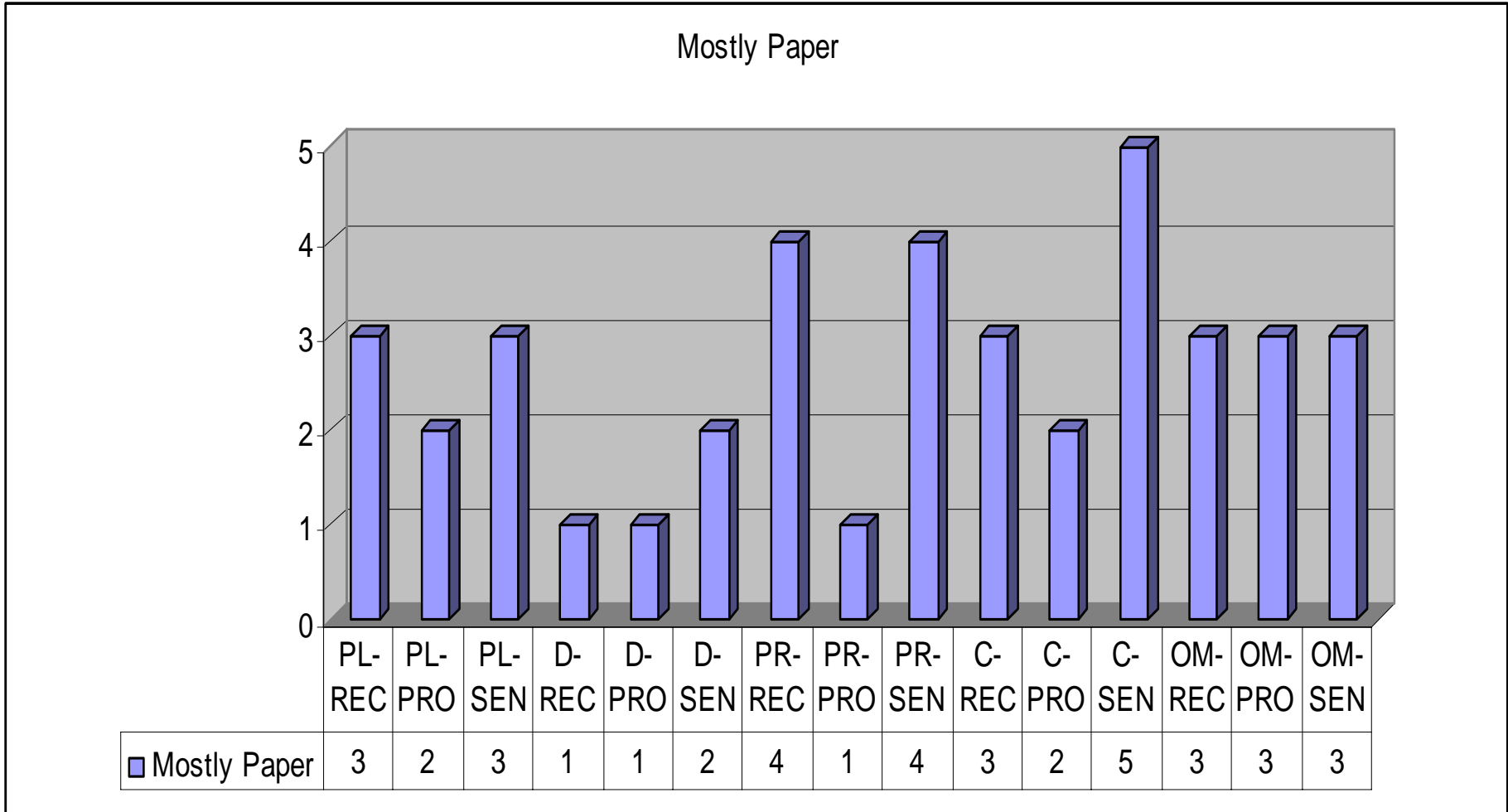
2. Survey of IT practices by Functional Area CURRENT STATUS: INITIAL SURVEY COMPLETE





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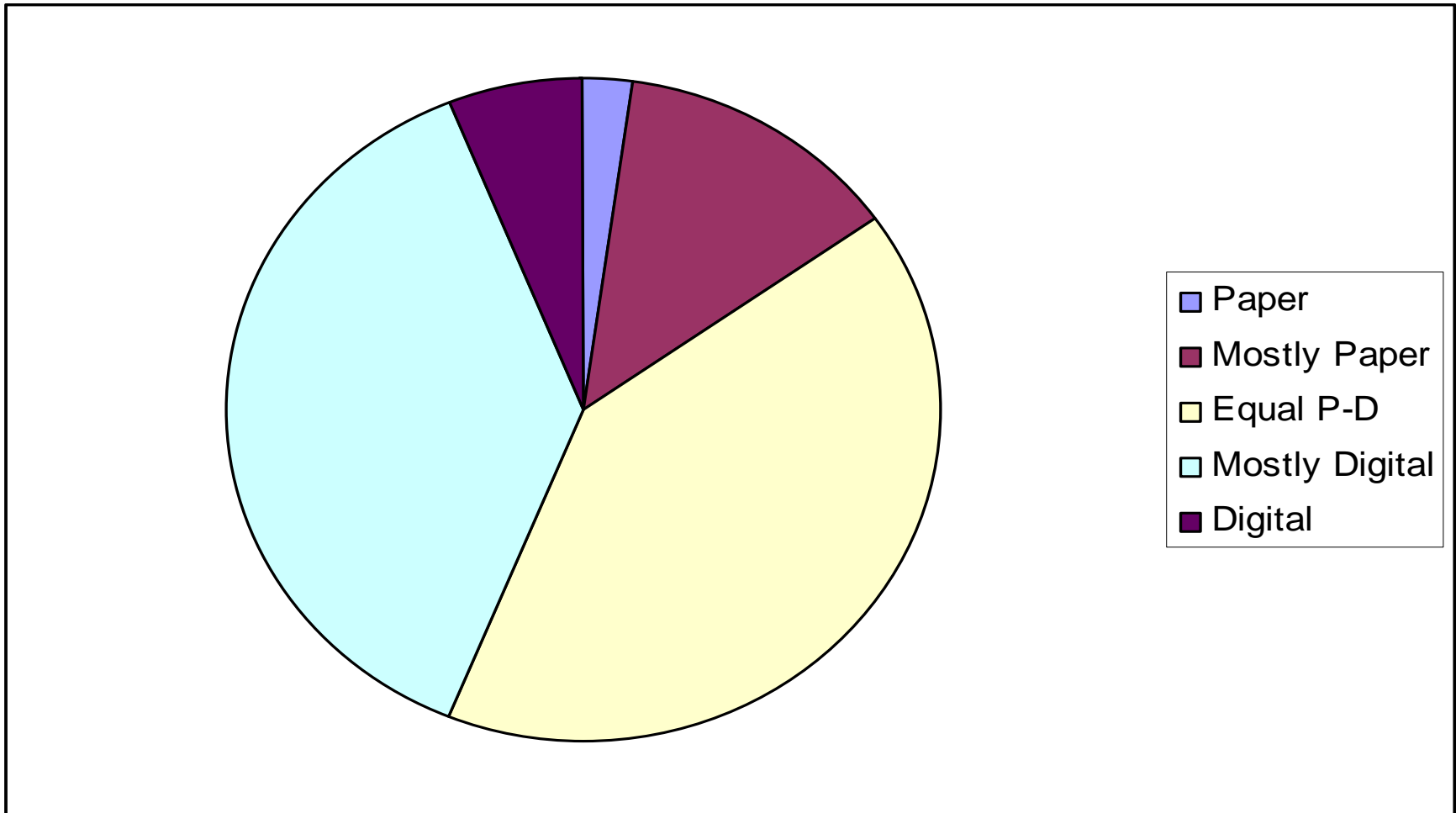
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2. Survey of IT practices by Functional Area
CURRENT STATUS: INITIAL SURVEY COMPLETE





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2. Survey of IT practices by Functional Area

State	Remark: Paper=0%,MP=25%,EQ=50%,MD=75%,D=100%		
	% of Digital based on Responses	% of Divisions Responses	% of DOT digital
AL	67%	20%	13%
AK	55%	93%	52%
CA	68%	100%	68%
CT	66%	53%	35%
FL	50%	100%	50%
GA	53%	100%	53%
HI	45%	100%	45%
IA	50%	20%	10%
IN	50%	20%	10%
KY	78%	100%	78%
KS	57%	93%	53%
MD	48%	93%	45%
MI	73%	80%	58%
MN	48%	100%	48%
MT	45%	100%	45%

State	Remark: Paper=0%,MP=25%,EQ=50%,MD=75%,D=100%		
	% of Digital based on Responses	% of Divisions Responses	% of DOT digital
NE	42%	40%	17%
NH	31%	27%	8%
NM	68%	100%	68%
NY	69%	60%	42%
OK	42%	100%	42%
OR	58%	40%	23%
PTA	52%	100%	52%
SC	68%	100%	68%
SD	65%	100%	65%
TN	75%	40%	30%
TX	68%	100%	68%
VA	81%	60%	48%
VI	75%	20%	15%
WY	43%	100%	43%



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3. Selected case studies

- ❖ FLORIDA DOT
- ❖ KENTUCKY TRANSPORTATION CABINET
- ❖ MINNESOTA DOT
- ❖ NEW YORK STATE DOT
- ❖ NORTH CAROLINA DOT



NCHRP SYNTHESIS TOPIC 38-02 IT BEST PRACTICES FOR PROJECT DESIGN AND CONSTRUCTION

3. Selected case studies

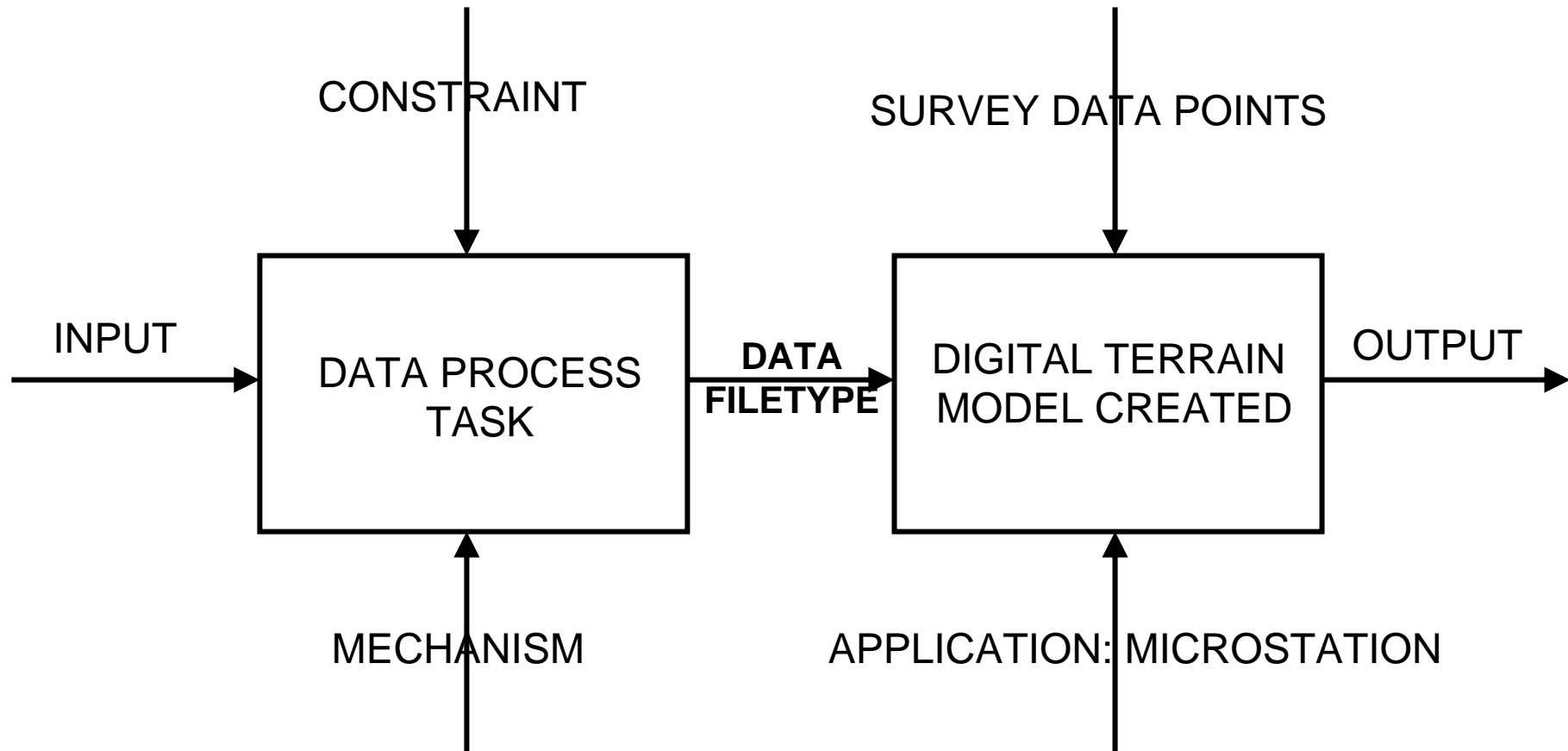
- ❖ FLORIDA DOT
- ❖ KENTUCKY TRANSPORTATION CABINET
- ❖ MINNESOTA DOT
- ❖ NEW YORK STATE DOT
- ❖ NORTH CAROLINA DOT

MAY NEED OTHERS!



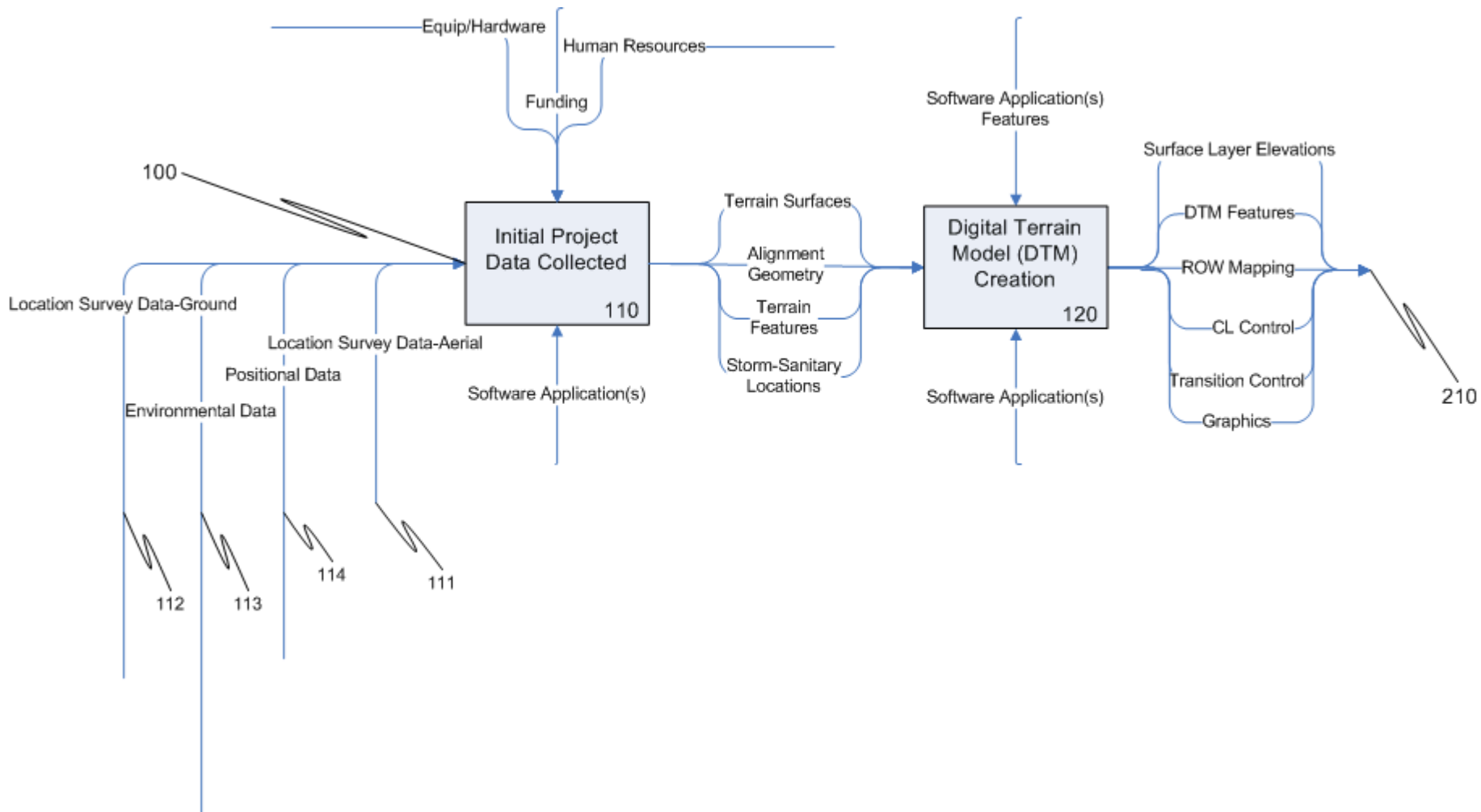
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4. Data Flow Process diagrams (IDEF0)



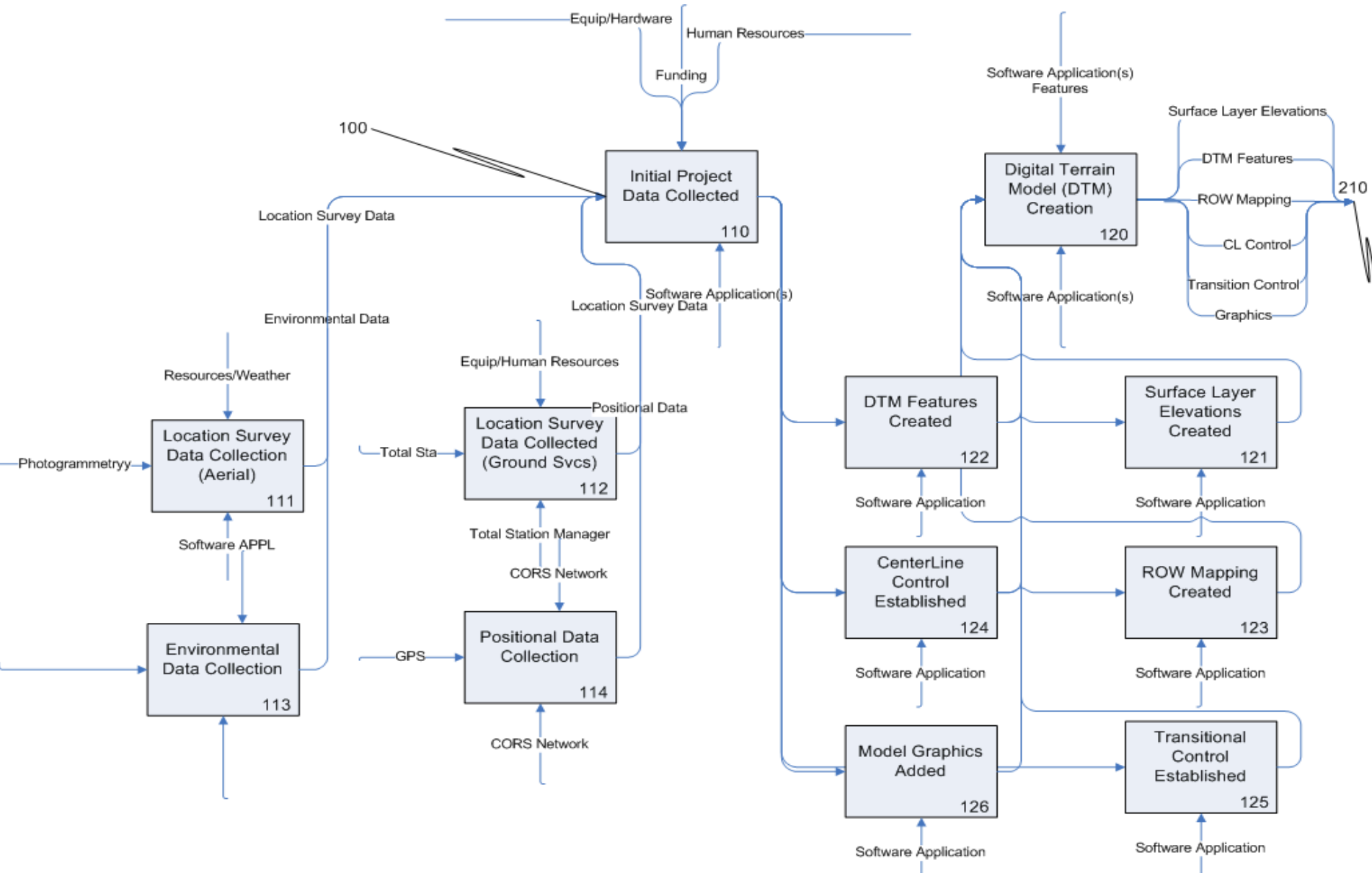


4. Data Flow Process diagrams (IDEF0)





4. Data Flow Process diagrams (IDEF0)





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5. Summary (Current Status)

- ✓ CASE STUDY INTERVIEWS UNDERWAY
- ✓ MAPPING UNDERWAY
- ✓ LITERATURE REVIEW COMPLETE
- ✓ 2ND DRAFT DUE EARLY OCTOBER



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5. Summary (Preliminary Conclusions)

- ✓ **STANDARDIZATION OF TERMS (ONTOLOGY)**
- ✓ **STANDARDIZATION OF DATA/FILE TYPES**



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5. Summary (Possible Solutions: Further Research)

COMMON DATA LANGUAGE:

SCHEMA-LAND/xml, TRANS/xml

BIM: INDUSTRIAL FOUNDATION CLASSES (IFC)

COMMON DATA/FILE TYPES

MAPPING CAPABILITIES (DATA SHARING)

INTELLECTUAL PROPERTY ISSUES (DATA SHARING)

VERSION TRACKING (DATA SHARING)

REPOSITORY ISSUES (DATA SHARING)



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5. Summary (Possible Solutions: Further Research)

DATA SHARING

- **ACROSS FUNCTIONAL AREAS**
- **BETWEEN PROJECT/CONTRACTUAL STAKEHOLDERS**

STANDARDIZATION STARTS SOMEWHERE

International Organization for Standardization (ISO)?

International Alliance for Interoperability (IAI)?

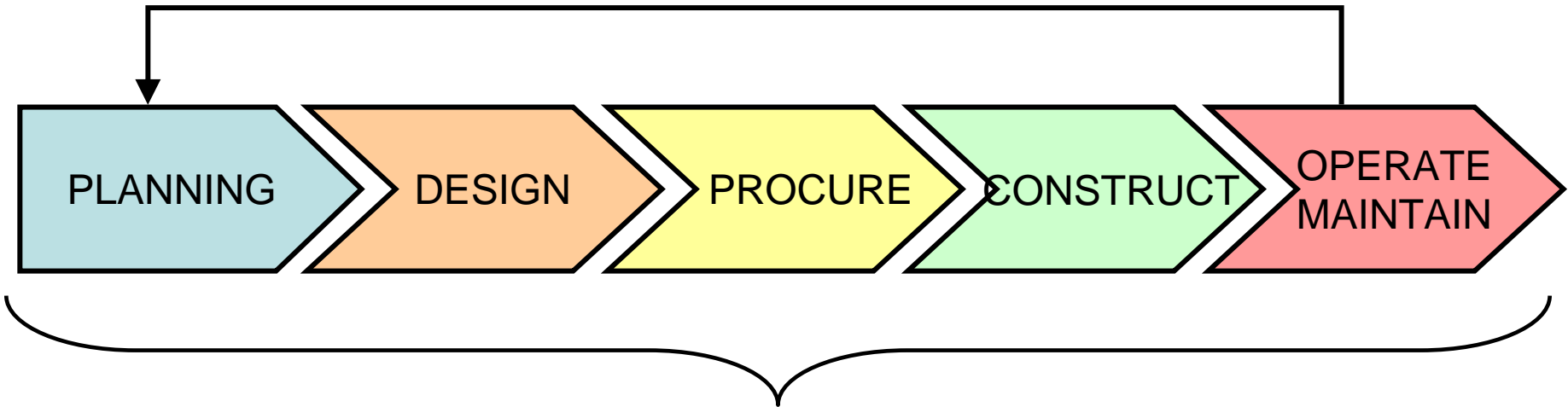
AASHTO: Joint Technical Committee(s)?



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5. Summary (Possible Solutions: Further Research)

PROJECT LIFE-CYCLE WITH FEEDBACK LOOP



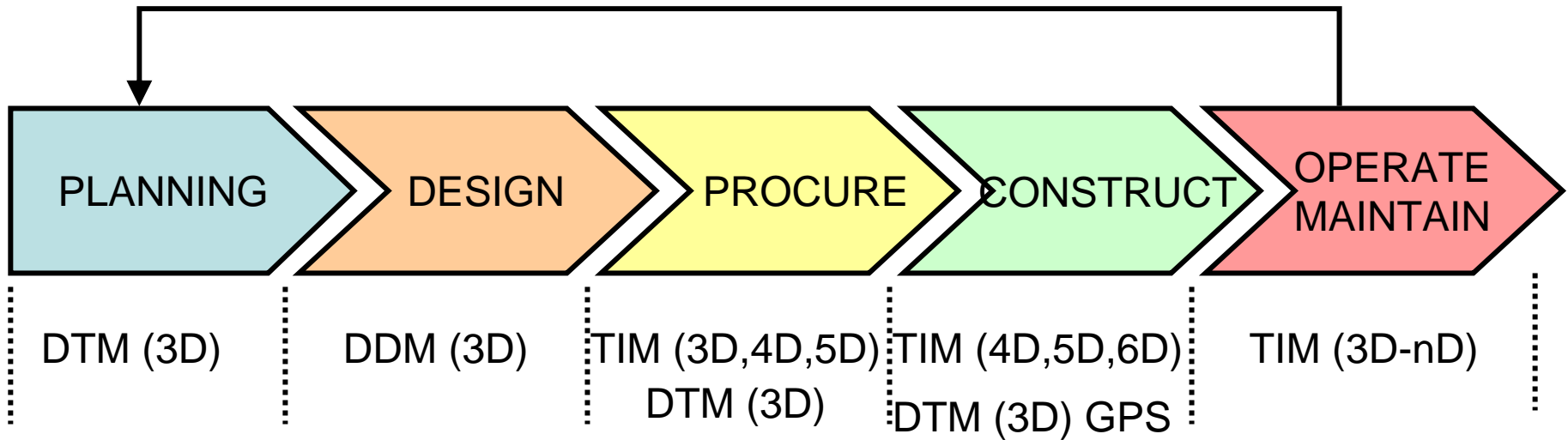
DOT Functional Areas



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5. Summary (Possible Solutions: Further Research)

TIM not BIM



DTM=Digital Terrain Model

DDM=Digital Design Model

TIM=Transp Information Model

3D=x,y,z digital model

4D=3D + schedule

5D=3D + estimate

6D=3D + work progress



SPECIAL THANKS TO 38-02 SYNTHESIS PANEL MEMBERS

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Thank You for Having Us!

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