

The Architecture and Design of a Corporate Engineering Data Repository

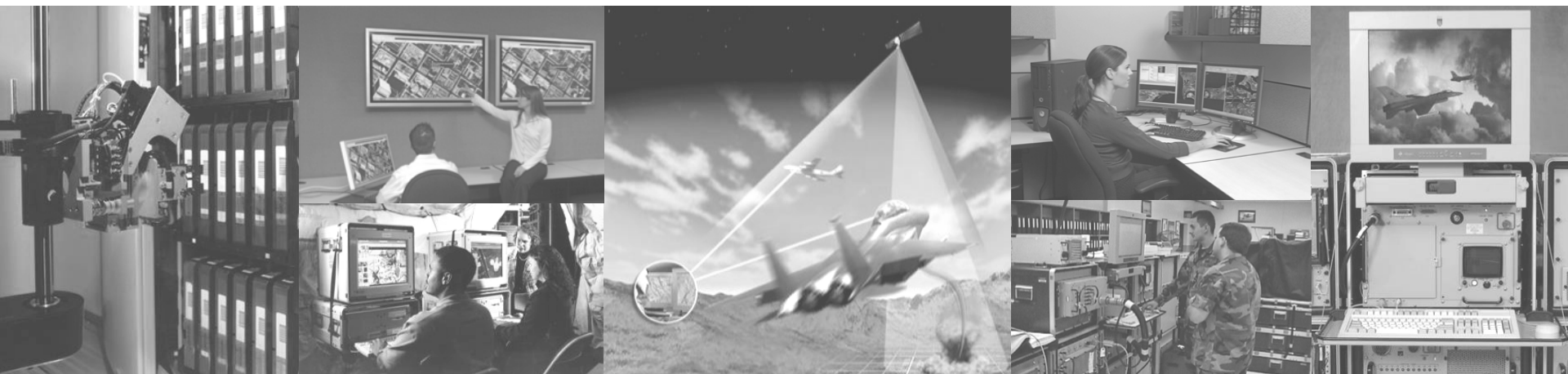
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Rome, Italy



Welcome to Rome!

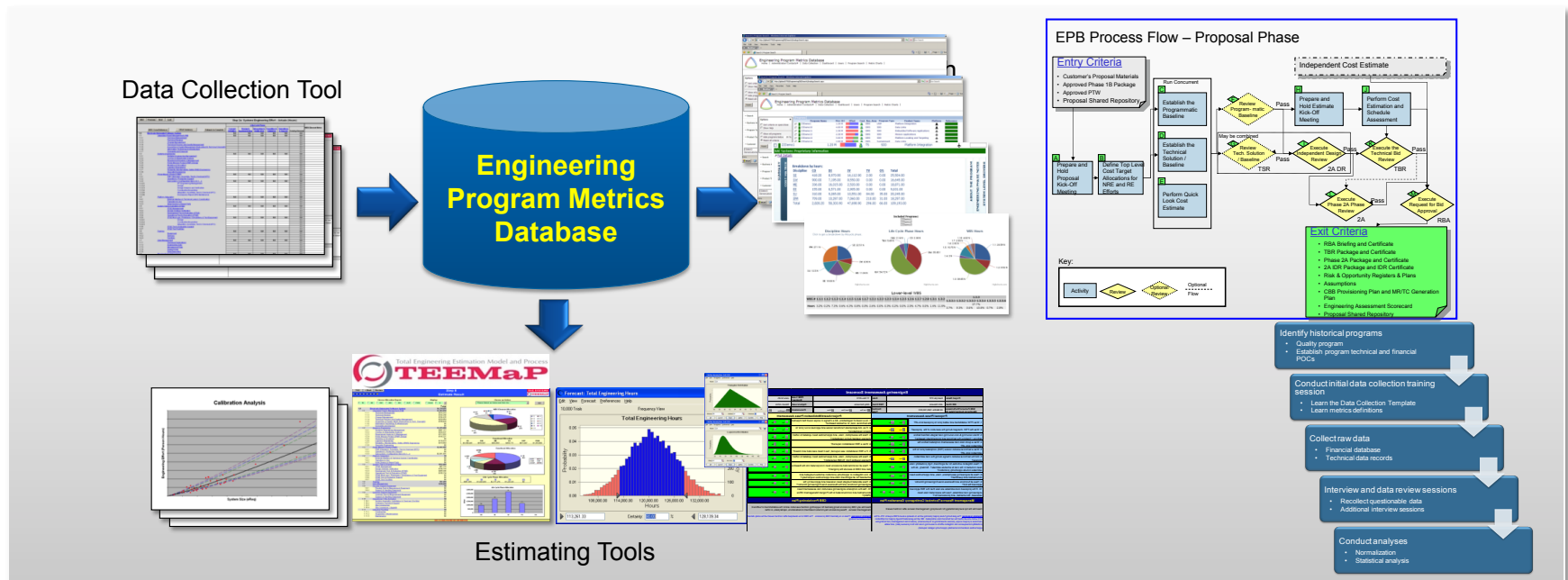


Outline

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

What's the Engineering Data Repository?

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



What's in the Repository?

Historical Data:

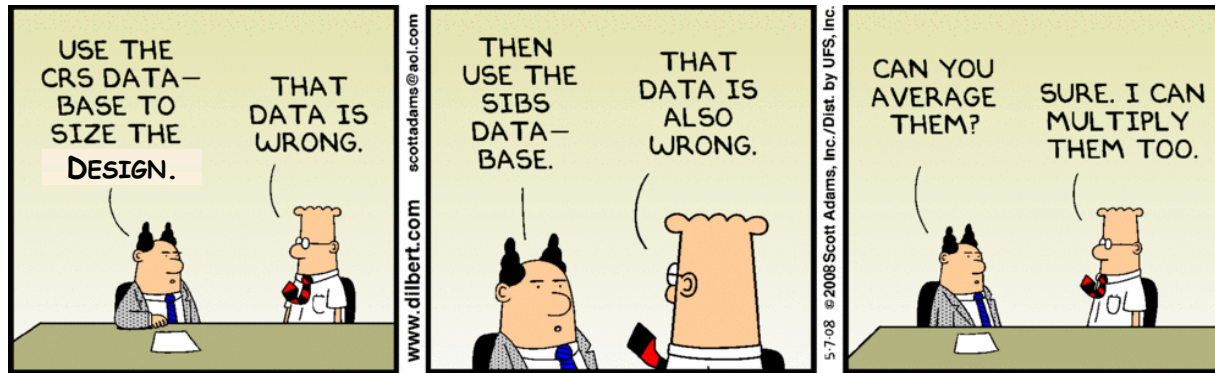
- Project metadata
 - Project and program level descriptions
 - Attributes and characteristics
- Engineering financial actuals
 - Actual (historical) efforts
 - Estimated (in-execution) efforts
- System-level design metrics, e.g.,
 - Requirements
 - Interfaces
 - Algorithms
 - System complexity factors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

What's Motivation?

- The dilemma we ran into in the past...

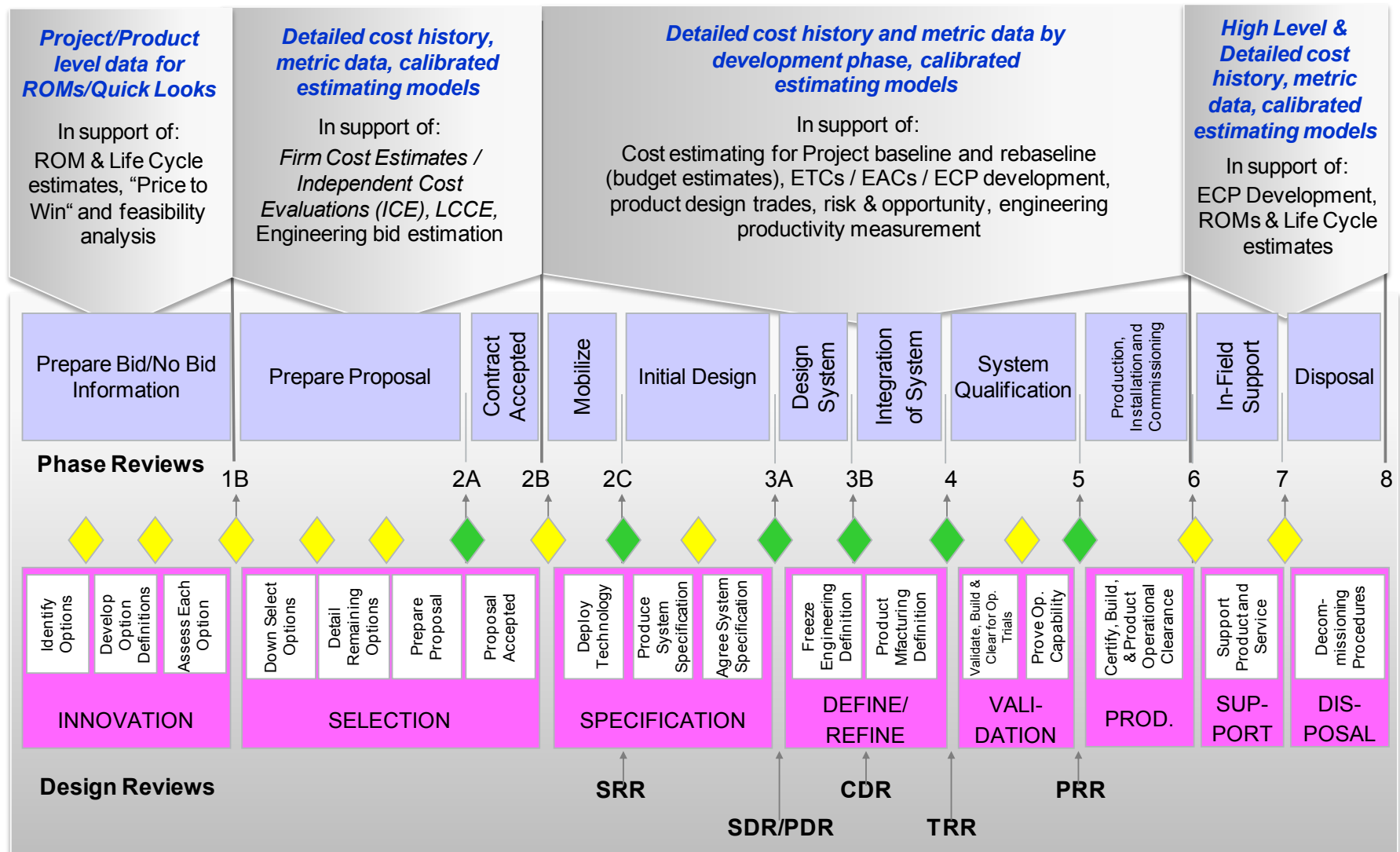


Adapted from Dilbert, © Scott Adams, Inc.

- 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

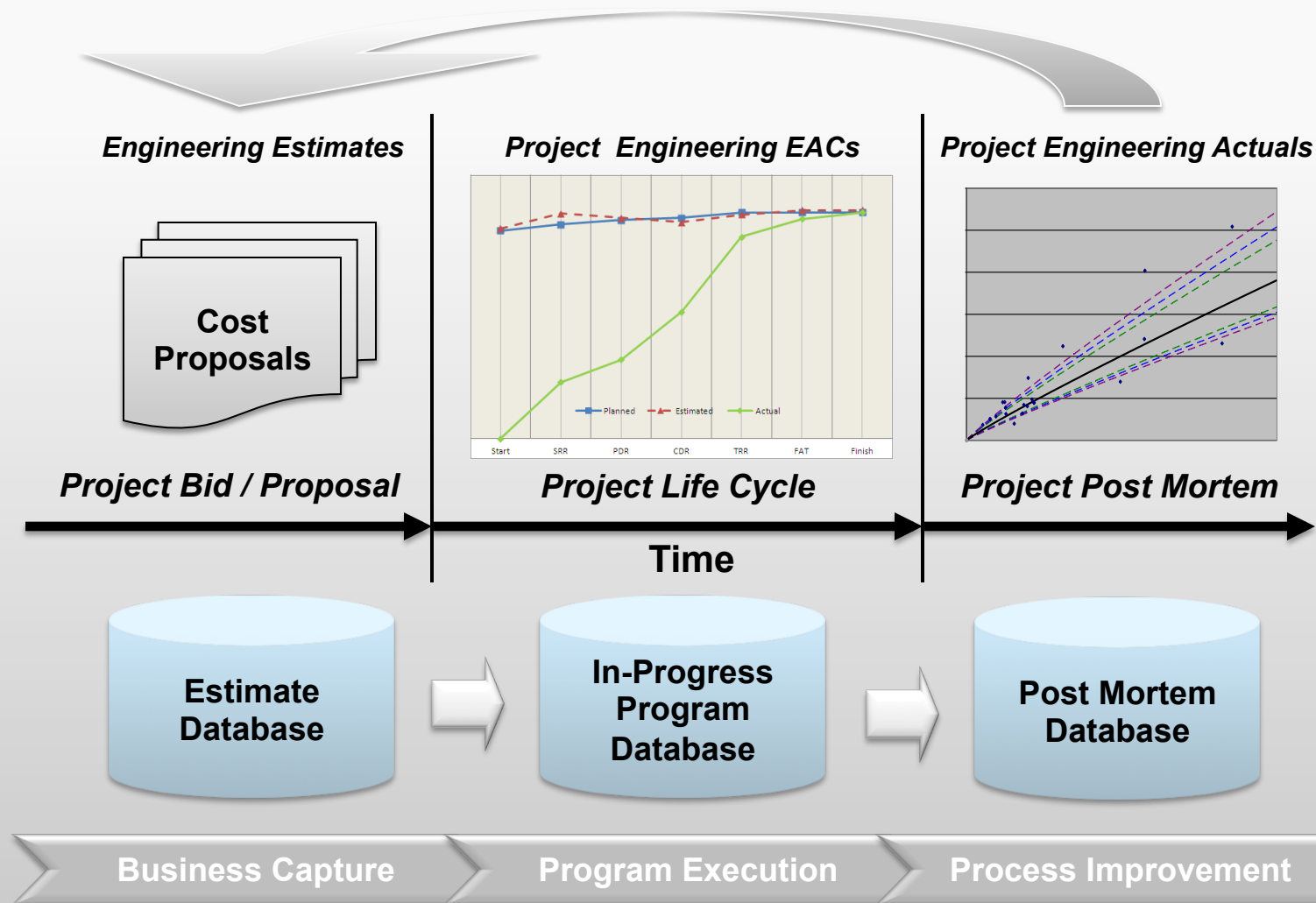
Lifecycle Operational Data Needs

Use of historical data essential in system design and program execution

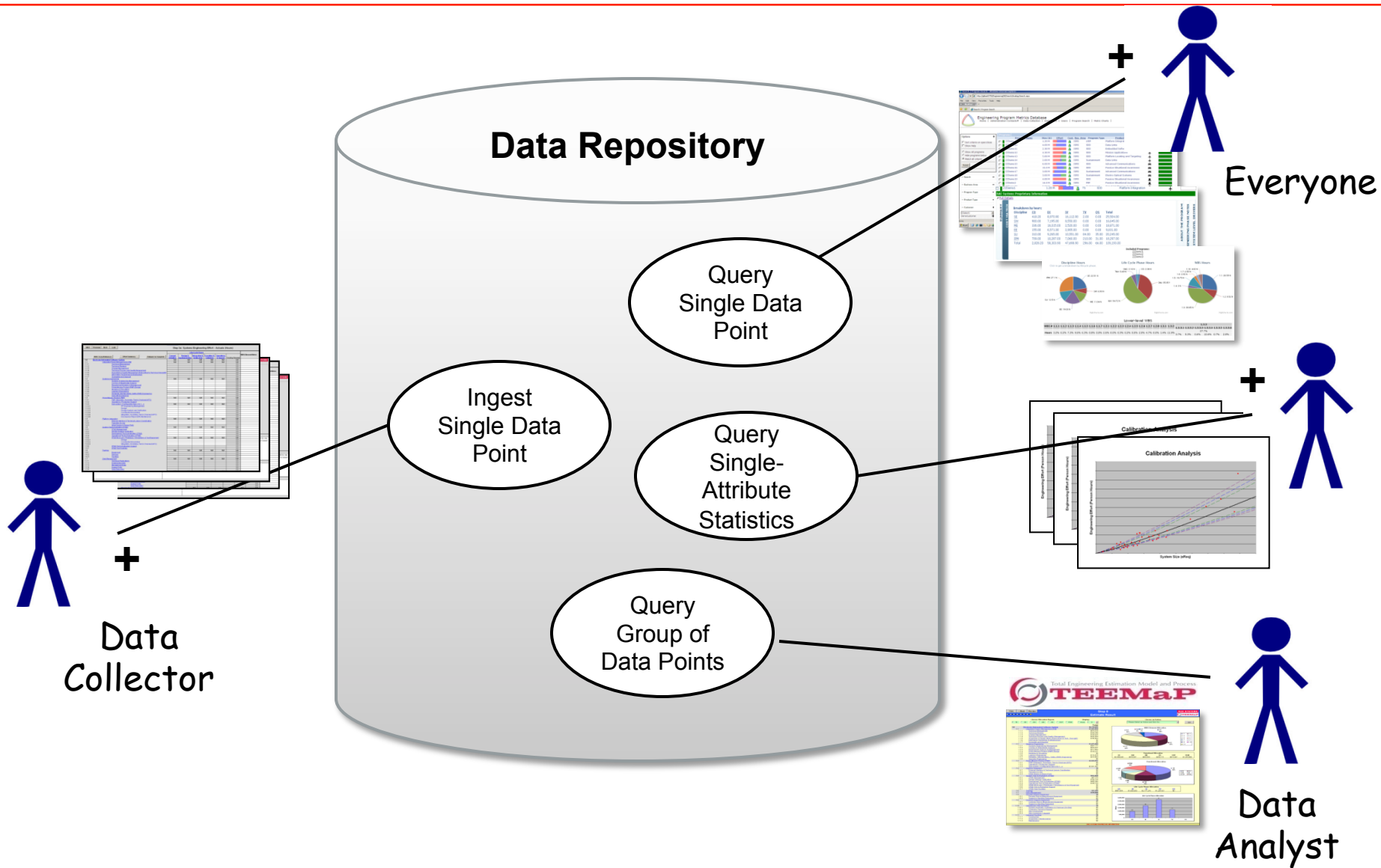


Three Interconnecting Logical Databases

Use Past Results to Predict Future Performance

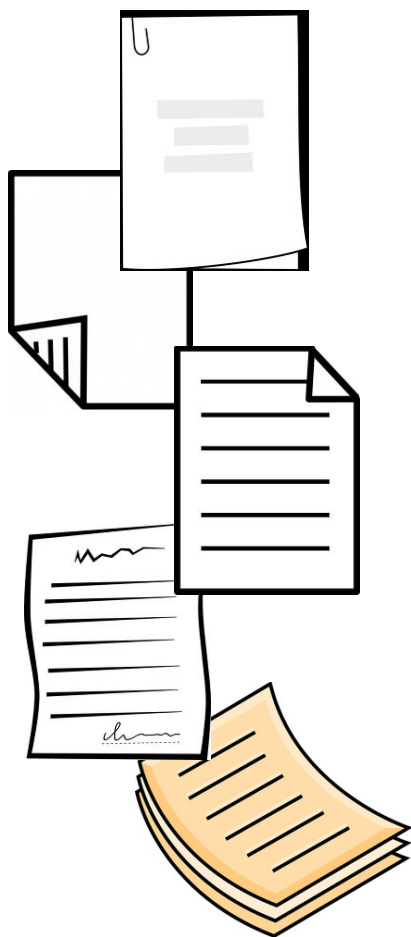


Typical Use Cases

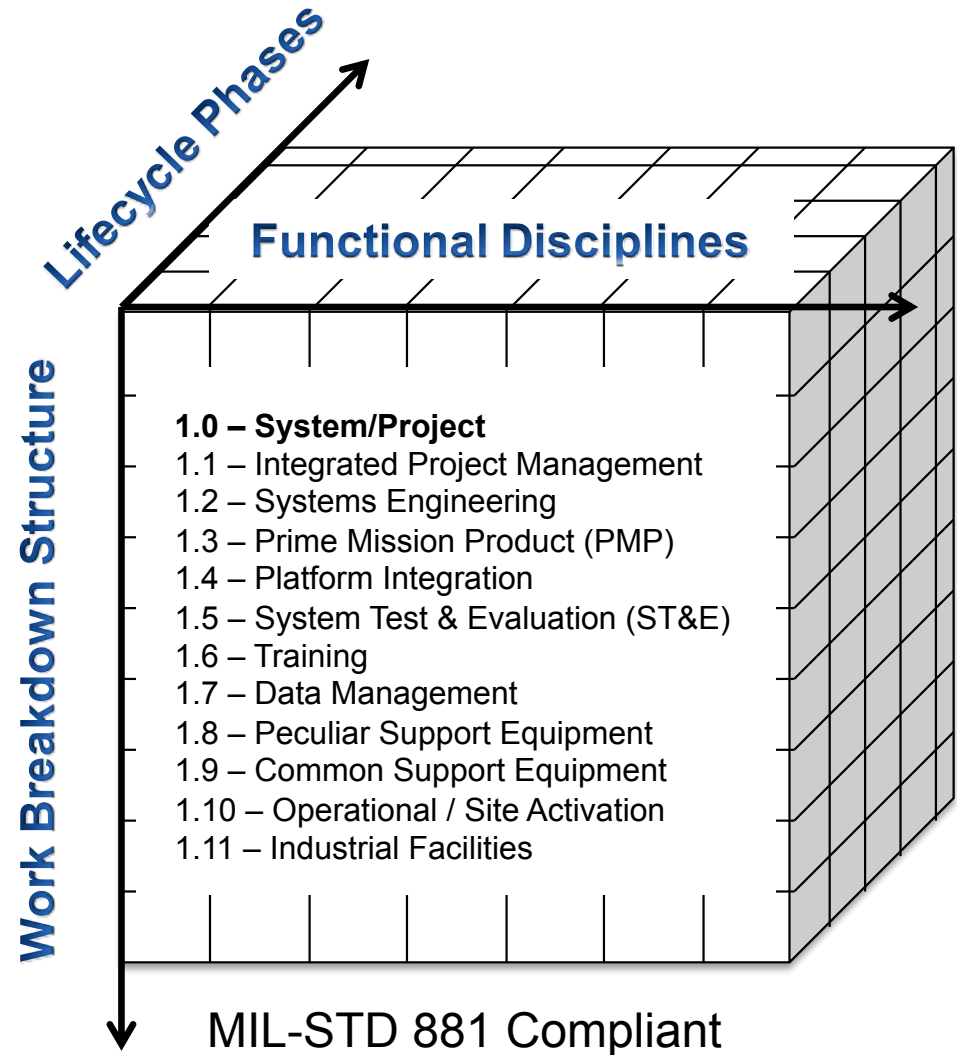


Cost Element Structure

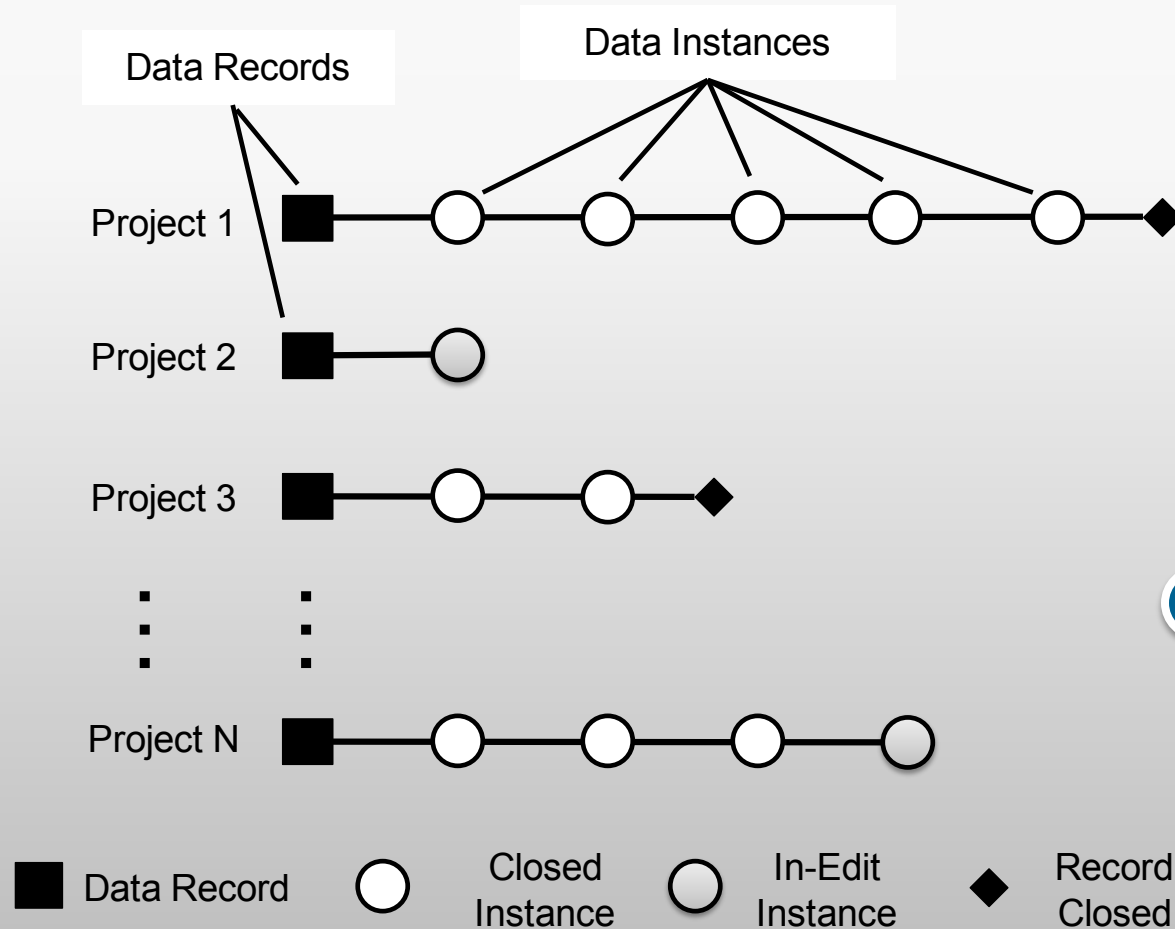
Project/Organization
Specific Structures



Mapping
Rules



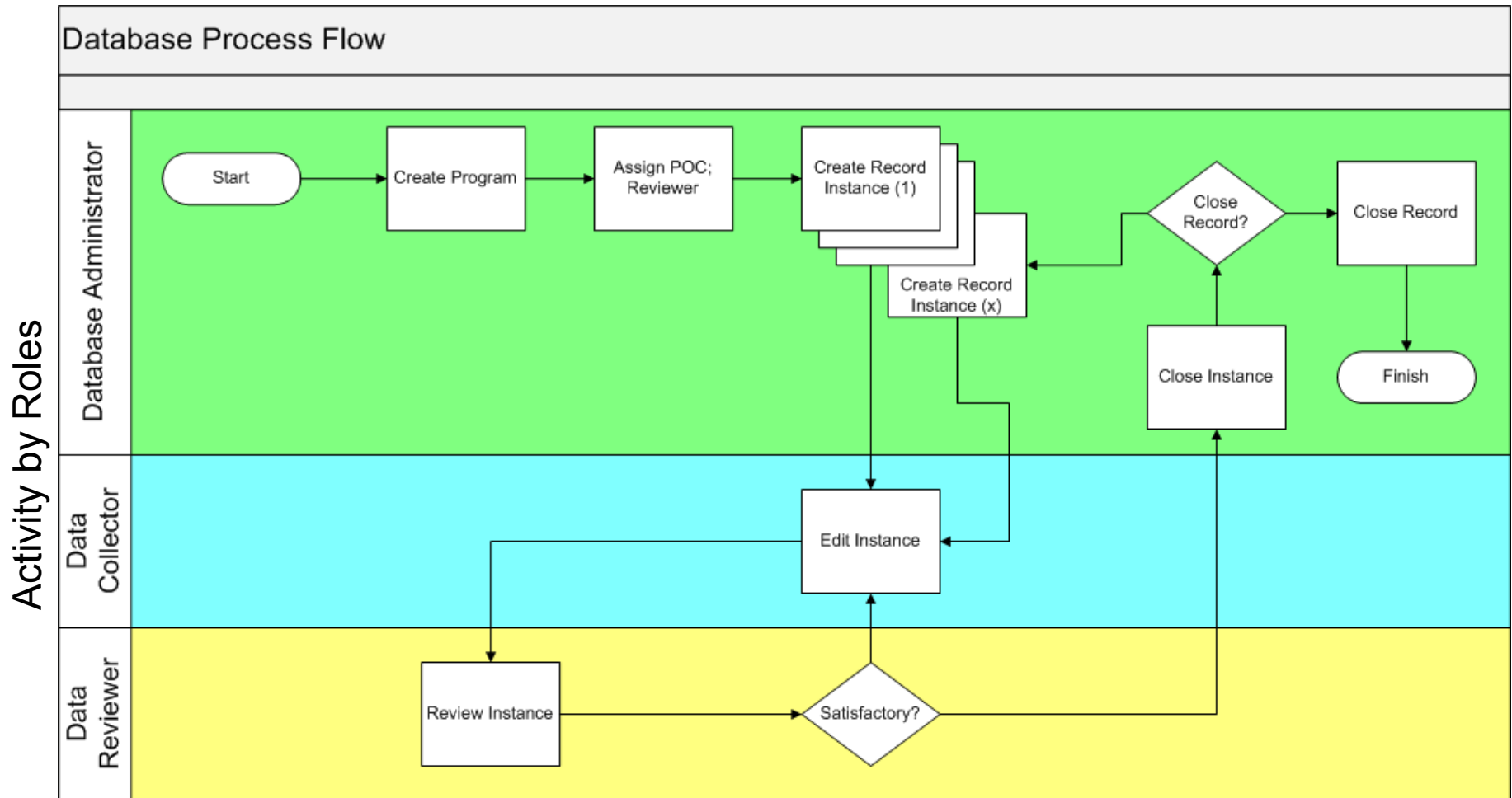
Dynamic Data Structure Design



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

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



Data Query Portal – Search by Program Attributes

Search | Program Search - Windows Internet Explorer

http://gldas60750/EngineeringDB/Search/AnalogySearch.aspx

File Edit View Favorites Tools

McAfee

Search | Program Search

Engineering Program Metrics Database

Home | Administration Contacts | Data Co

Users | Program Search | Metric Charts

Search Criteria

Search Relevance

Individual Selection

Accessible from Corp. Intranet

Search Dashboard

Options

- ☐ Sort criteria on open/close
- ☐ Show Help
- ☐ Show all programs
- ☐ Hide programs below 25 %
- ☒ Match all criteria

Reset

Search

Business Area

Program Type

Product Type

Customer

(Select)

DemoCustomer

Program Name	Size (\$)	Effort	Cust.	Bus. Area	Program Type	Product Types	Platform	Relevance
ZZDemo1	1.20 M		ISRS	LRIP	Platform Integration			
ZZDemo10	4.00 M		ISRS	SDD	Data Links			
ZZDemo11	2.30 M		ISRS	SDD	Embedded Software Applications			
ZZDemo12	4.30 M		ISRS	SDD	Mission Applications			
ZZDemo13	5.00 M		ISRS	SDD	Platform Locating and Targeting			
ZZDemo14	2.00 M		ISRS	Sustainment	Data Links			
ZZDemo15	6.00 M		ISRS	SDD	Advanced Communications			
ZZDemo16	15.0 M		ISRS	SDD	Passive Situational Awareness			
ZZDemo17	3.00 M		ISRS	Sustainment	Advanced Communications			
ZZDemo18	3.00 M		ISRS	Sustainment	Electro-Optical Systems			
ZZDemo19	4.00 M		ISRS	SDD	Passive Situational Awareness			
ZZDemo2	14.0 M		ISRS	FRP	Passive Situational Awareness			
ZZDemo20	5.00 M		ISRS	Sustainment	Signal Intelligence Systems			
ZZDemo3	5.00 M		ISRS	FRP	Passive Situational Awareness			
ZZDemo4	3.50 M		ISRS	LRIP	Subsystem Integration			
ZZDemo5	4.50 M		ISRS	FRP	Platform Integration			
ZZDemo6	2.20 M		ISRS	SDD	Advanced Communications			
ZZDemo7	10.0 M		ISRS	SDD	Embedded Software Applications			
ZZDemo8	800,000		ISRS	C&TD	Embedded Software Applications			
ZZDemo9	5.50 M		ISRS	SDD	Advanced Communications			

Done

Local intranet

100%

Start

Microsoft ...

Secure Ac...

Inbox - Mi...

New Ham...

Search | P...

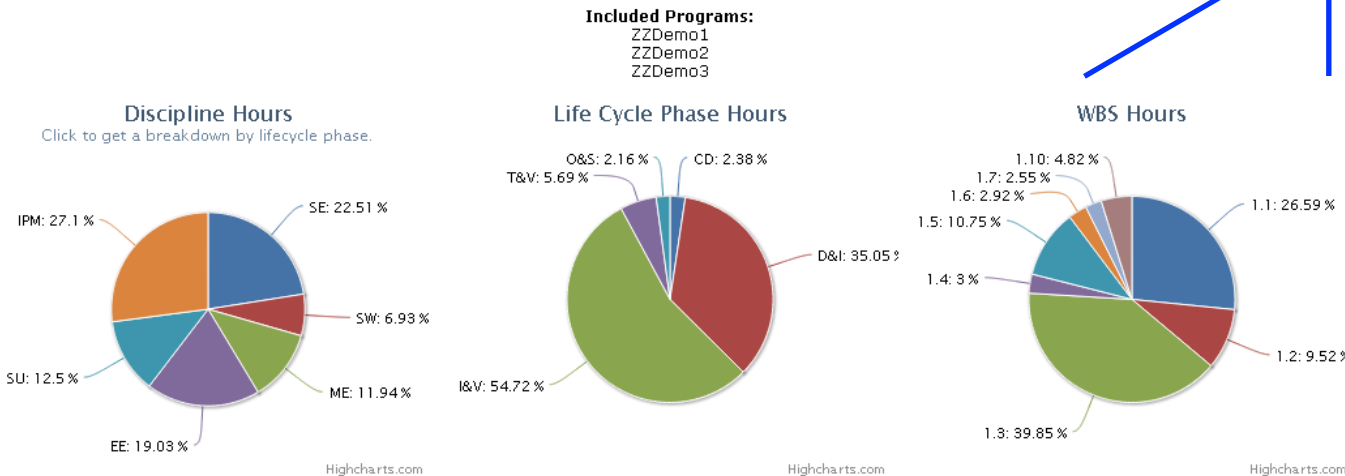
Search | ...

Untitled - ...

8:

Detail Data Queries

Calculated Statistics



Detail Project Data

Lower-level WBS																1.3.3			
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	1.3.3.2
Hours	3.2%	5.2%	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%	3.7%	9.3%

ZZDemo1

1.20 M

TS

SDD

Platform Integration

BAE Systems Proprietary Information

Full Details

SUMMARY

COST MATRIX

Breakdown by hours:

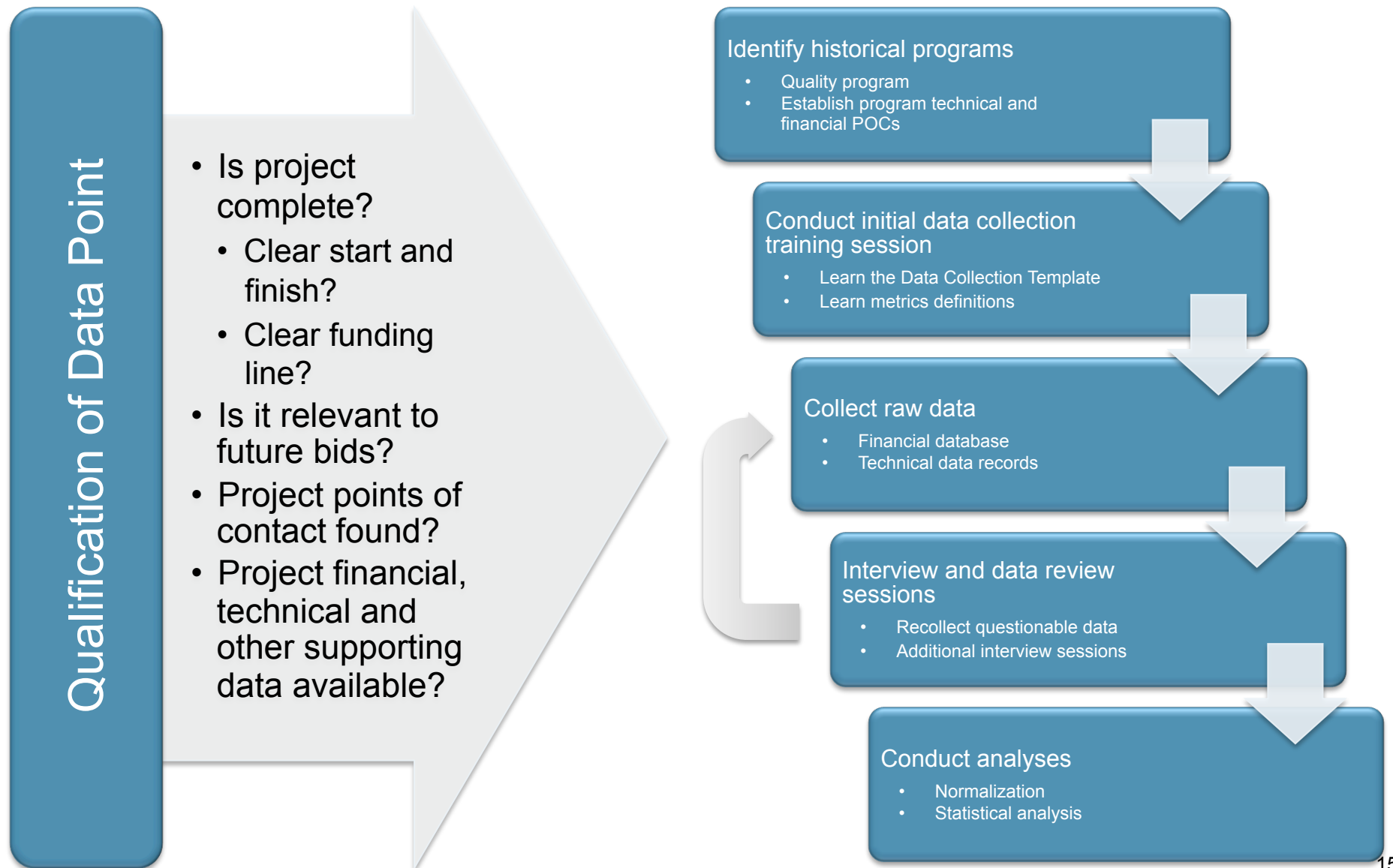
Discipline	CD	DI	IV	TV	OS	Total
SE	418.20	8,970.90	16,112.90	2.00	0.00	25,504.00
SW	900.00	7,195.00	8,550.00	0.00	0.00	16,645.00
ME	336.00	16,015.00	2,520.00	0.00	0.00	18,871.00
EE	155.00	6,571.00	2,905.00	0.00	0.00	9,631.00
SU	310.00	9,265.00	10,551.00	84.00	35.00	20,245.00
IPM	709.00	10,287.00	7,060.00	210.00	31.00	18,297.00
Total	2,828.20	58,303.90	47,698.90	296.00	66.00	109,193.00

ABOUT THE PROGRAM

ENGINEERING PHASE NOTES

SYSTEM LEVEL DRIVERS

Consistent Process is a Cornerstone



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

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

Questions & Comments

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