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The Architecture and Design of a Corporate Engineering Data Repository

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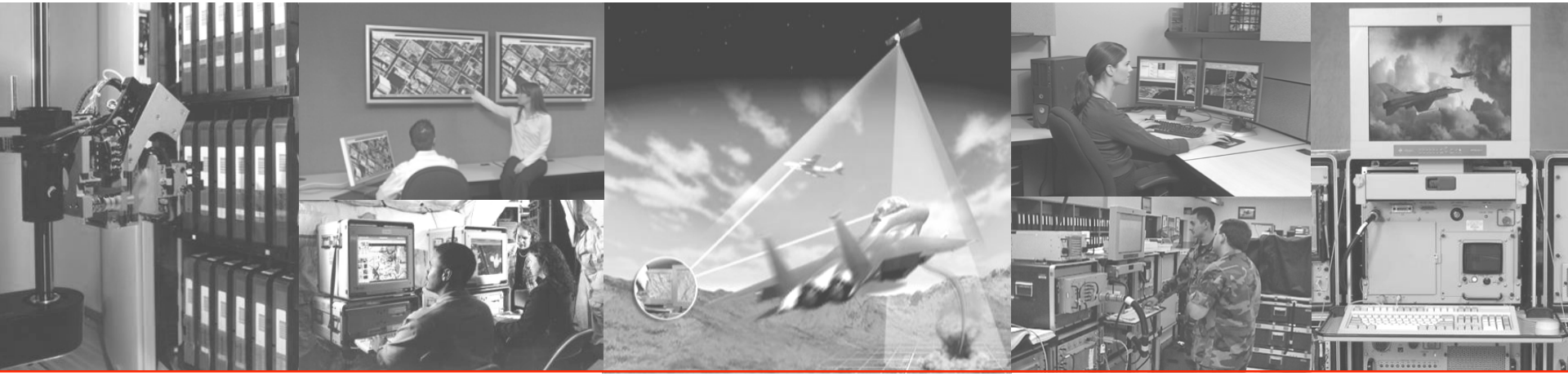

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Welcome to Rome!

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Outline

- What is the Engineering Data Repository?
- CONOPS
- Architectural and Design Considerations
- Use Interfaces
- Data Collection Process
- Lessons Learned

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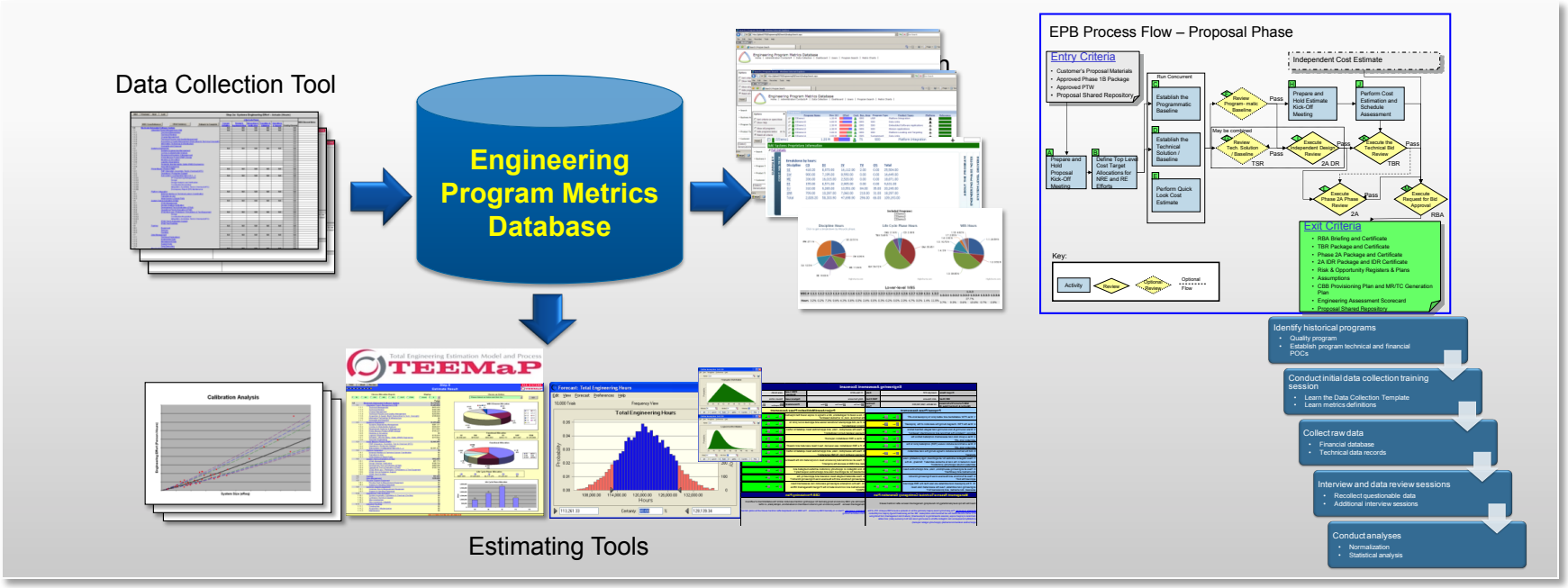
What's the Engineering Data Repository?

- A suite of tools, comprised of
  - Database of historical program data
  - Data query portal
  - Tools
  - Process assets
  - Training



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What's in the Repository?

Historical Data:

- Project metadata
  - Project and program level descriptions
  - Attributes and characteristics
- Engineering financial actuals
  - Actual (historical) efforts
  - Estimated (in-execution) efforts
- System-level design metrics, e.g.,
  - Requirements
  - Interfaces
  - Algorithms
  - System complexity factors
- Subsystem/component-level metrics, e.g.,
  - SLOC counts
  - SWaP
  - Drawing counts
  - Supportability

Tools and Processes:

- Data search and query interfaces
- Engineering (parametric) estimating tools
- Data collection and analysis tools
- Procedures, templates, checklists
- Training materials, videos
- References

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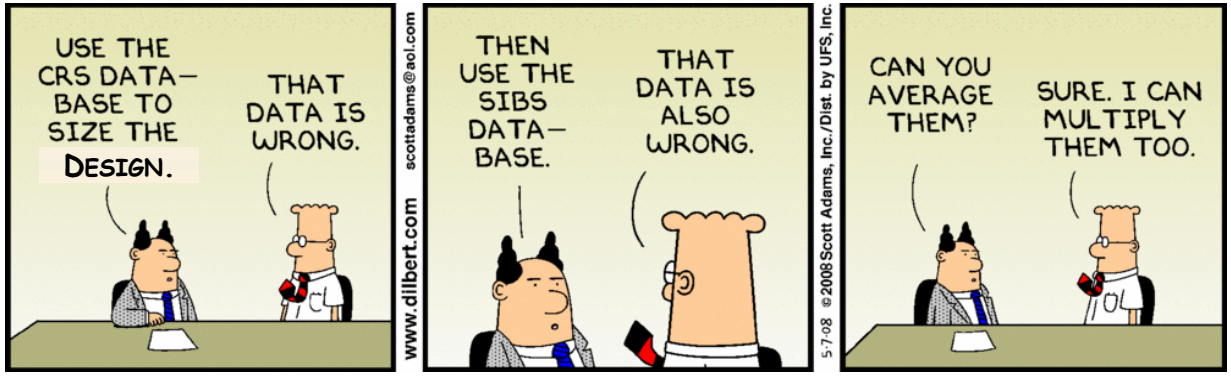
What's Motivation?

- The dilemma we ran into in the past…



Adapted from Dilbert, © Scott Adams, Inc.

- Provide enterprise-wide, central and easy-to-use data store for all engineers
  - Consistent use of historical data in system design and business winning
  - Supporting entire project life cycle
  - Improved estimation accuracy, confidence and credibility
  - Save cost and reduce cycle time
  - Strategic competitive discriminator

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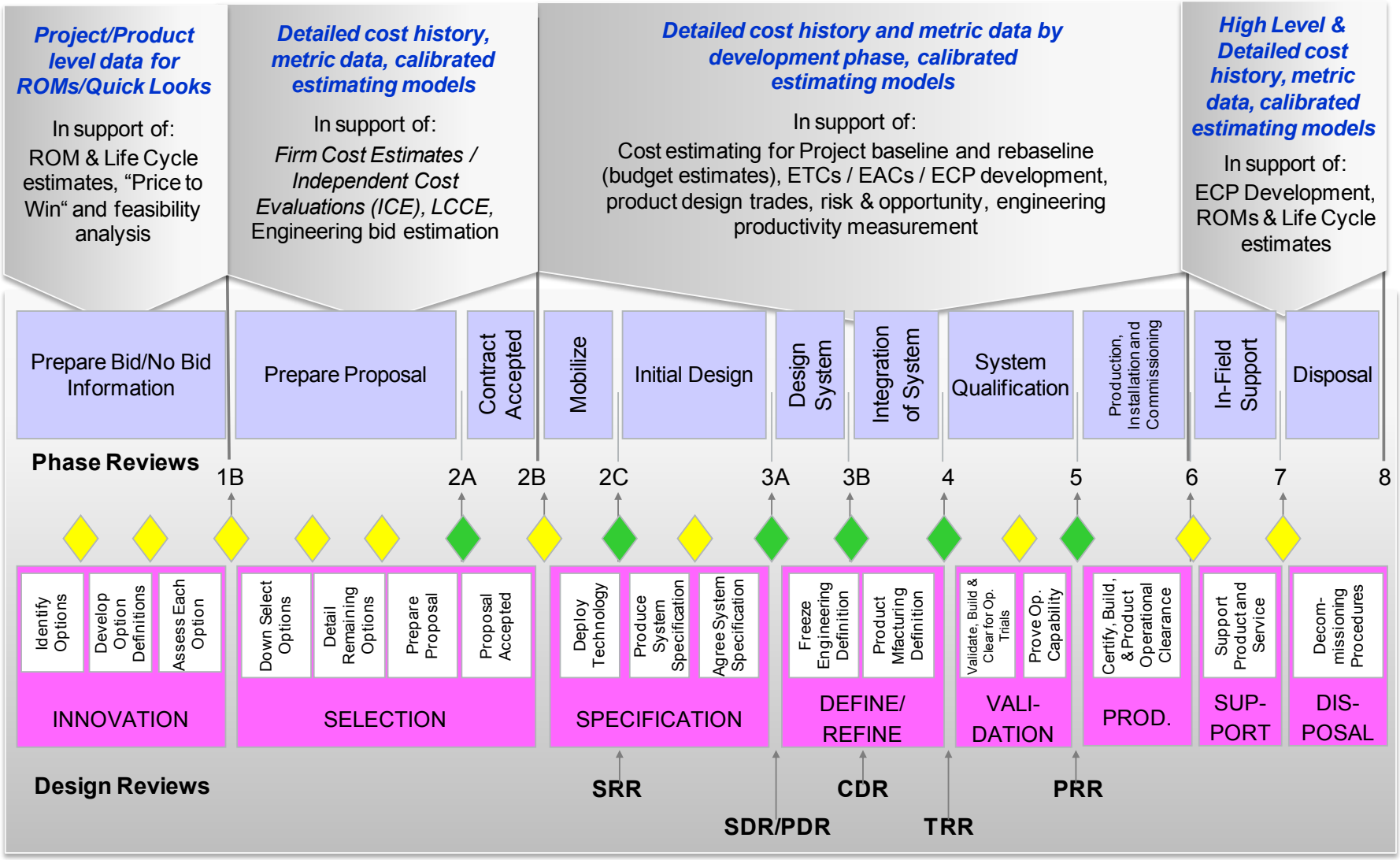
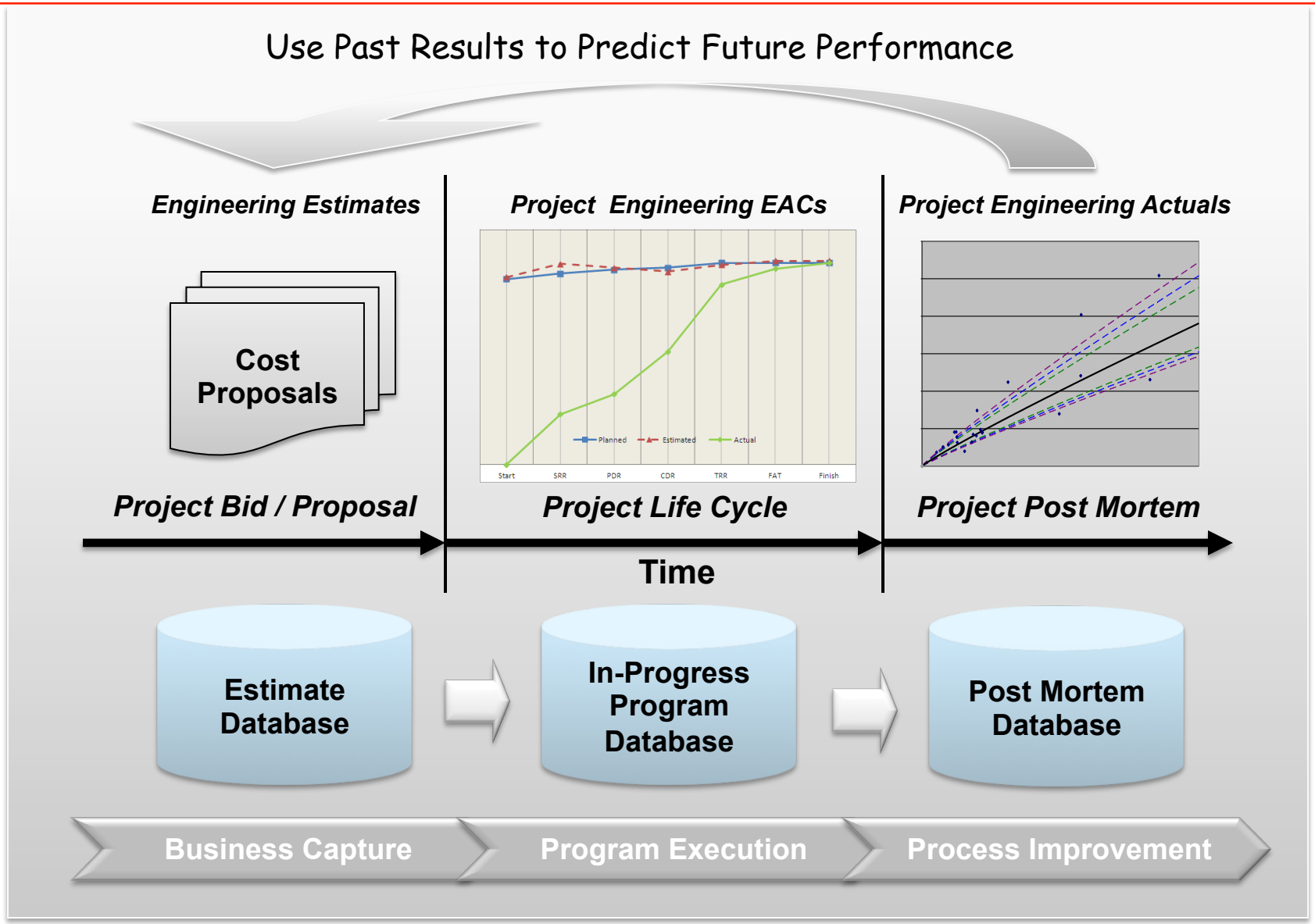
Lifecycle Operational Data Needs

Use of historical data essential in system design and program execution



Three Interconnecting Logical Databases



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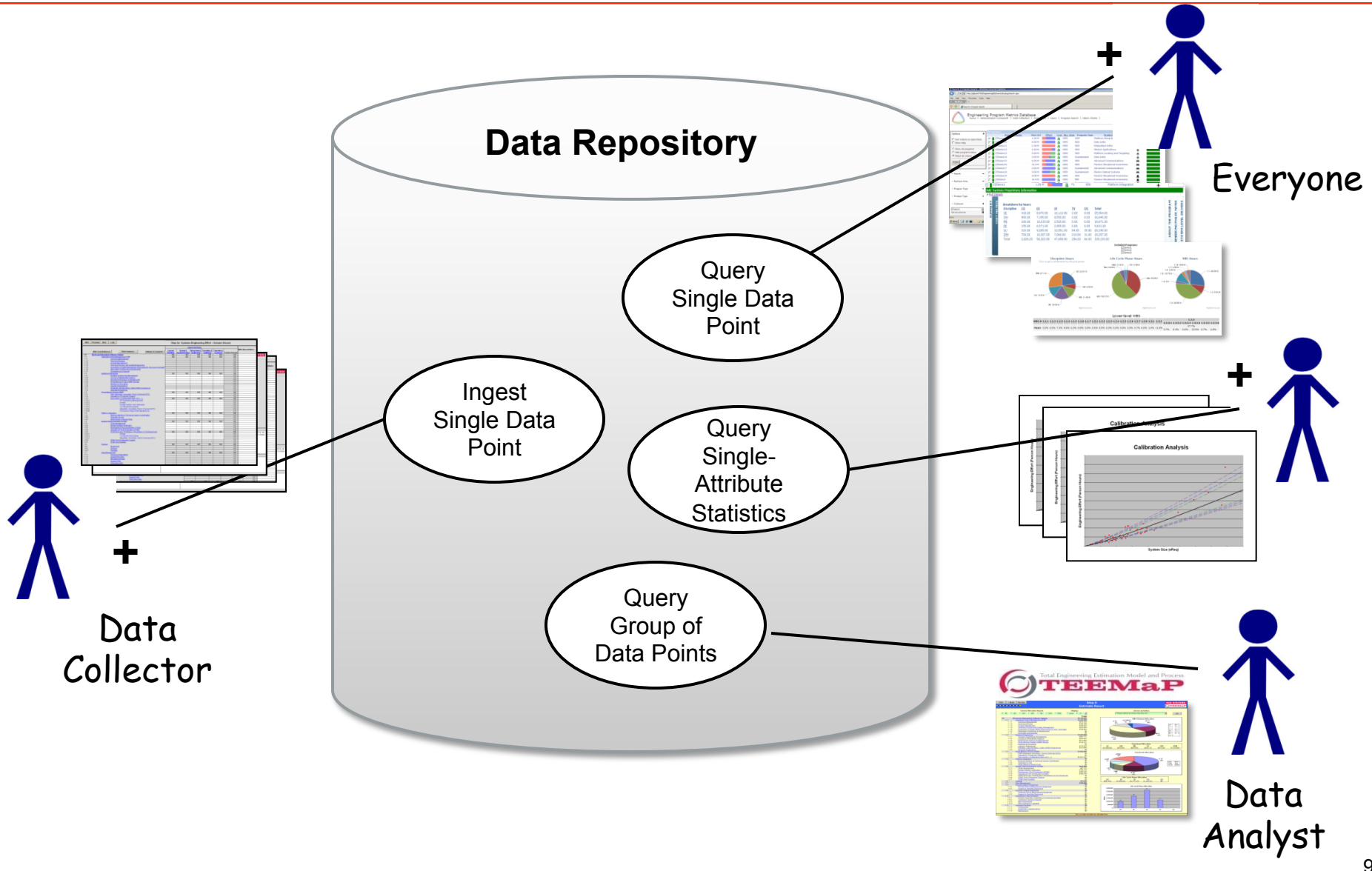
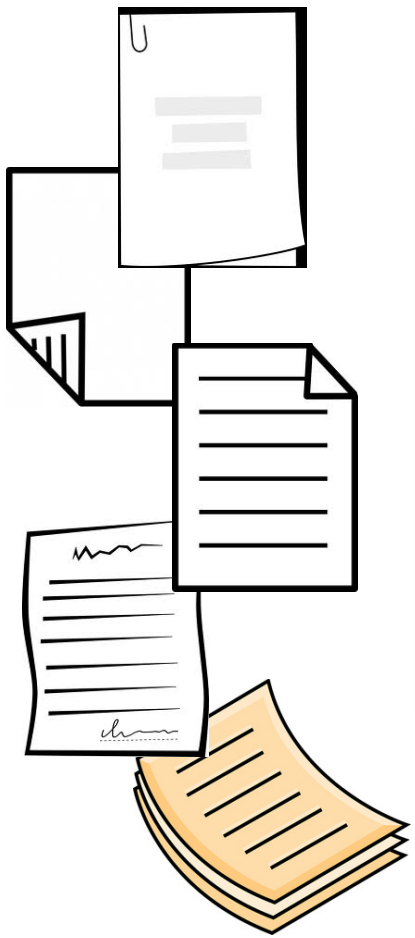
Typical Use Cases



Cost Element Structure

Project/Organization
Specific Structures



Mapping Rules

Lifecycle Phases

Functional Disciplines

Work Breakdown Structure

1.0 – System/Project
1.1 – Integrated Project Management
1.2 – Systems Engineering
1.3 – Prime Mission Product (PMP)
1.4 – Platform Integration
1.5 – System Test & Evaluation (ST&E)
1.6 – Training
1.7 – Data Management
1.8 – Peculiar Support Equipment
1.9 – Common Support Equipment
1.10 – Operational / Site Activation
1.11 – Industrial Facilities

MIL-STD 881 Compliant

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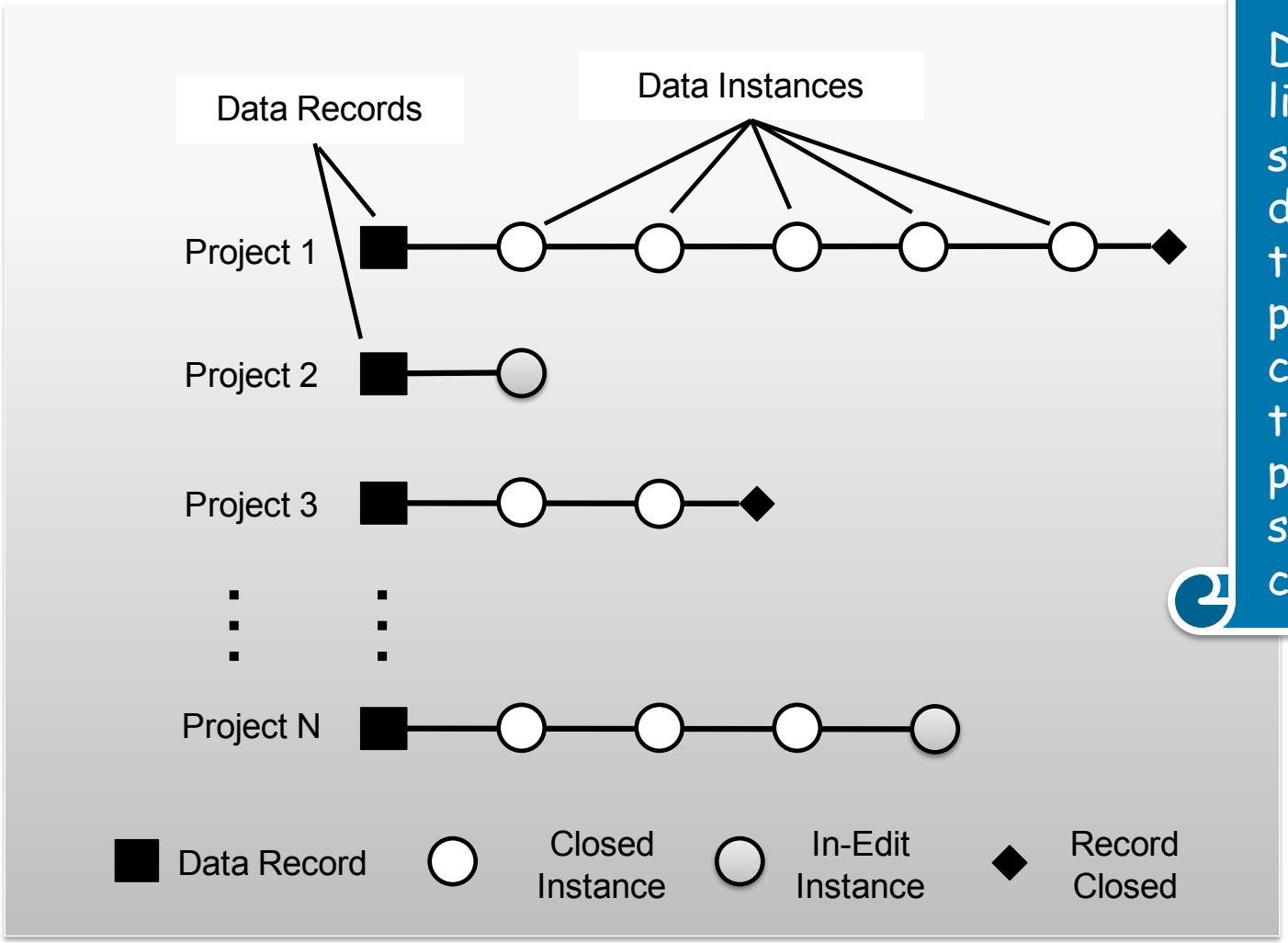
Dynamic Data Structure Design



Dynamic linked lists used to support different data types and periodic collections throughout project and system life cycles

Database Workflow Supporting Collection of Multiple Data Instances of Same Program Data

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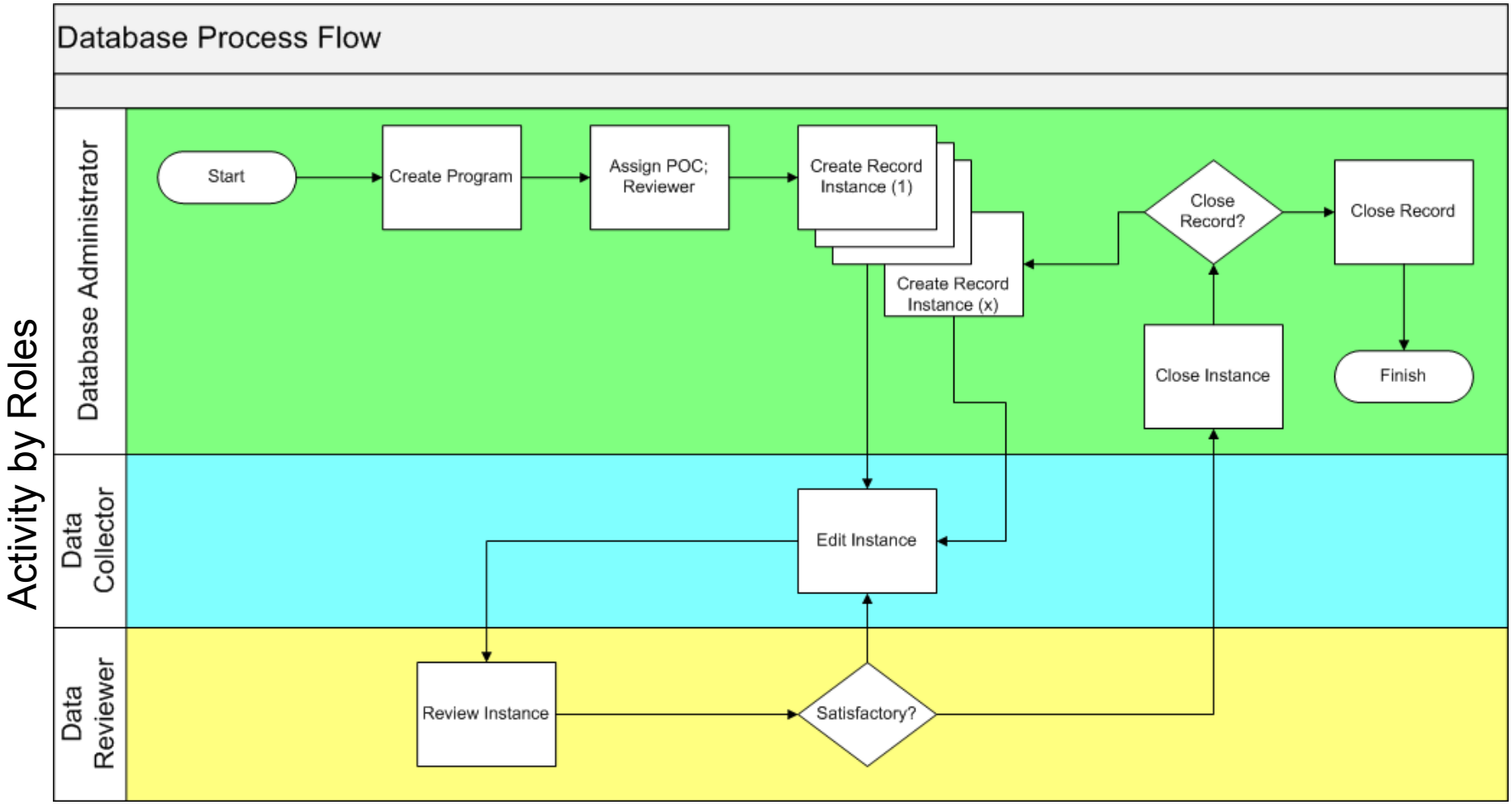
Built-in Data Ingestion and Review Functions to Support Role-based Interactions



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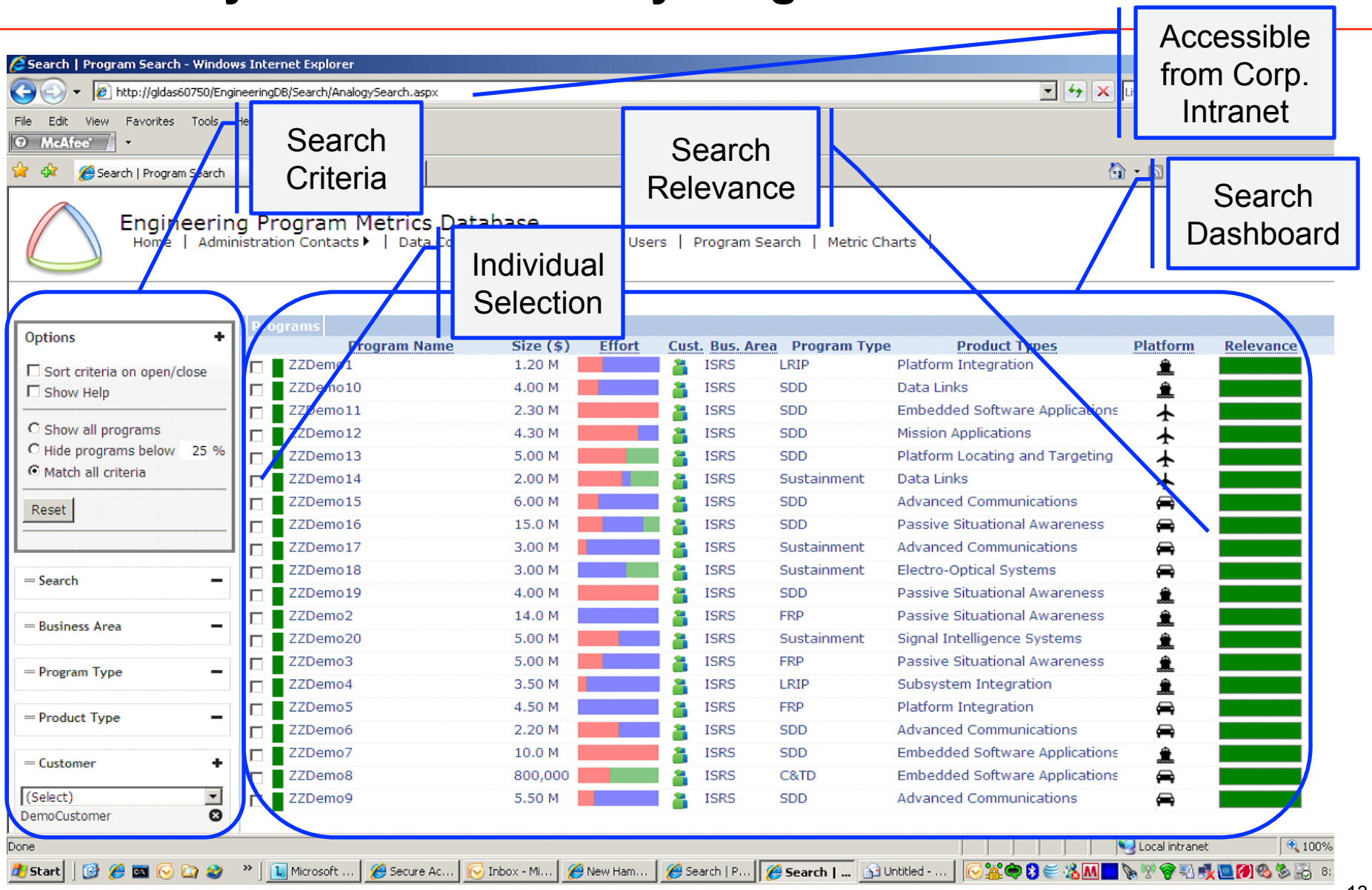
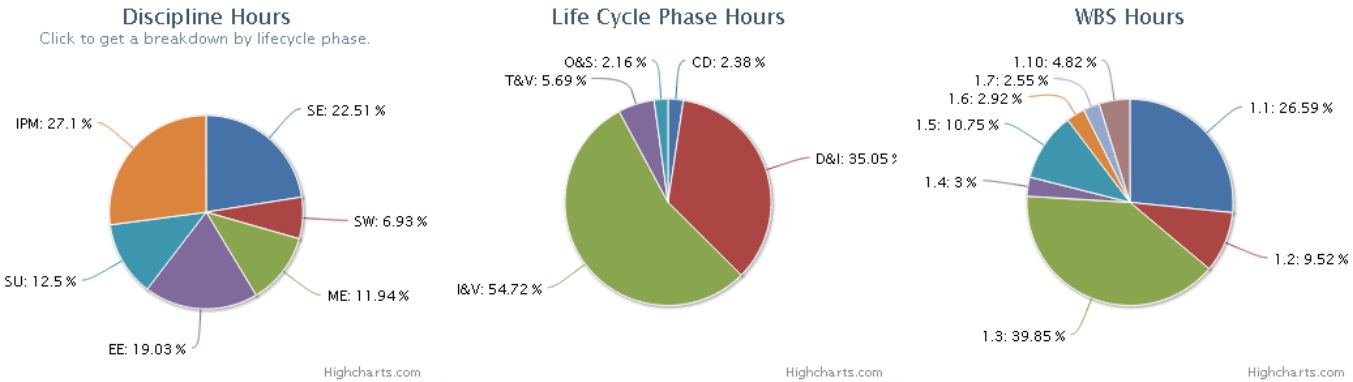
Data Query Portal – Search by Program Attributes



Detail Data Queries

Calculated Statistics

Included Programs:
ZZDemo1
ZZDemo2
ZZDemo3



Detail Project Data

Lower-level WBS

WBS #	1.1.1	1.1.2	1.1.3	1.1.4	1.1.5	1.1.6	1.1.7	1.2.1	1.2.2	1.2.3	1.2.4	1.2.5	1.2.6	1.2.7	1.2.8	1.3.1	1.3.2	1.3.3					
																		1.3.3.1	1.3.3.2	1.3.3.3	1.3.3.4	1.3.3.5	1.3.3.6
Hours	3.2%	8.2%	7.3%	9.6%	6.3%	0.8%	0.0%	2.6%	0.0%	0.3%	0.2%	0.0%	2.0%	4.7%	0.0%	1.4%	11.9%	27.7%					
																		3.7%	9.3%	0.6%	10.6%	0.7%	2.8%

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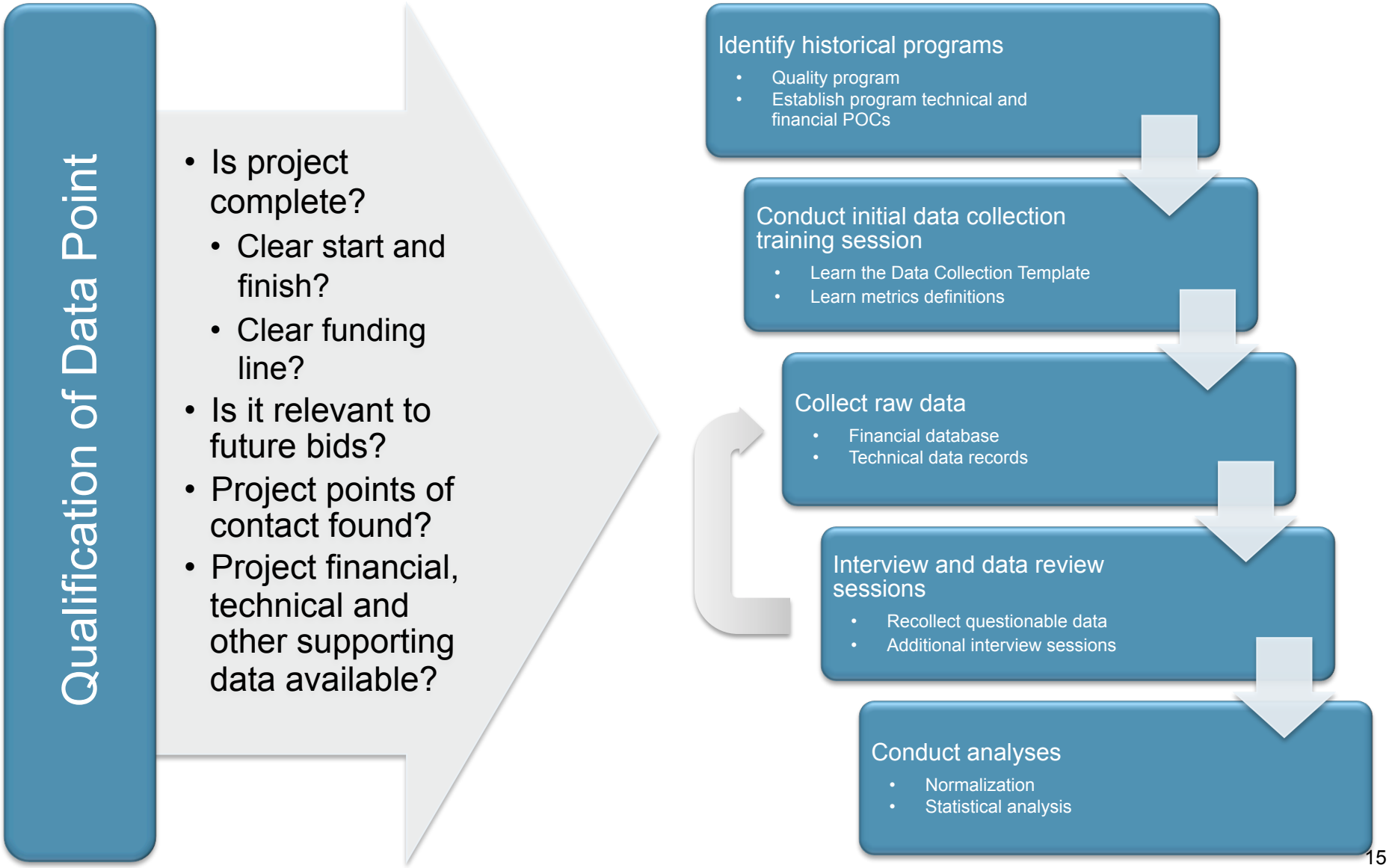
Consistent Process is a Cornerstone



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Practical Lessons Learned

- Data quality
  - Consistency, consistency, consistency!
  - **“If you are consistently wrong, you’re not wrong”**
- Give it an extra time
- Problem solving exercise
- Corporate expertise
- Management championship

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In Closing

- Enterprise-level Engineering Data Repository
  - Data
  - Tools
  - Process
  - Training
- Used throughout project and system design life cycles
- Proven effective
  - Easy-to-use, popular with engineers
  - Improved accuracy, confidence and credibility
  - Save cost and reduce cycle time
  - Enhanced business competitiveness

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Questions & Comments

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