Overcoming the Information Challenge:

Applying EA to E&P

Steve Hawtin

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Enterprise Architecture

Contested term, our definition:

- the description of current & future company makeup
- defining the structure and operation of an organization

As Is: Existing reality

To Be: Workable improvements

Blue Sky: Long term aspirations

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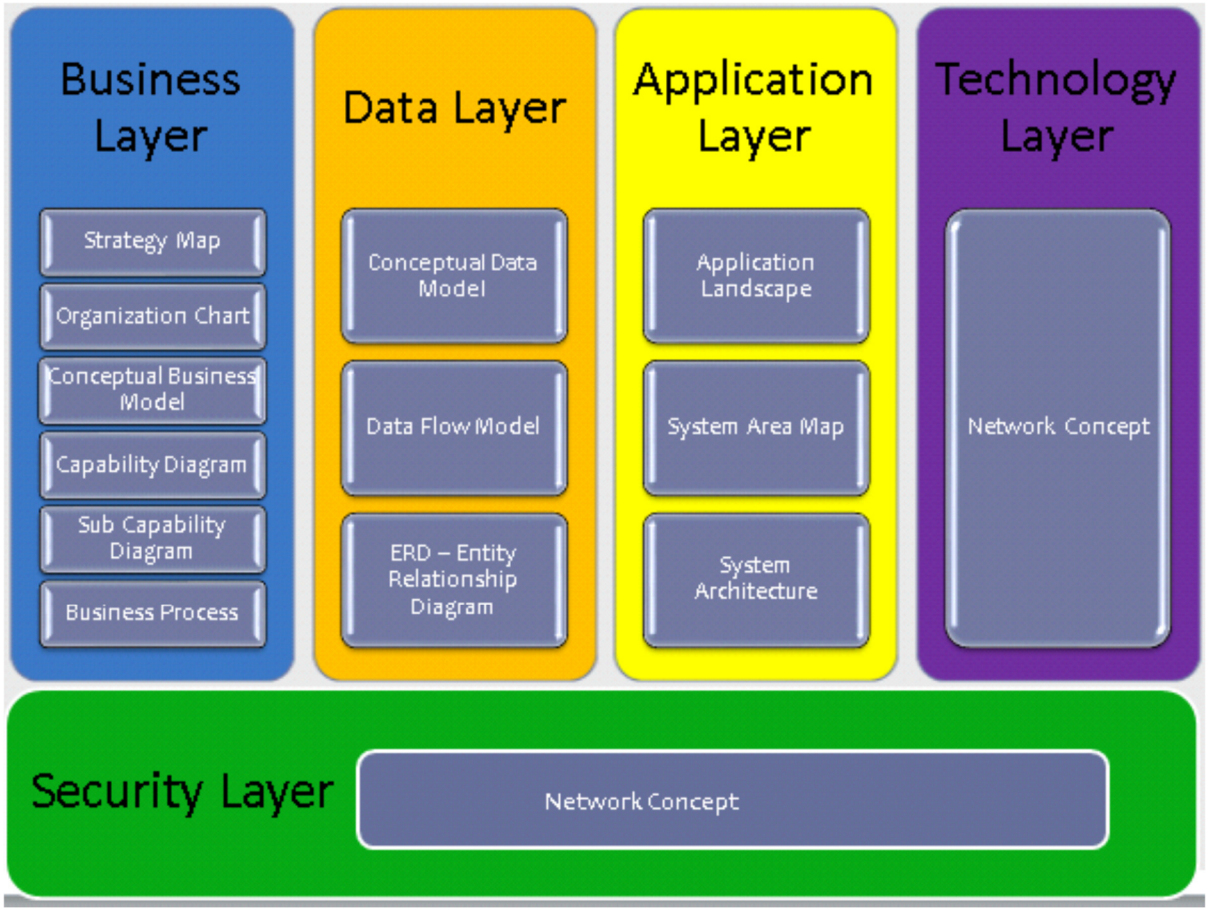
ADCO: Enterprise Architecture Content Framework



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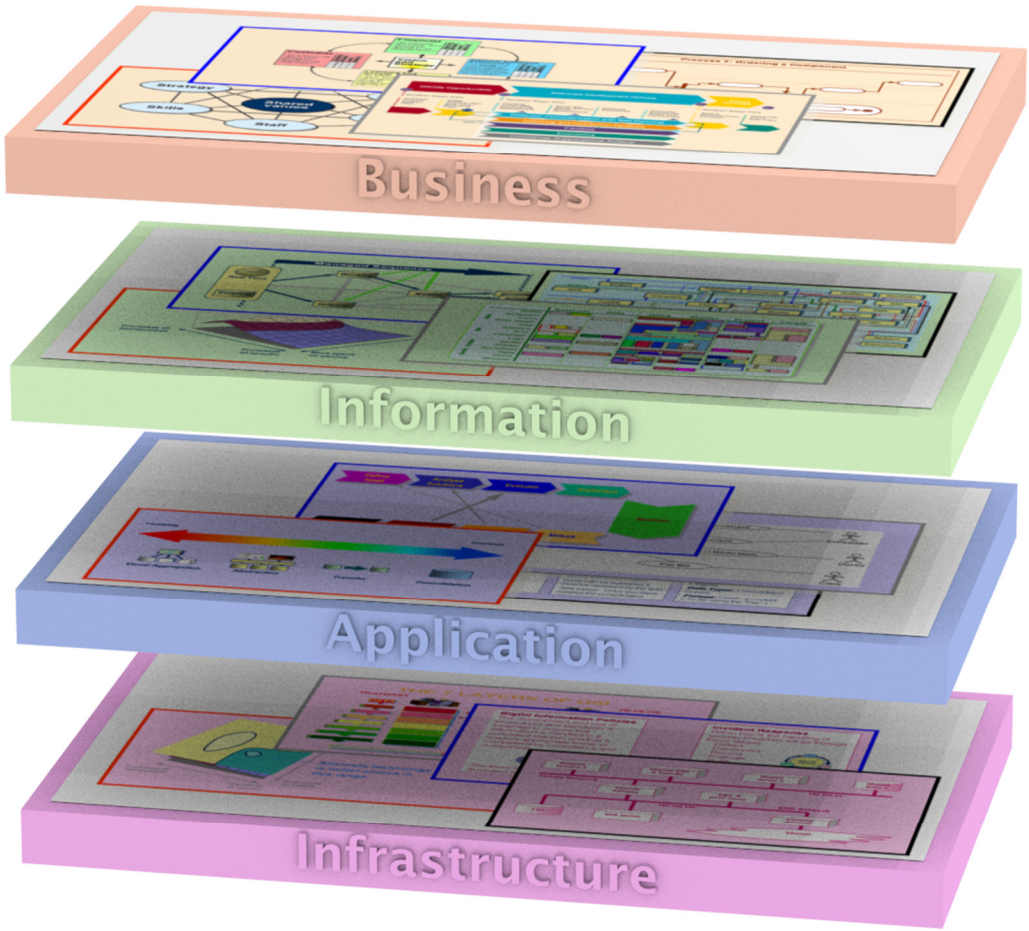
Schlumberger's View of Enterprise Architecture



Business
- Organization, Strategy,
- Business Process

Information
- Master Data, Information Flow
- Data Relationships

Applications
- Applications Portfolio,
- Functionality

Infrastructure
- Physical Components,
- Network, Support Utilities

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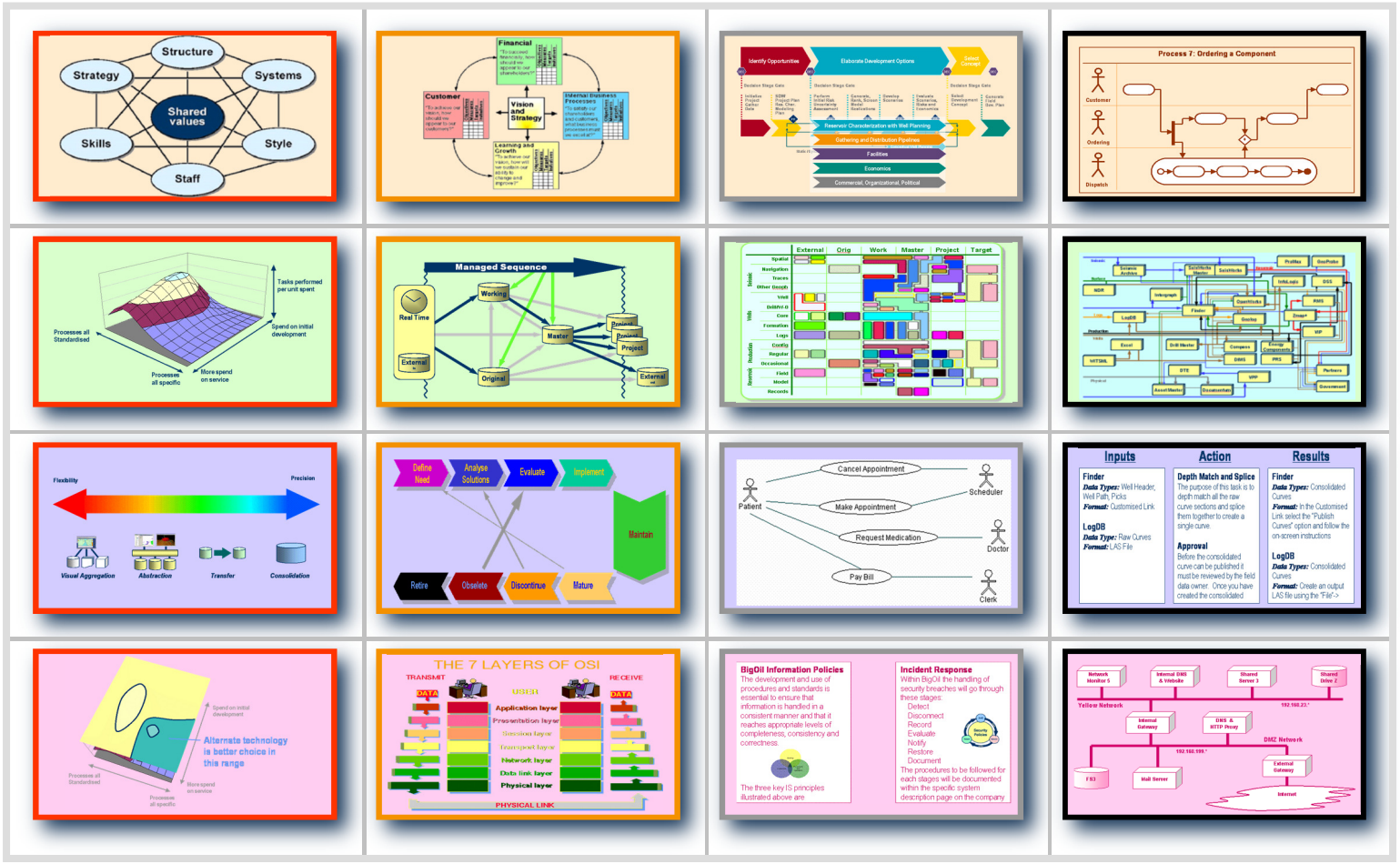
Specialised diagram types for different audiences



Business Processes

Information Landscape

Application

Infrastructure

Principles | Patterns | Policies | Procedures

Conceptual ⟷ Physical

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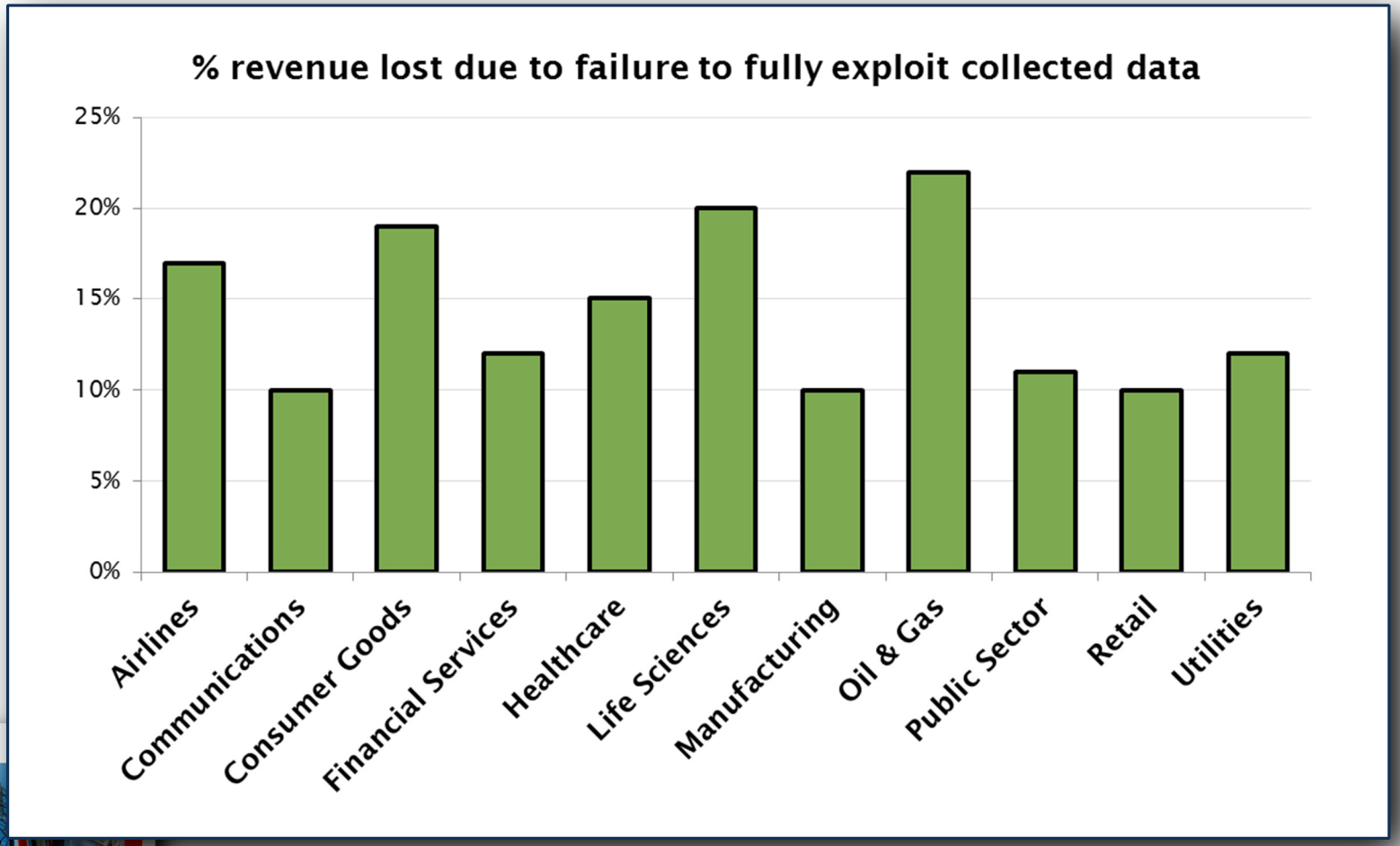
Industry Scorecard: Oracle Report



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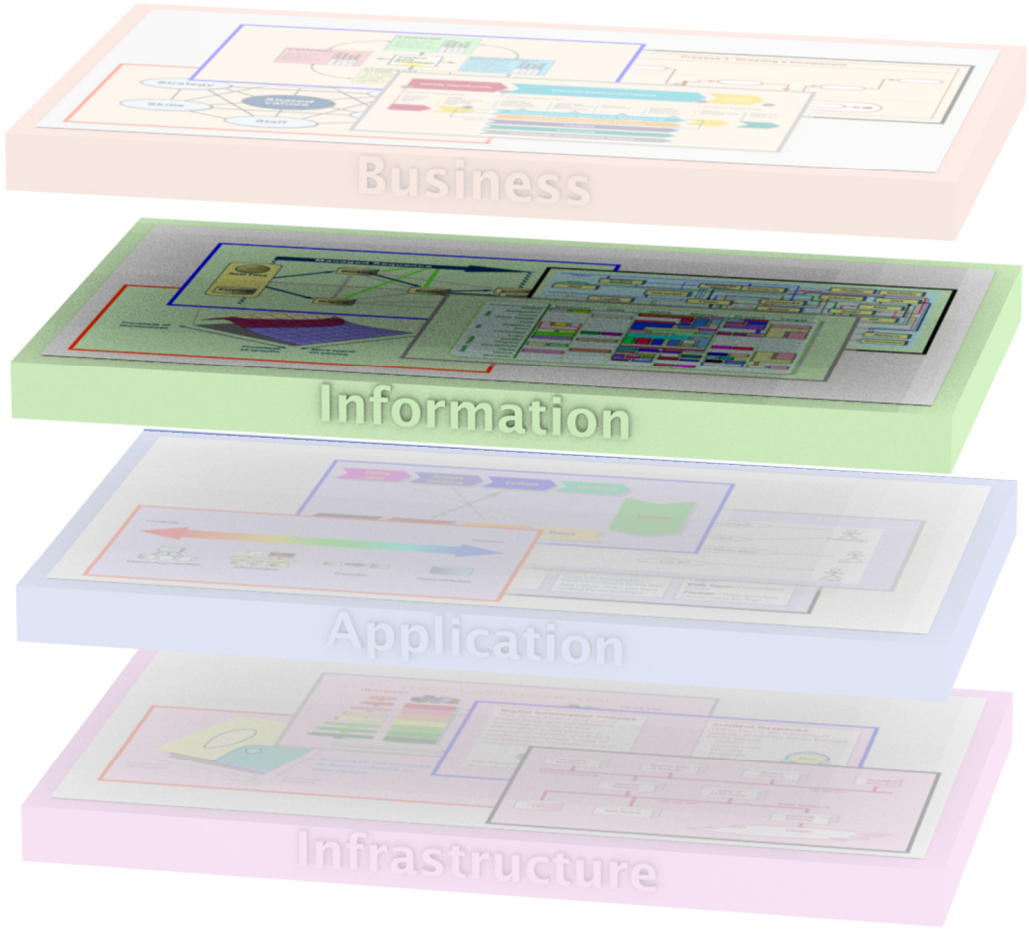
www.oracle.com/us/industries/industry-scorecard-1683398.html

What makes EA challenging for E&P companies?



Business
Organization, Strategy,
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Information
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Applications Portfolio,
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Infrastructure
Physical Components,
Network, Support Utilities

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Another Unique Industry

Data flow and data modelling techniques that work in other industries have failed to deliver business benefits in E&P companies:

- Why?
- What needs to be done?

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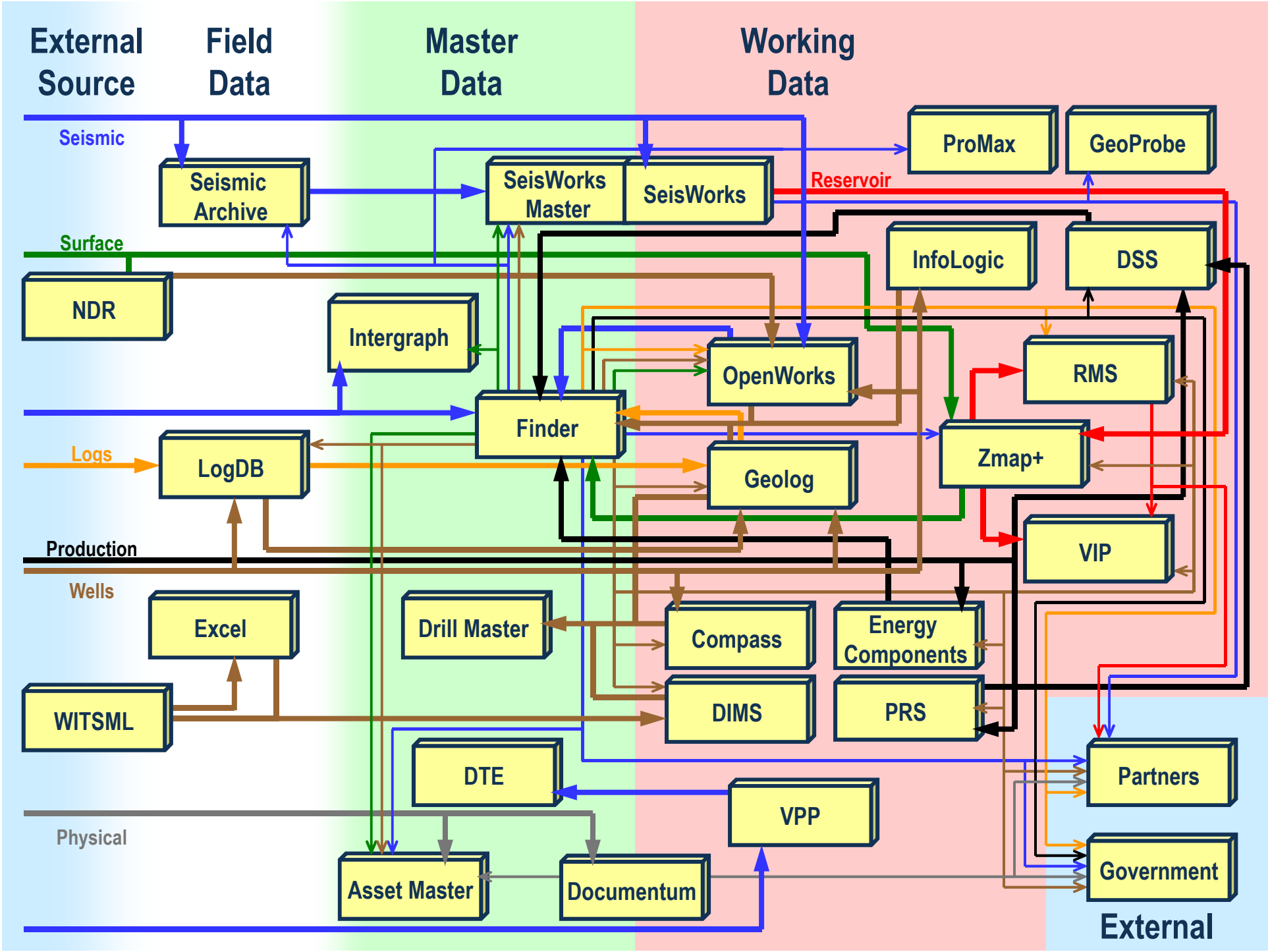
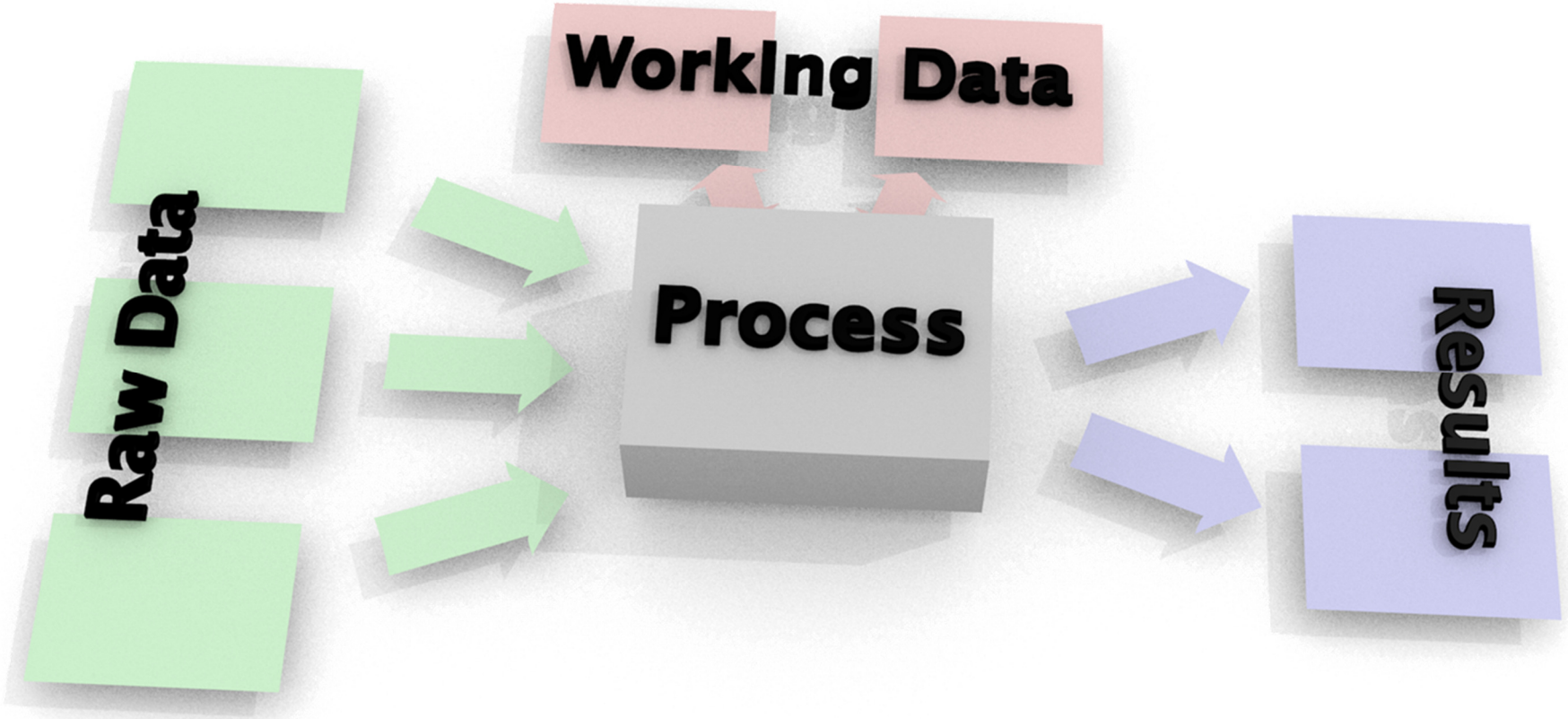

External Source
Field Data
Master Data
Working Data
Seismic
Surface
Logs
Production
Wells
Physical
Reservoir
Seismic Archive
SeisWorks Master
SeisWorks
ProMax
GeoProbe
NDR
Intergraph
InfoLogic
DSS
OpenWorks
RMS
Finder
Zmap+
LogDB
Geolog
VIP
Excel
Drill Master
Compass
Energy Components
WITSML
DIMS
PRS
DTE
VPP
Partners
Asset Master
Documentum
Government
External

Naïve View



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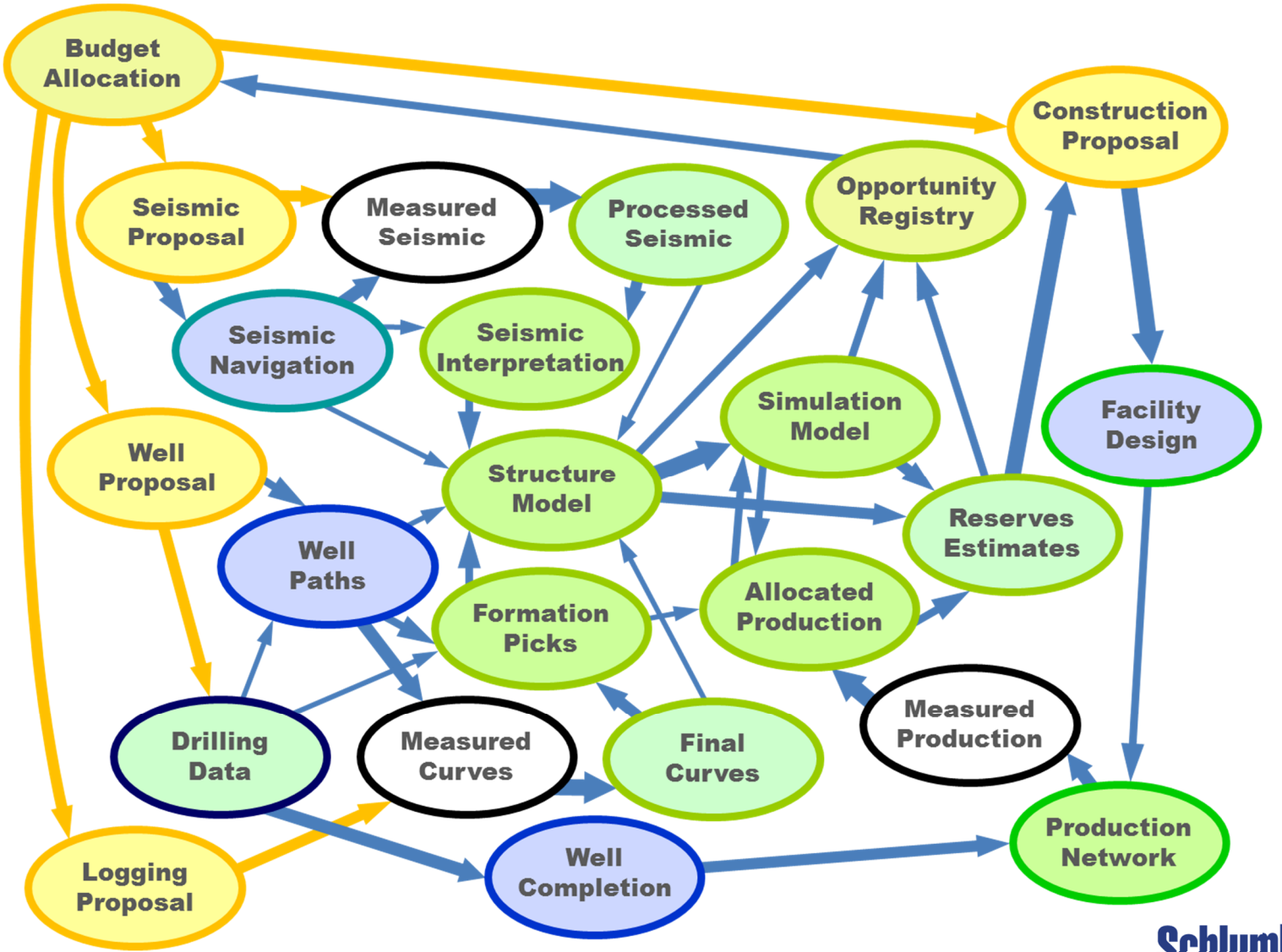
Typical Subsurface Data Flows *(simplified)*



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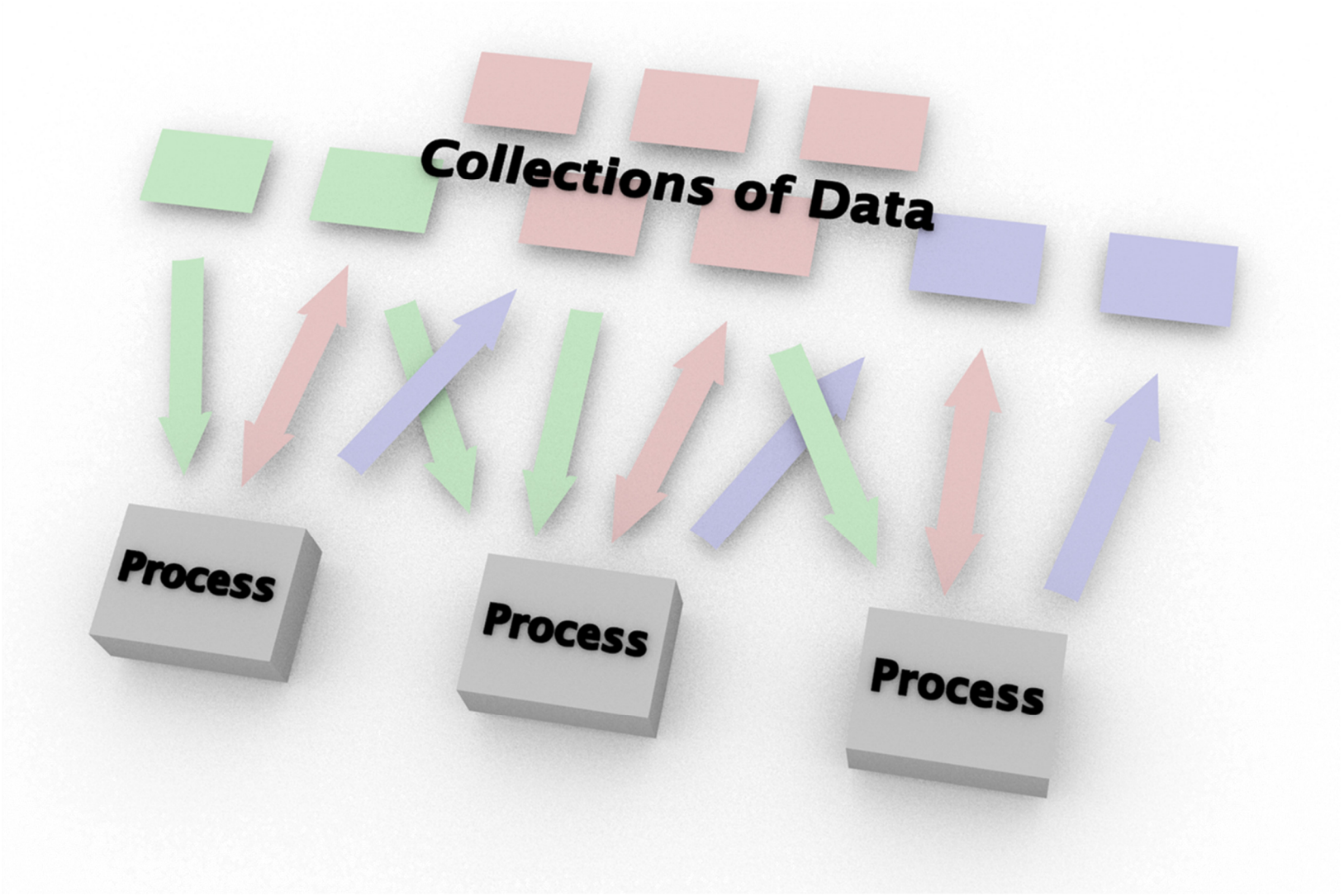
How processes actually interact



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So… what does E&P experience teach?

- Document reality, then identify opportunities
- Data categories not Data types
  - Avoid "data modelling" *(the POSC lesson)*
  - Apply systematically
- Repositories not Applications *(and especially not Databases)*
- Use generic EA terms if possible, but be aware where specialised variations are needed:
  - Profiles, Maturity, Roles, Function, Asset Lifecycle, Activities, Data Conventions, Data Ownership, Data Lifecycle

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E&P Technical Data Categories

Spatial

Culture

Bathymetry/ Topography

Surface Images

Gravity & Magnetics

Seismic

Navigation

Trace

Acquisition Parameters

Processing Parameters

Velocities

Well

Identity

Headers

Directional

Drilling

Planning

Drilling

Completion

Events

Formation

Core Description

Surface Picks

Pressures

Logs

Raw Curves

Final Curves

Zoned Properties

Synthetic Seismograms

Production

Configuration

External Network

Network

Surface

Sub-Surface

Regular

Measured Volumes

Operational

Allocated Volumes

Occasional

Planned Events

Unplanned Events

Samples

Well Tests

Indexes

Physical Assets

Scanned Documents

Electronic Documents

Reservoir

Reserves

Prospects

Seismic Interpretation

Horizon Grids

Geologic Models

Simulation Models

Facilities

Document Control

Build Data

Project Control

Maintenance

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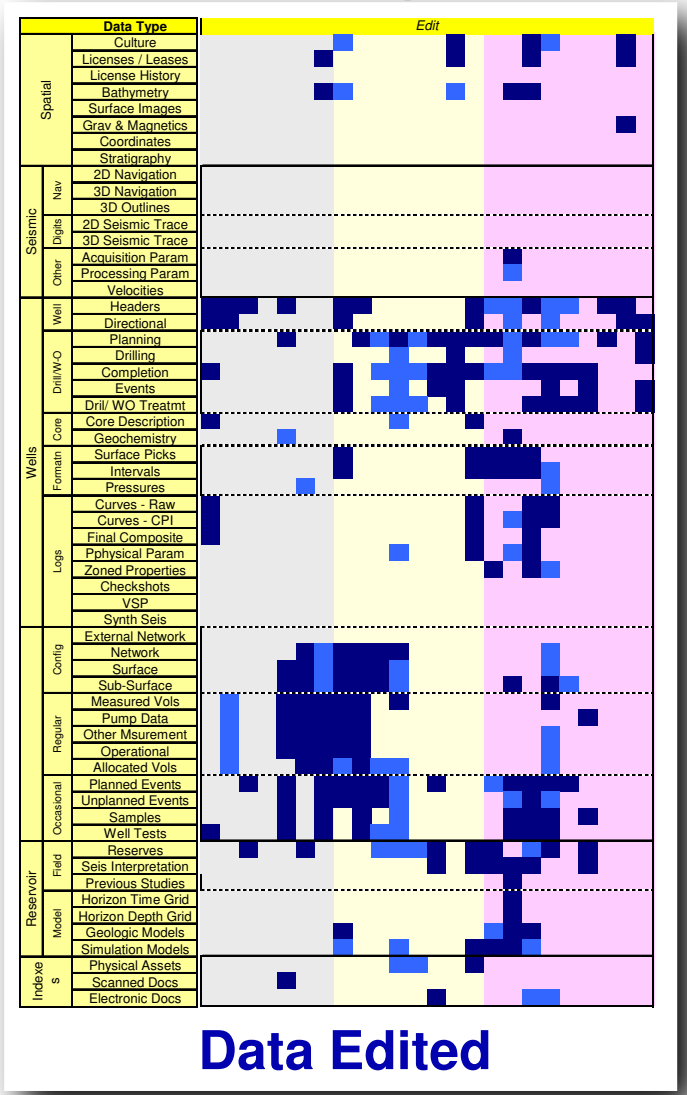
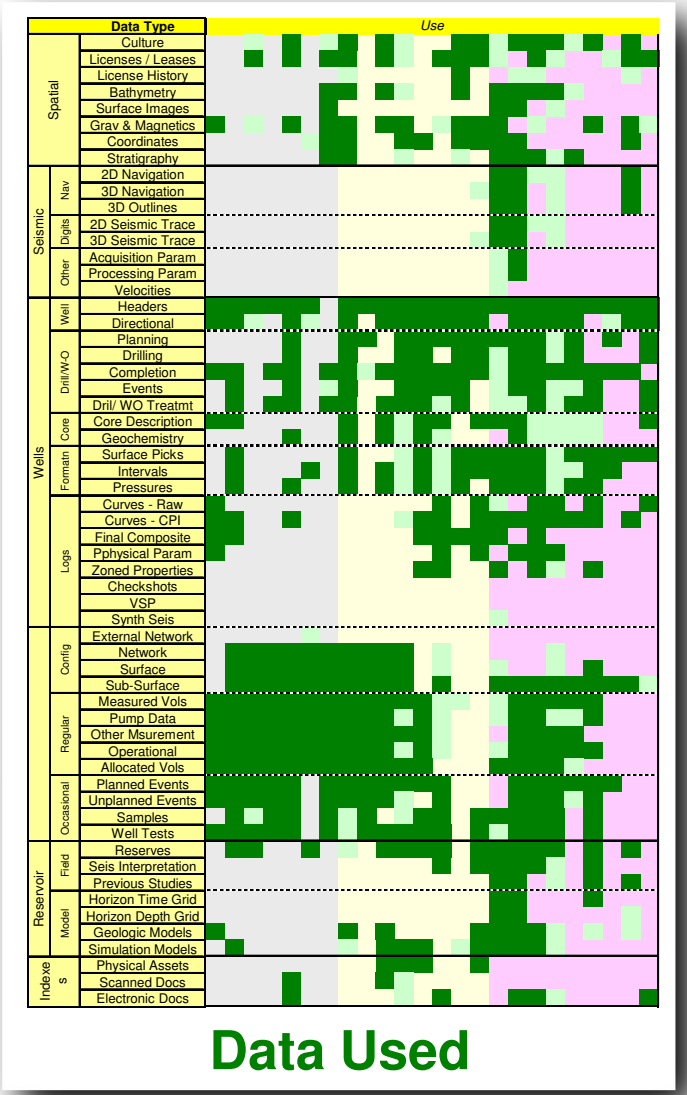
User Data Footprints



Spatial
Seismic
Drilling
Logs
Production
Reservoir
Records



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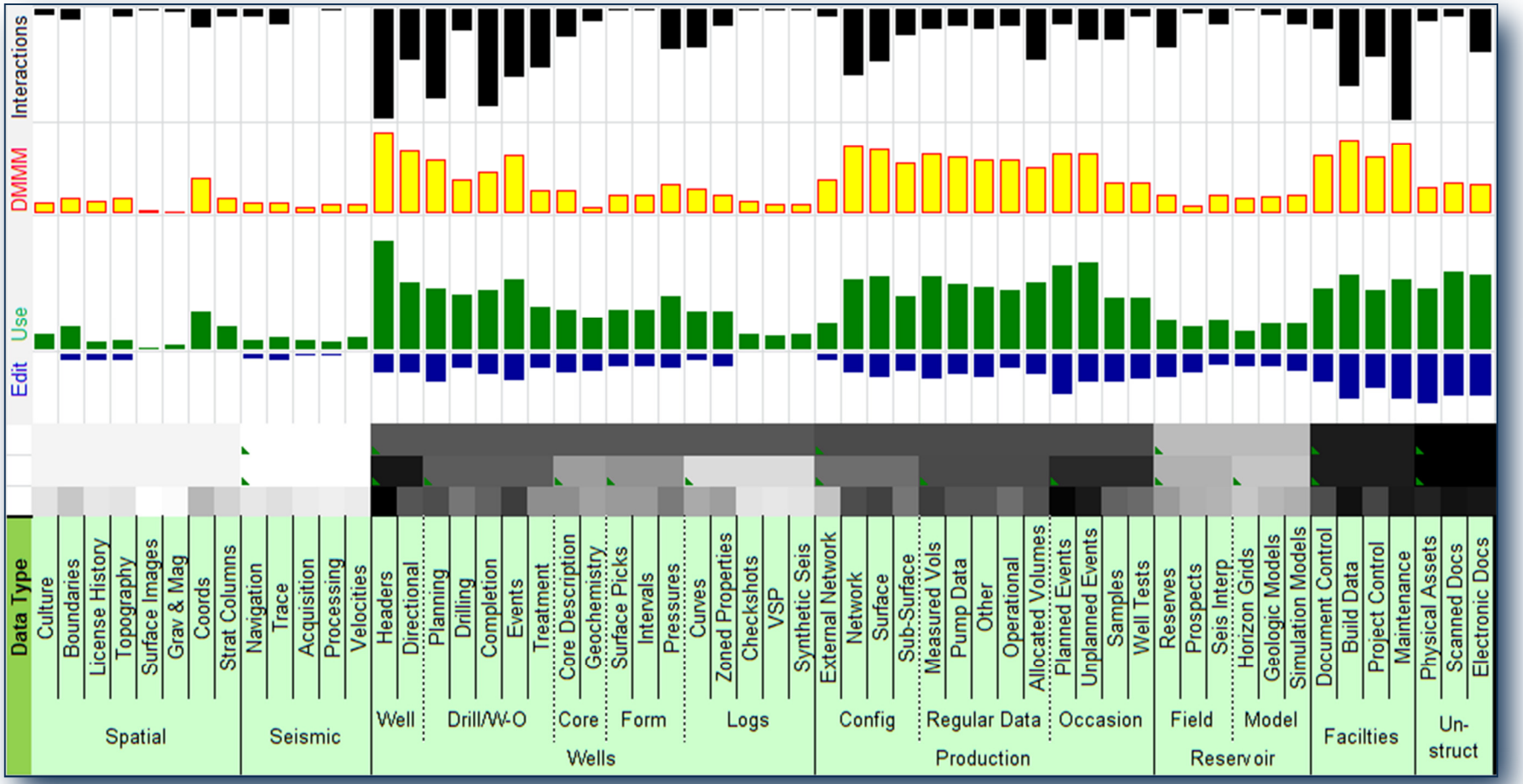
Identifying the key data categories



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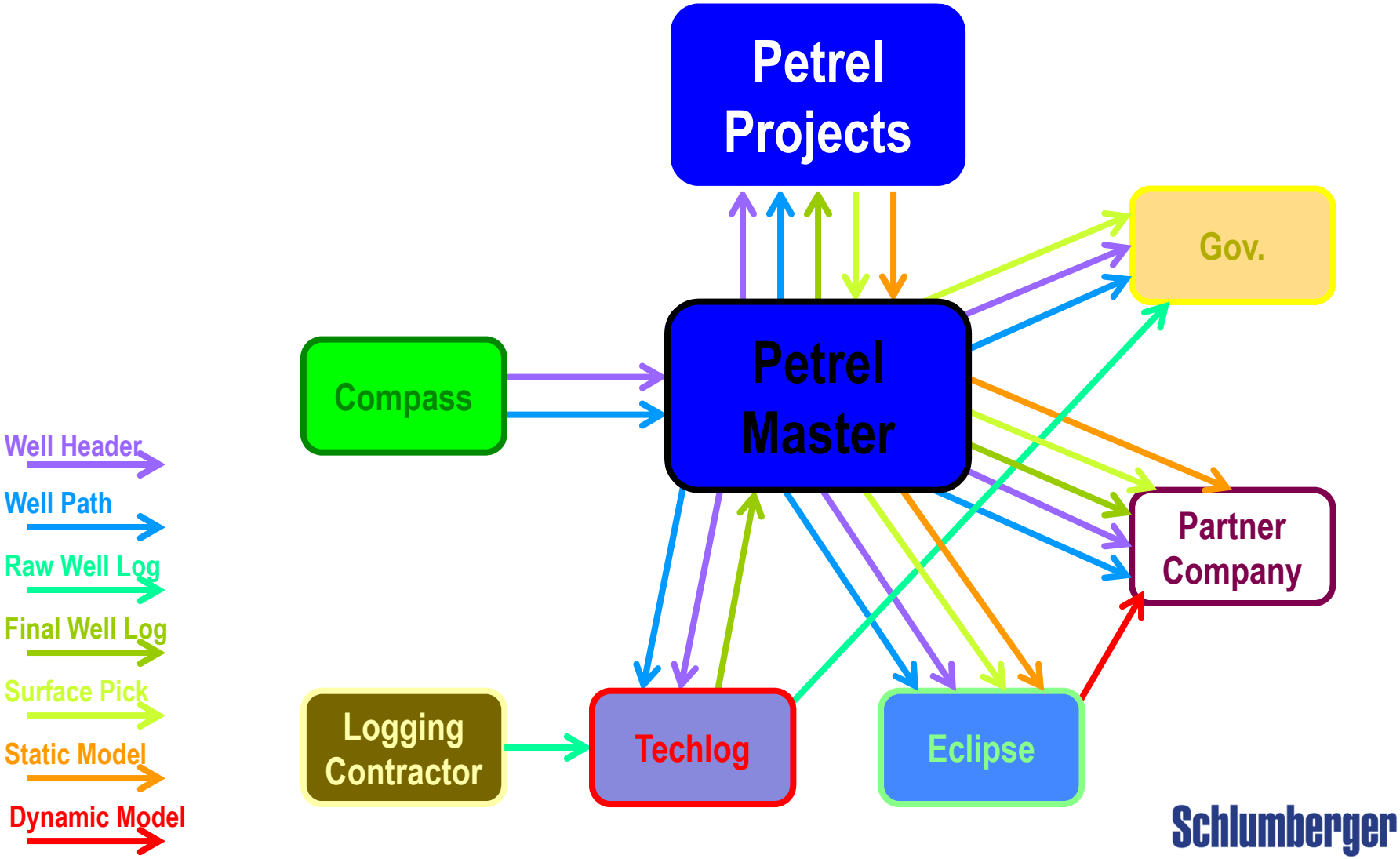
Why "Matrix Pictures"?



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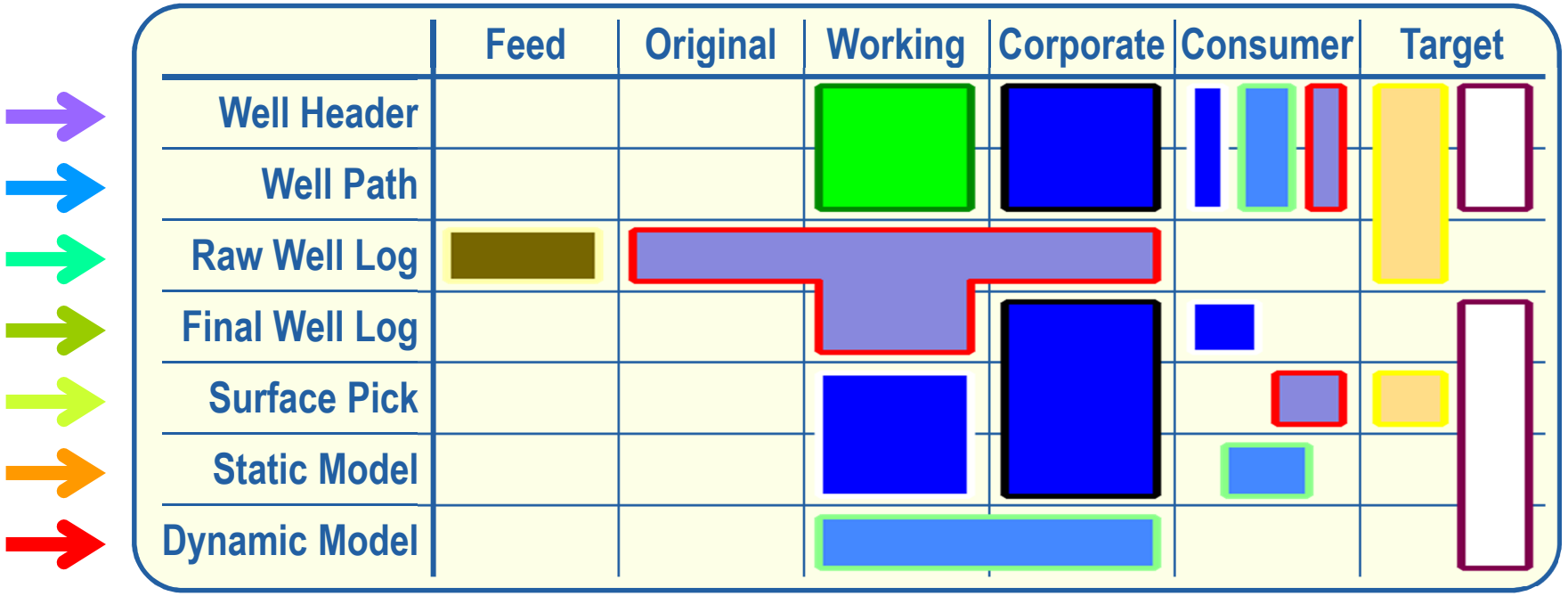
Simpler, more comprehensive (but less familiar) picture



Compass

Logging Contractor

Partner Company

Government

Eclipse

Petrel Master

Petrel Projects

Techlog

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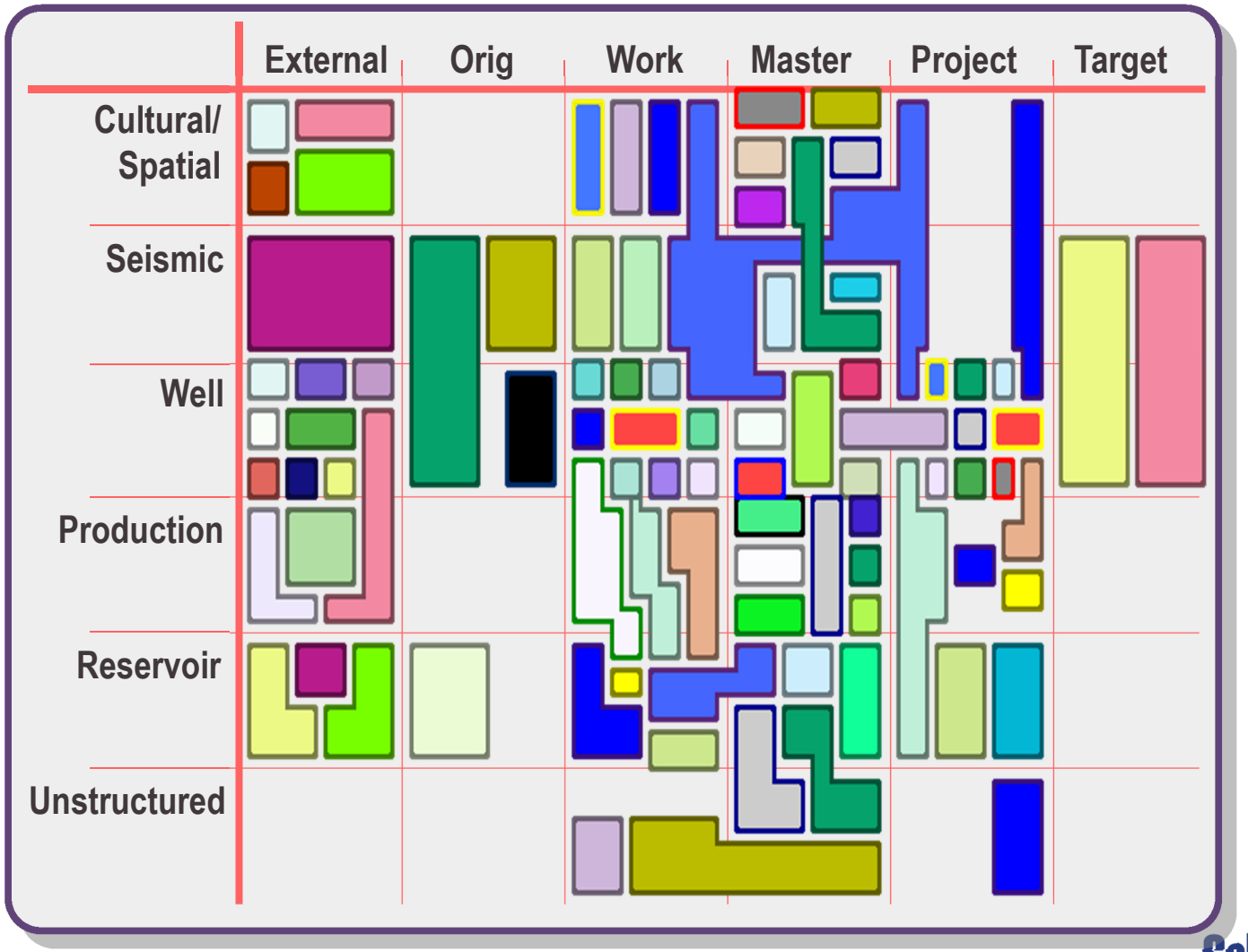
Repository roles



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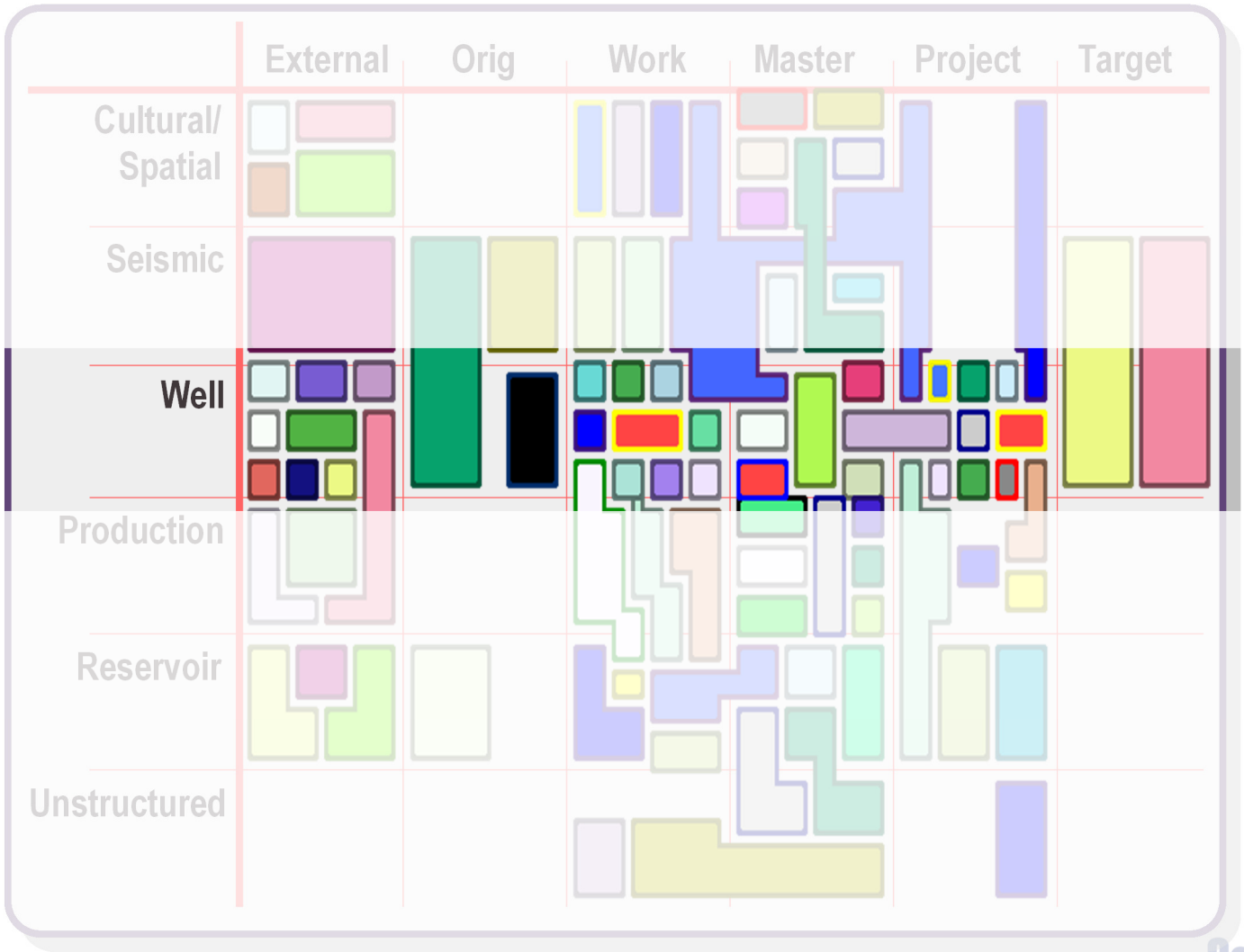
Repository roles



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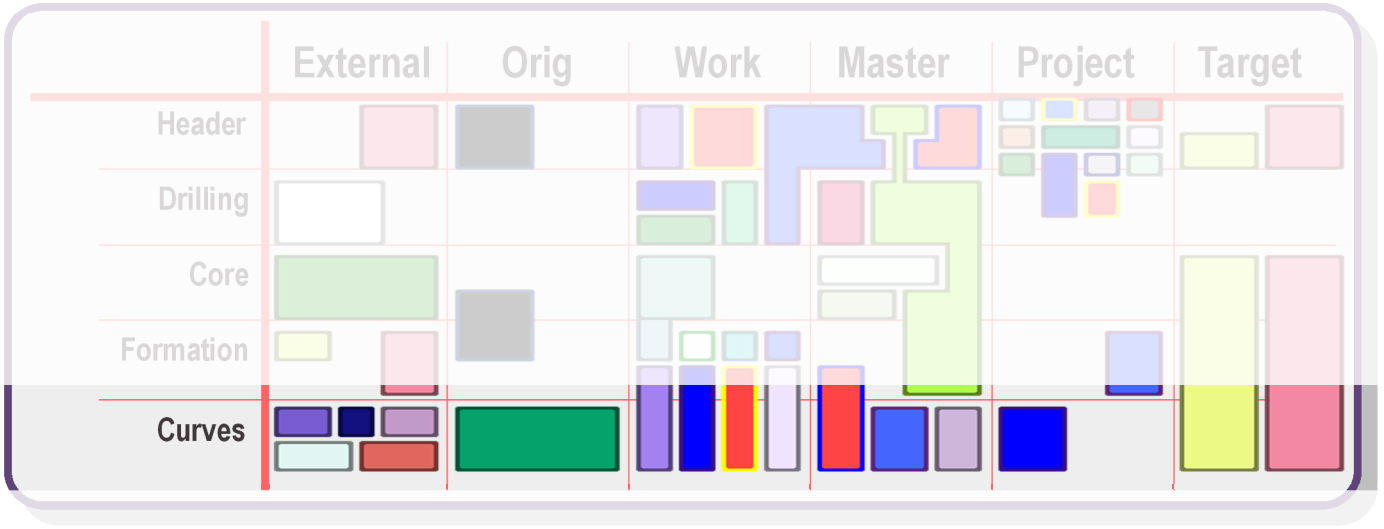
Repository roles - Well Data



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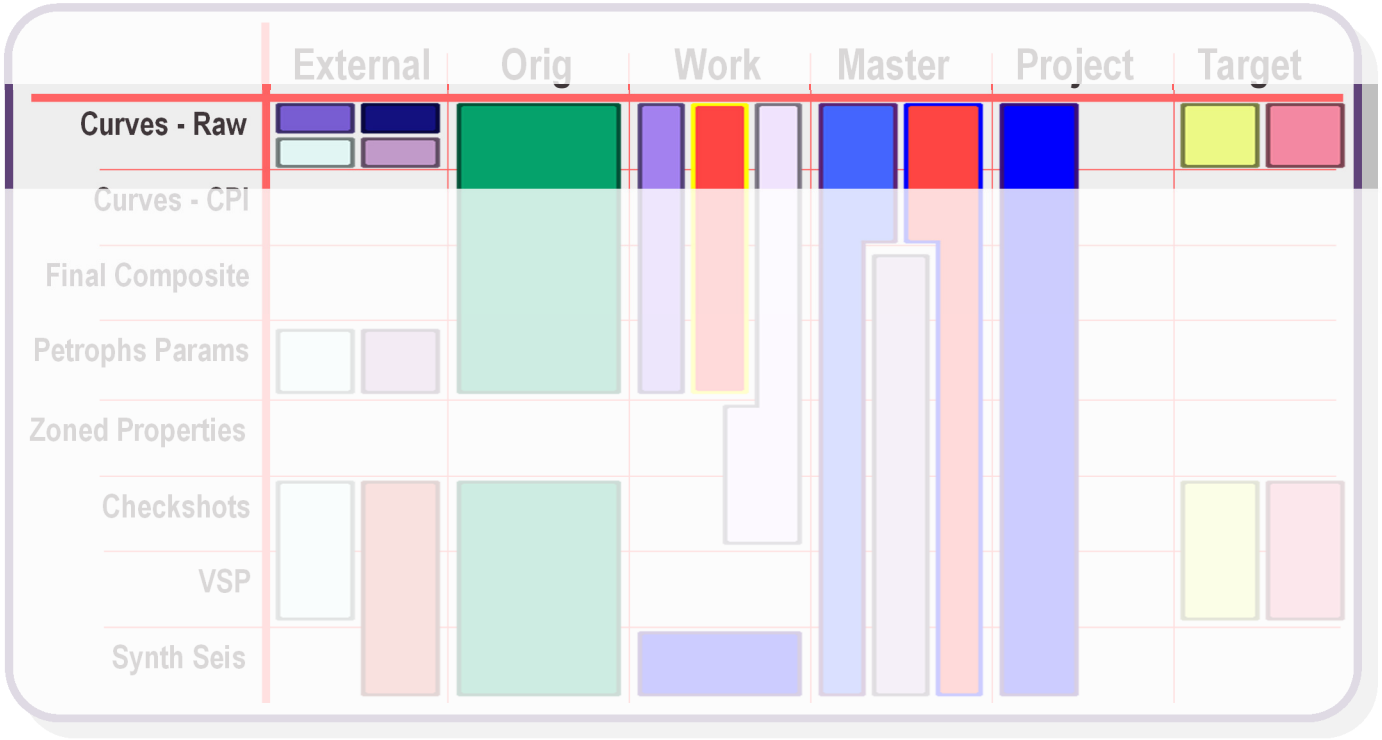
Repository roles - Curve Data



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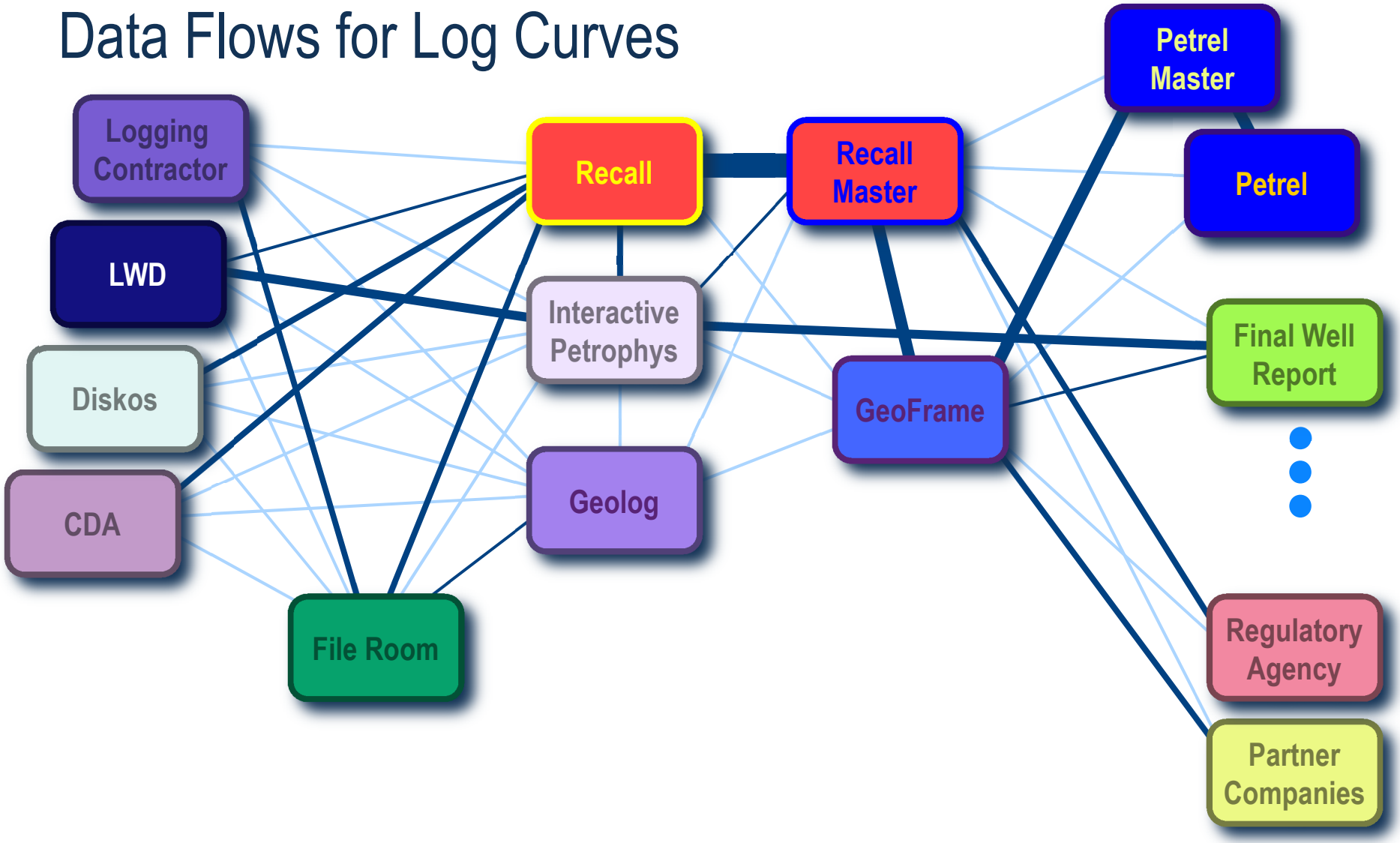
Data Flows for Log Curves



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The “IM Landscape”

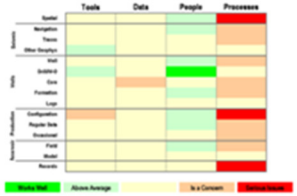
BigOil - Aberdeen Information Landscape

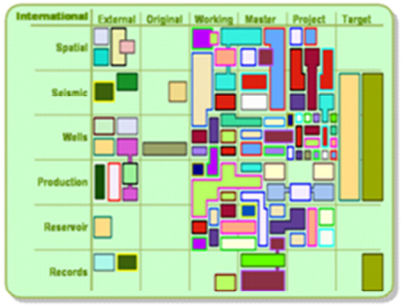
Organisation

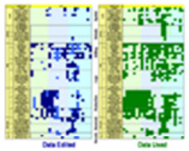
Within the Aberdeen location there are three different ways of handling data, here identified as “North Sea”, “Kecil Minyak” and “International”.

User Impression

The users were asked to rate the quality of the tools, legacy data, people and processes for handling for each data grouping. This is the summary of the user’s responses.

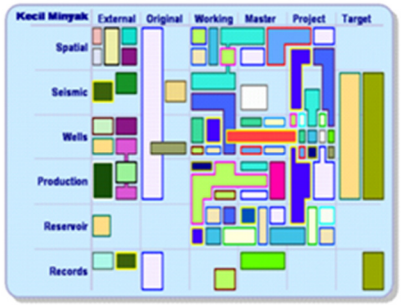






User Footprint

This diagrams show the way the users interviewed interact with data in BigOil’s Aberdeen office. The columns each represents the data categories that a single user either edits or uses.



Repository Role Diagrams

These images document the roles that repositories play in the management of Exploration and Production (E&P) data. The range of data handled has been divided into different categories. Each row documents the repositories that handle that data. The roles that the repositories play have been divided into:

- **External:** The external source for the data
- **Original:** A location where raw values are archived
- **Working:** Where data is edited and interpreted
- **Master:** Approved version of the data usually available for use more widely
- **Project:** Data consumers that use the data without modifying it
- **Target:** Locations outside the company to which data is dispatched

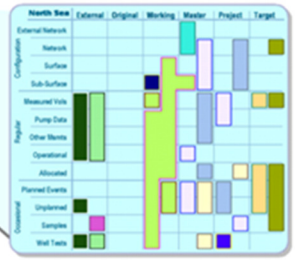
Responsibility

The responsibility for carrying out the tasks in the data life cycle depends on the data category. This diagram shows which tasks are carried out by users, the IM group or contractors.

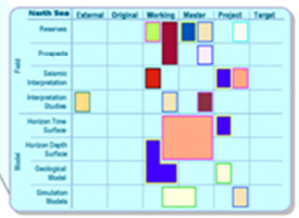
Spatial

Wells

Production



Reservoir



Data Flows – Log Curve Data

This depicts the main data flows for log curve data

Data Flows for Log Curves

Activity Diagram – Log Curve Data

The Information Management Group is responsible for collating new data and passing to CDA before data is sent to the asset team who load the data to Geolog.

Situation Depicted

Date: Oct 2007
Location: BigOil Inc, Aberdeen Office
Data Source: BigOil staff interviews Sep-Oct 2007
Created By: Schlumberger Information Solutions

BigOil

Schlumberger

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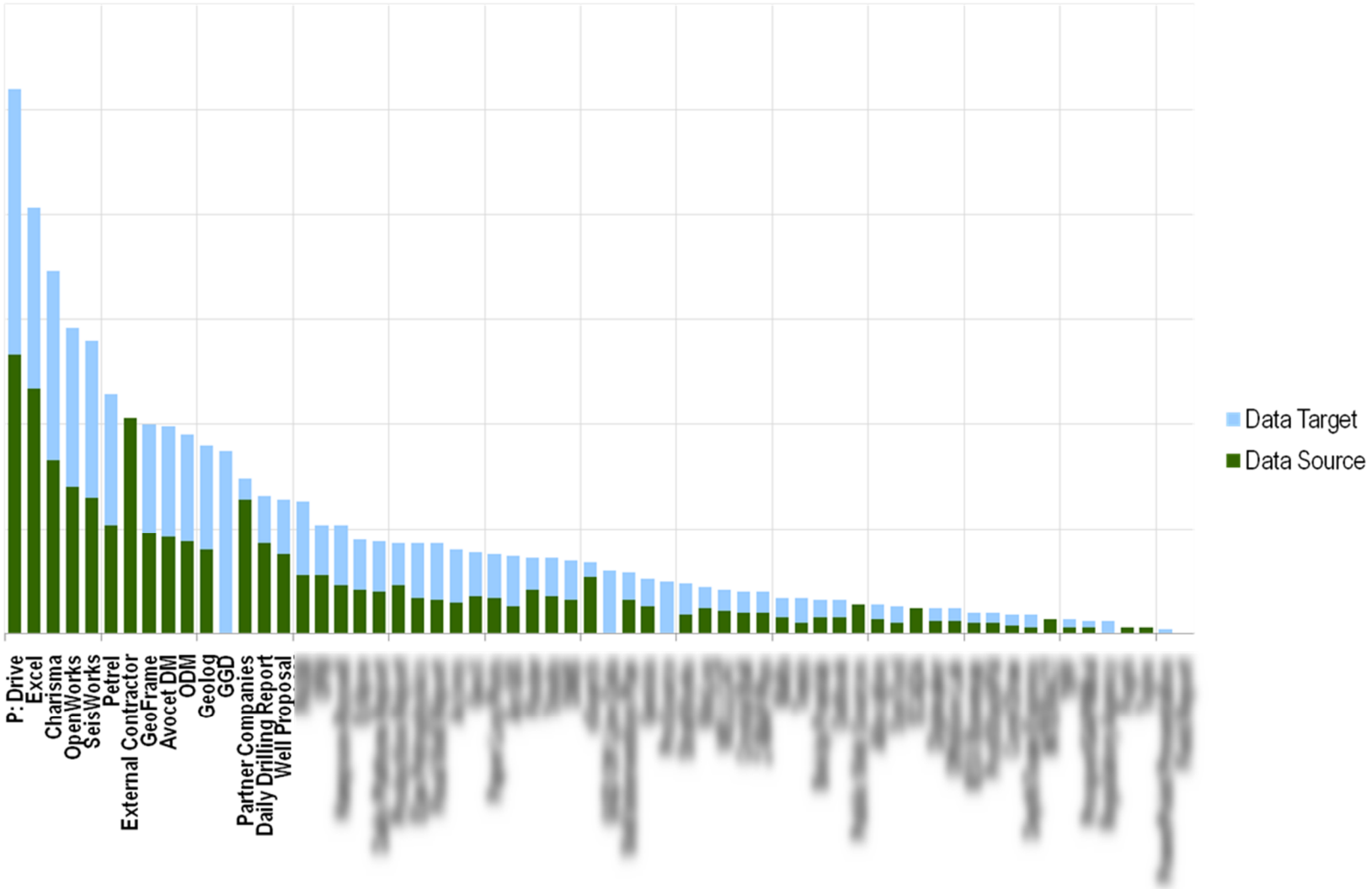
Repository Activity



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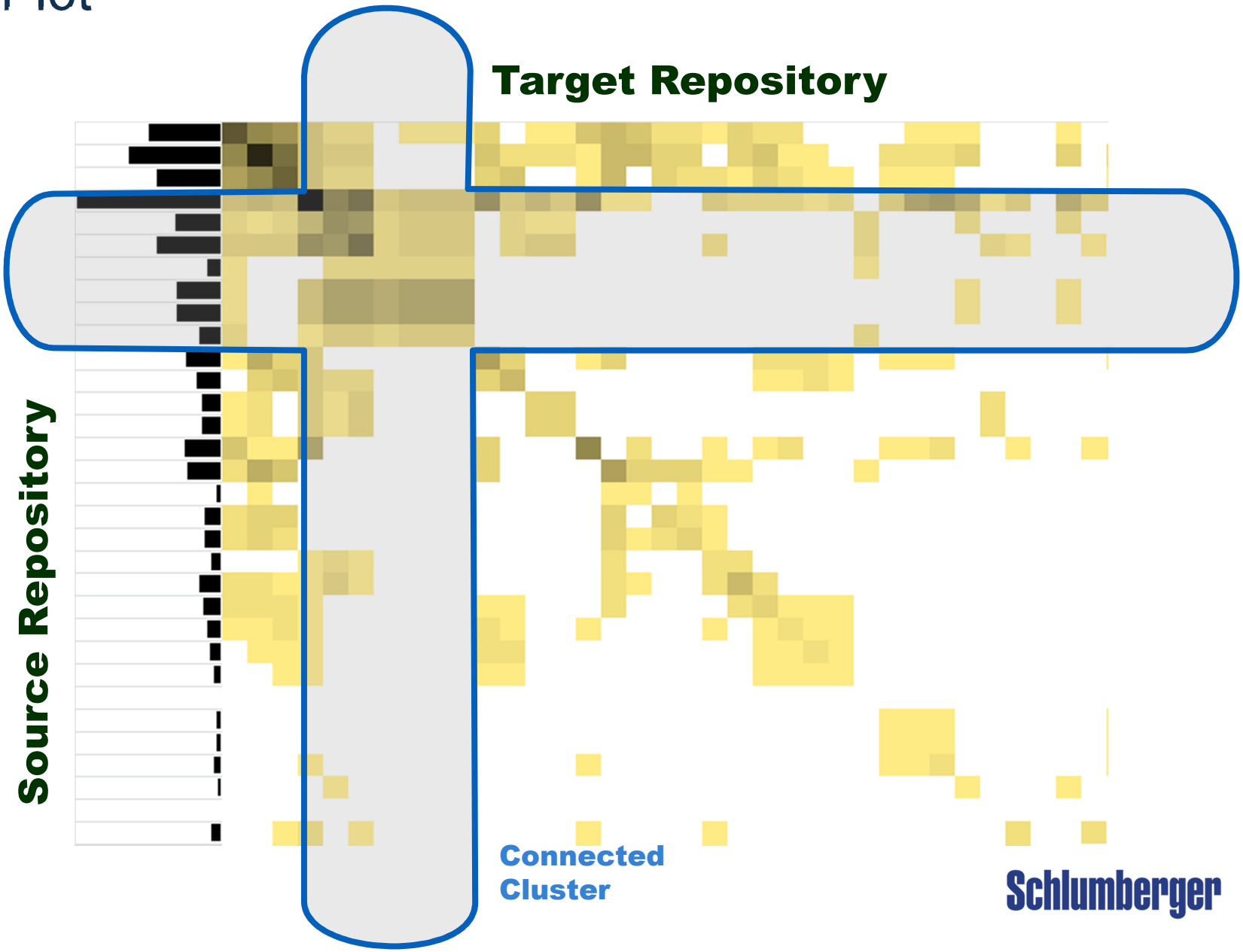
N2 Plot


Target Repository
Source Repository
Connected
Cluster
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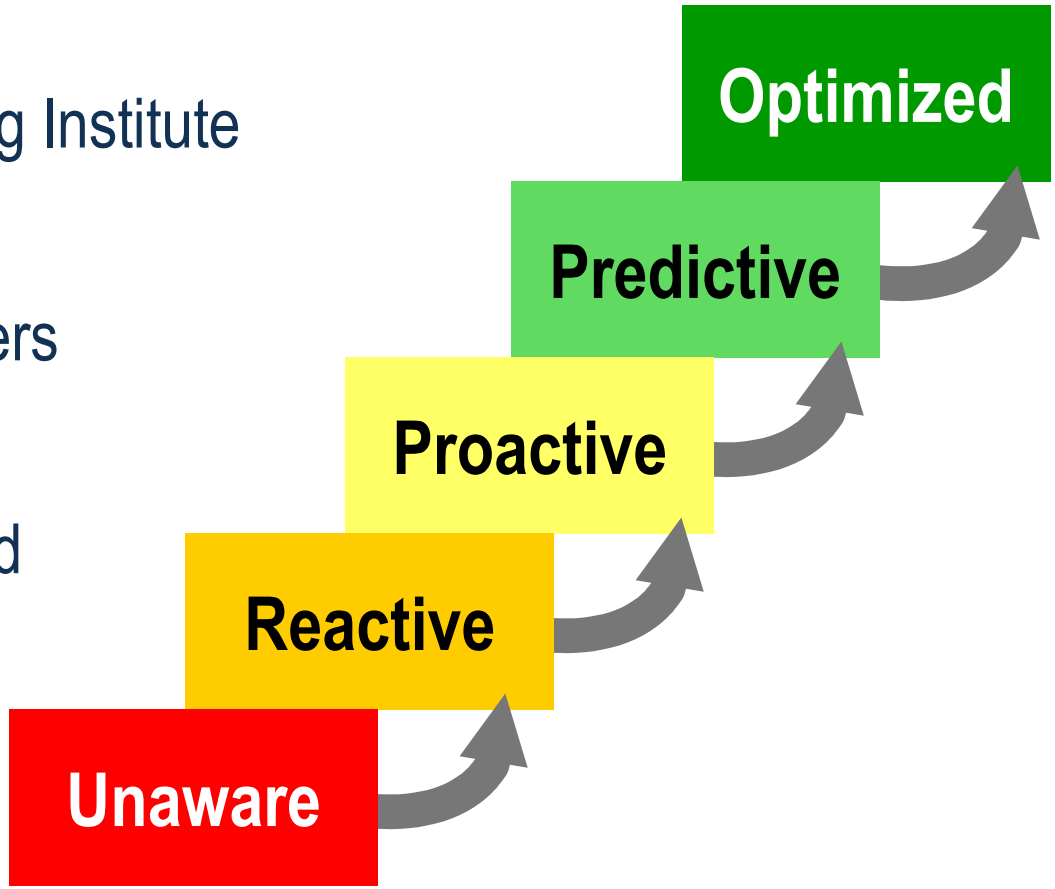
Data Management Maturity Metric

- 1980s
  - Software Engineering Institute
- 1990s
  - Schlumberger + others
- 2000s
  - Universally employed by mature E&P IM consultancies



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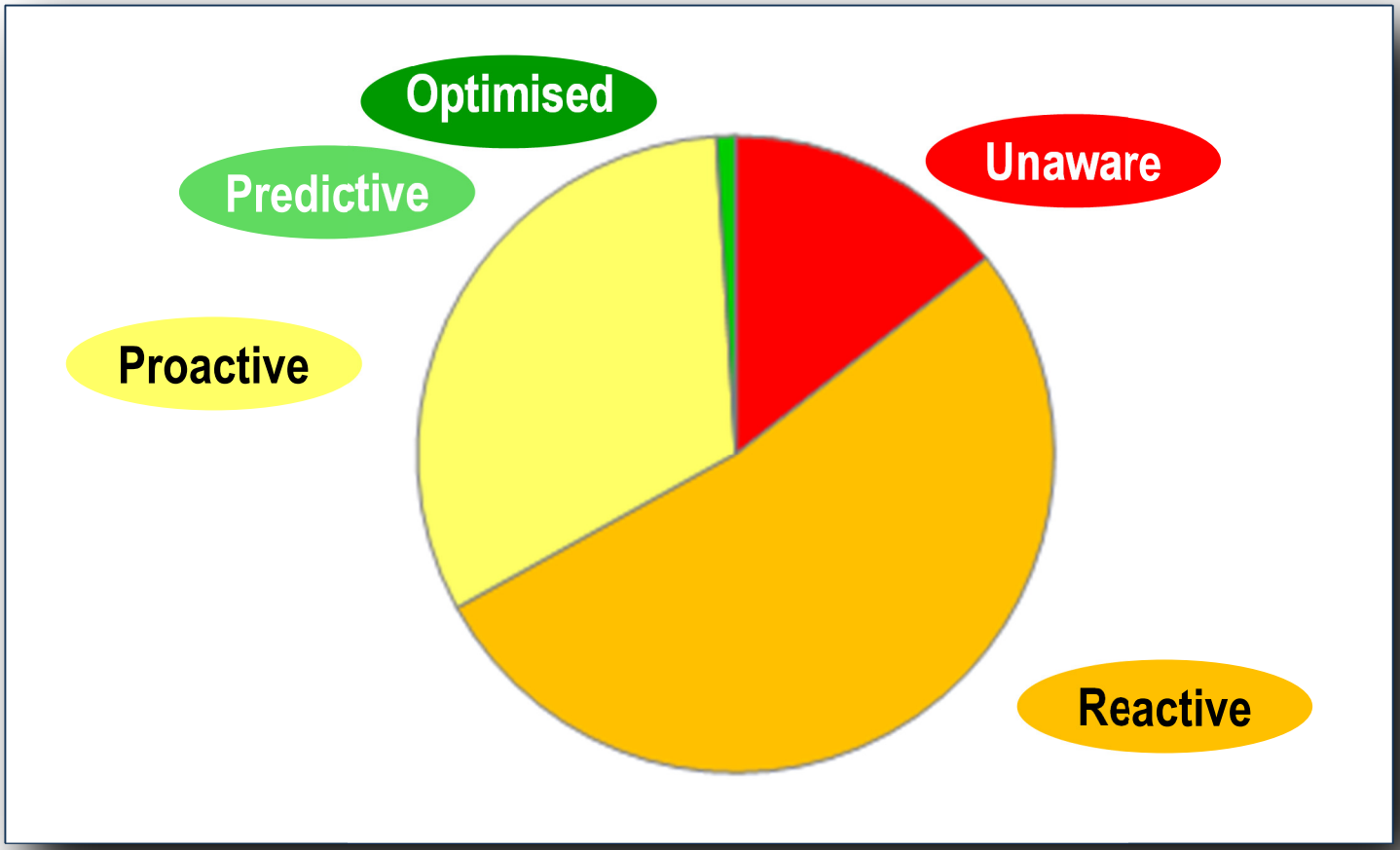
Typical Maturity breakdown



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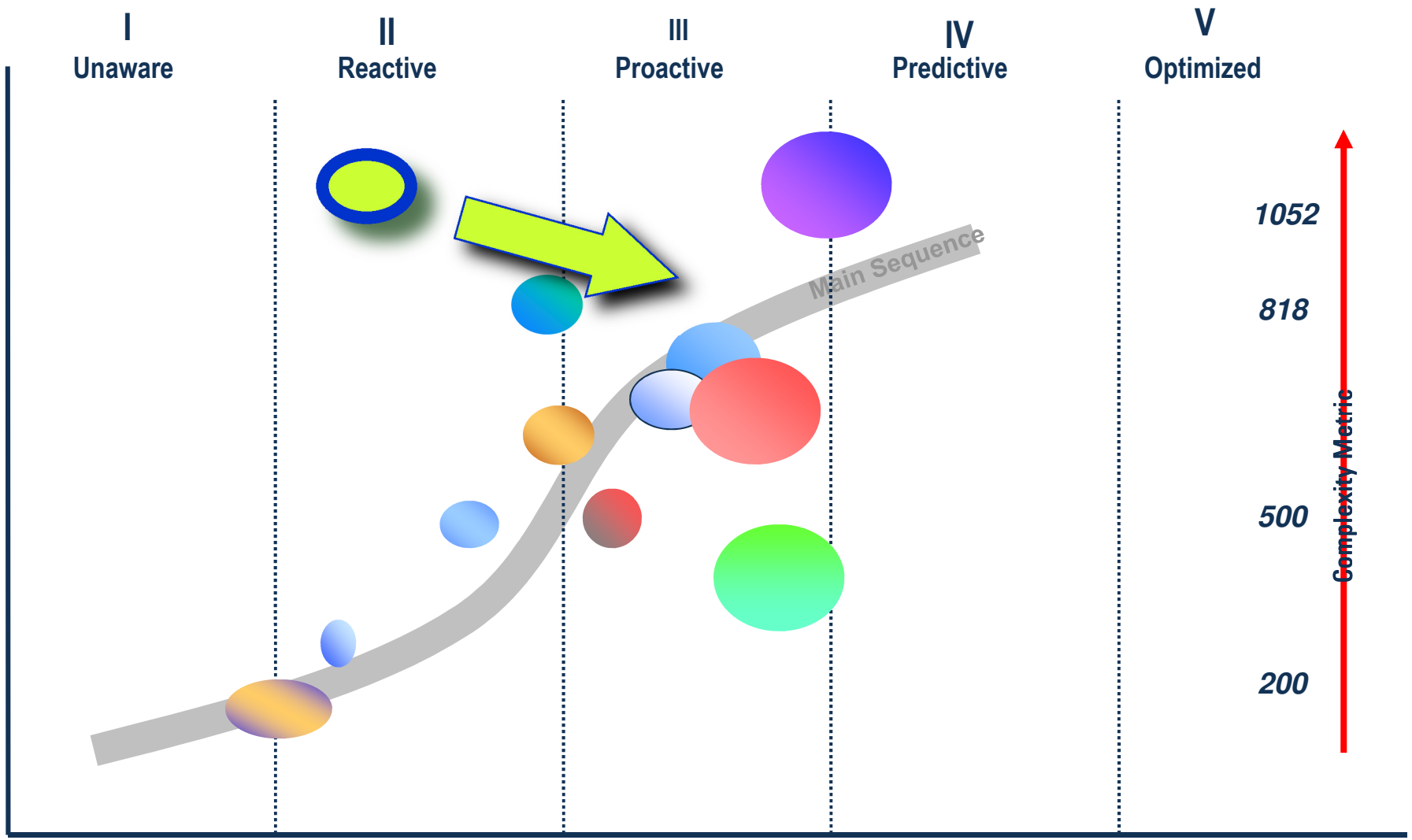
Maturity v Complexity



Based on Jess Kozman & Steve Hawtin "The Main Sequence" (2008) - PNEC12

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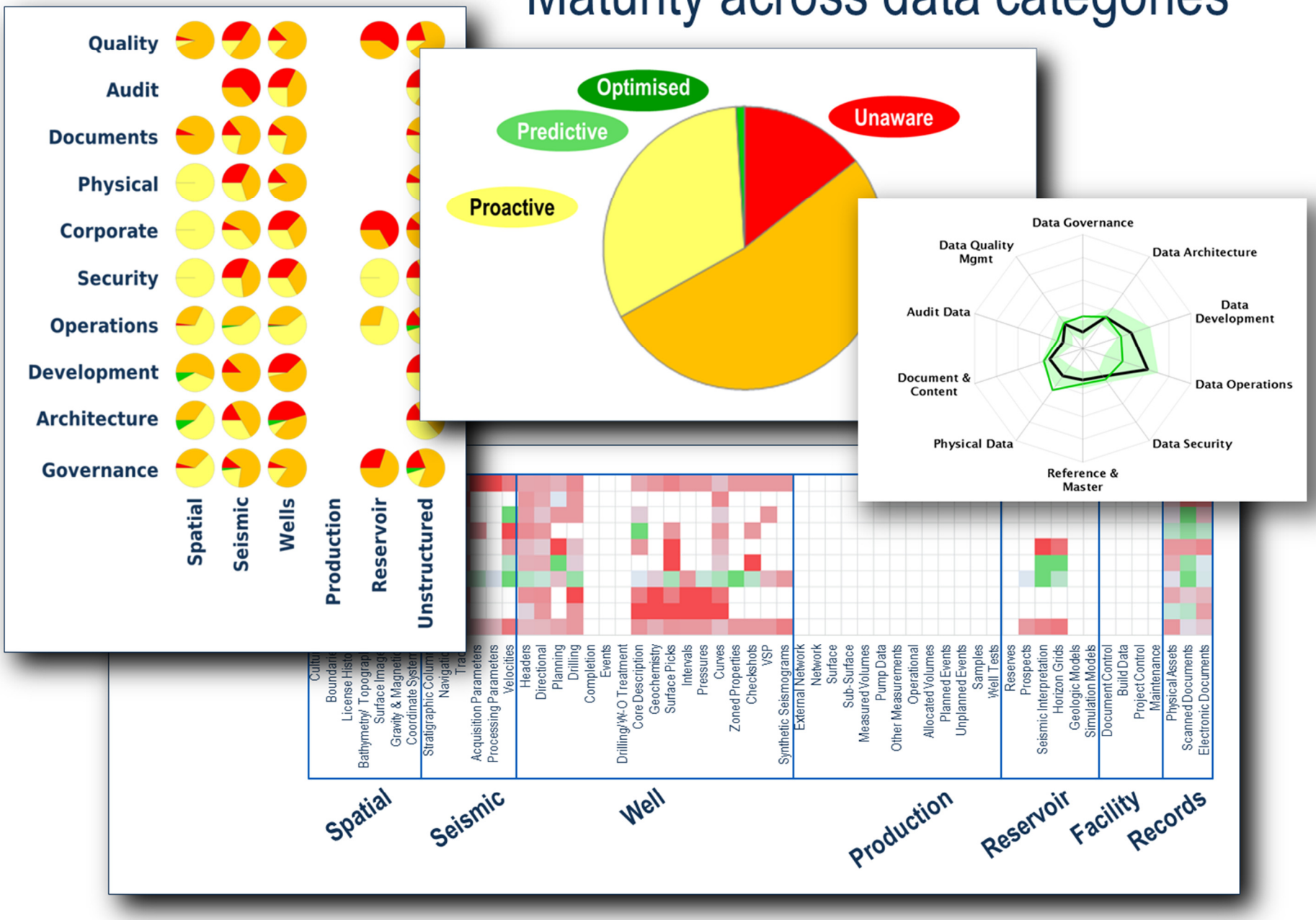
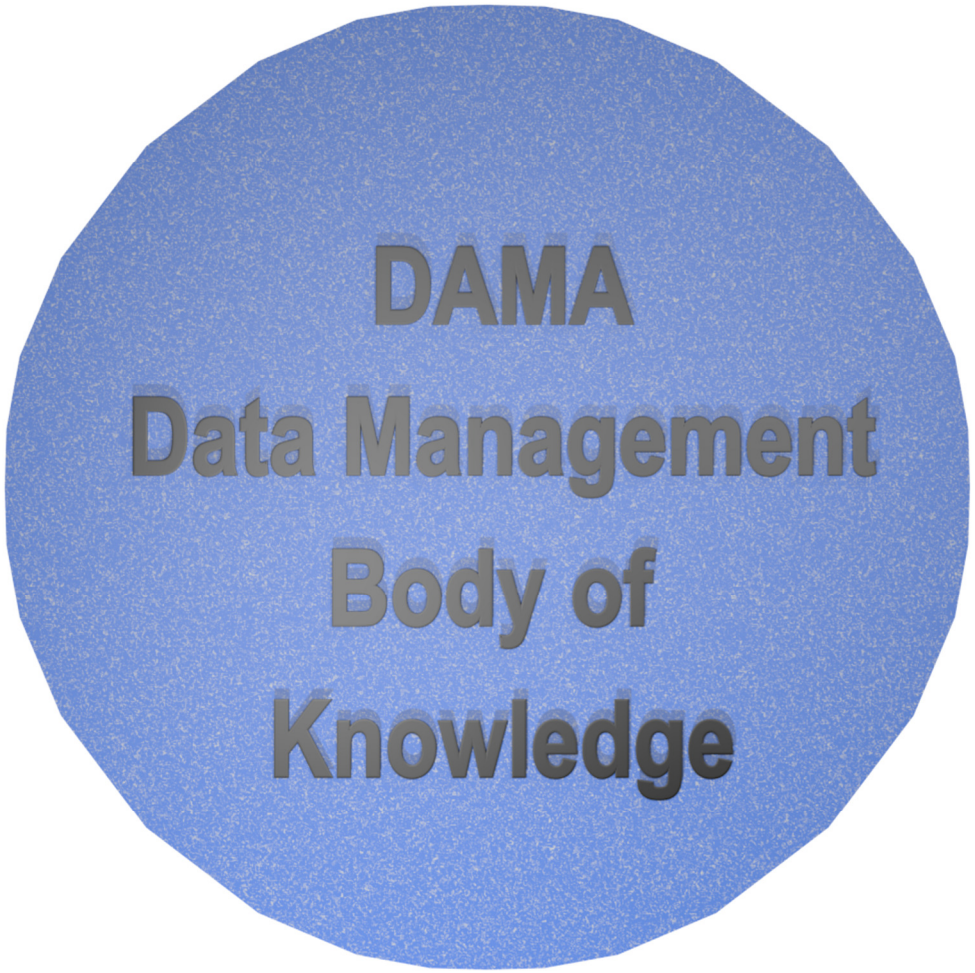
http://dm4ep.com/

Maturity across data categories



Data Management International



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The DMBoK Functions

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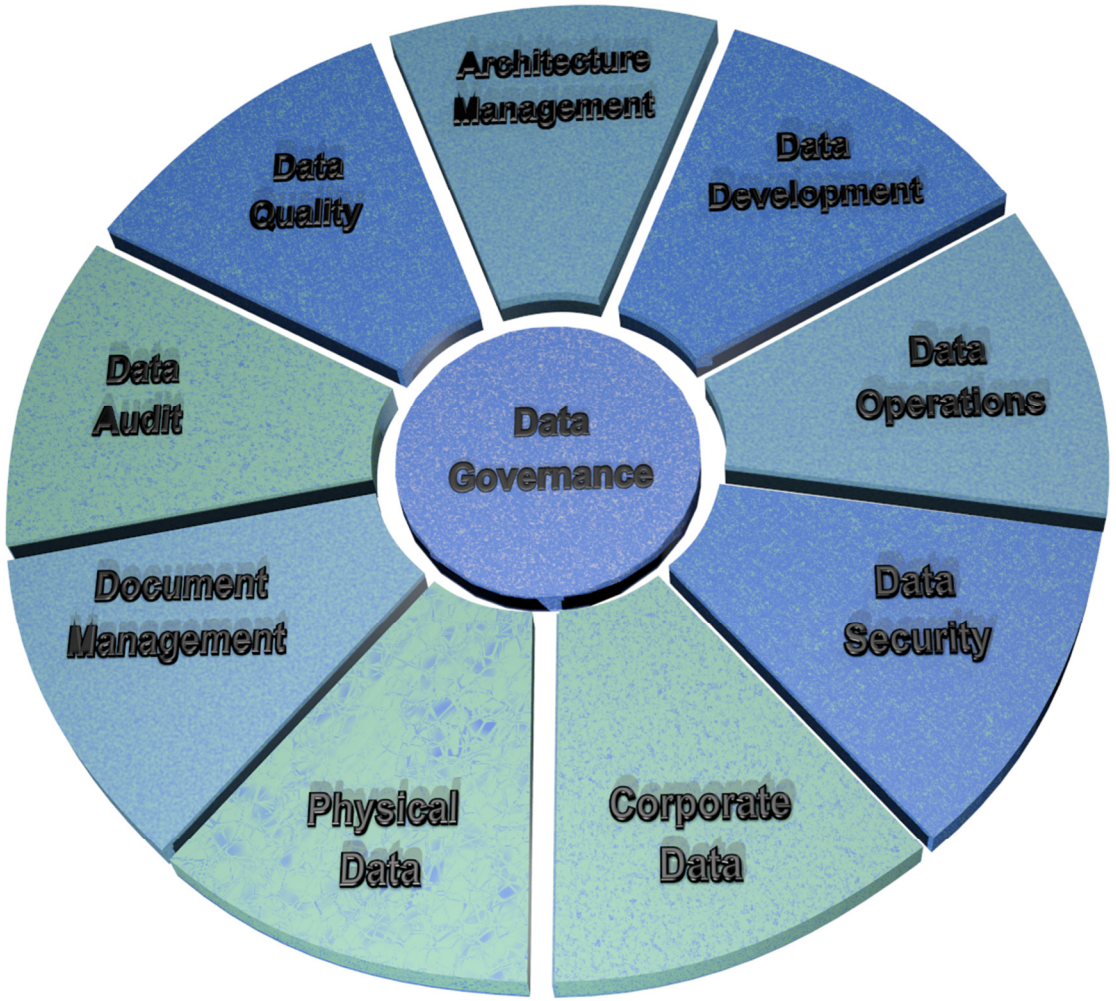
Data Handling in E&P



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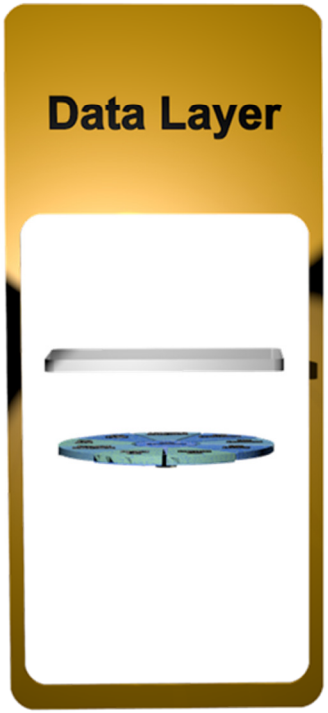
…the information layer…



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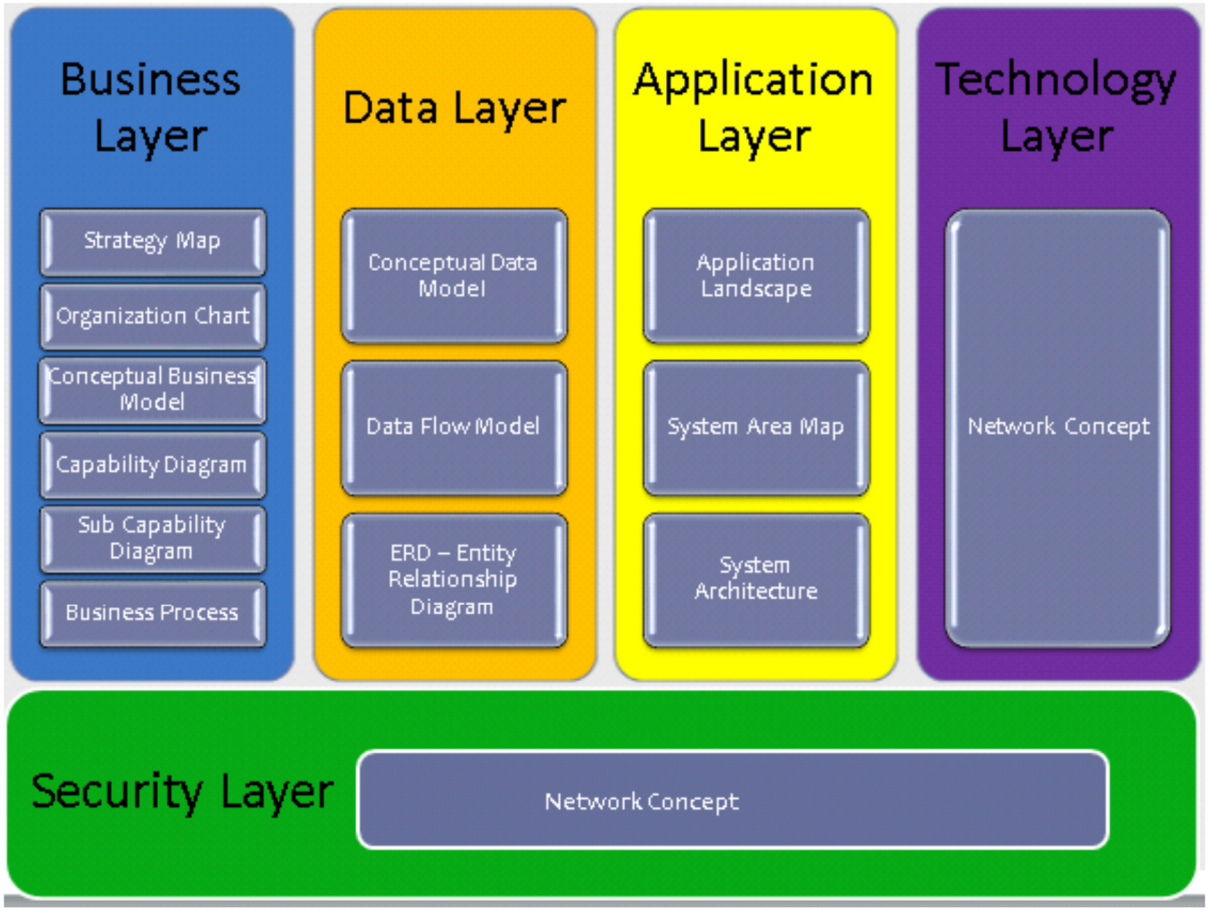
ADCO: Enterprise Architecture Content Framework



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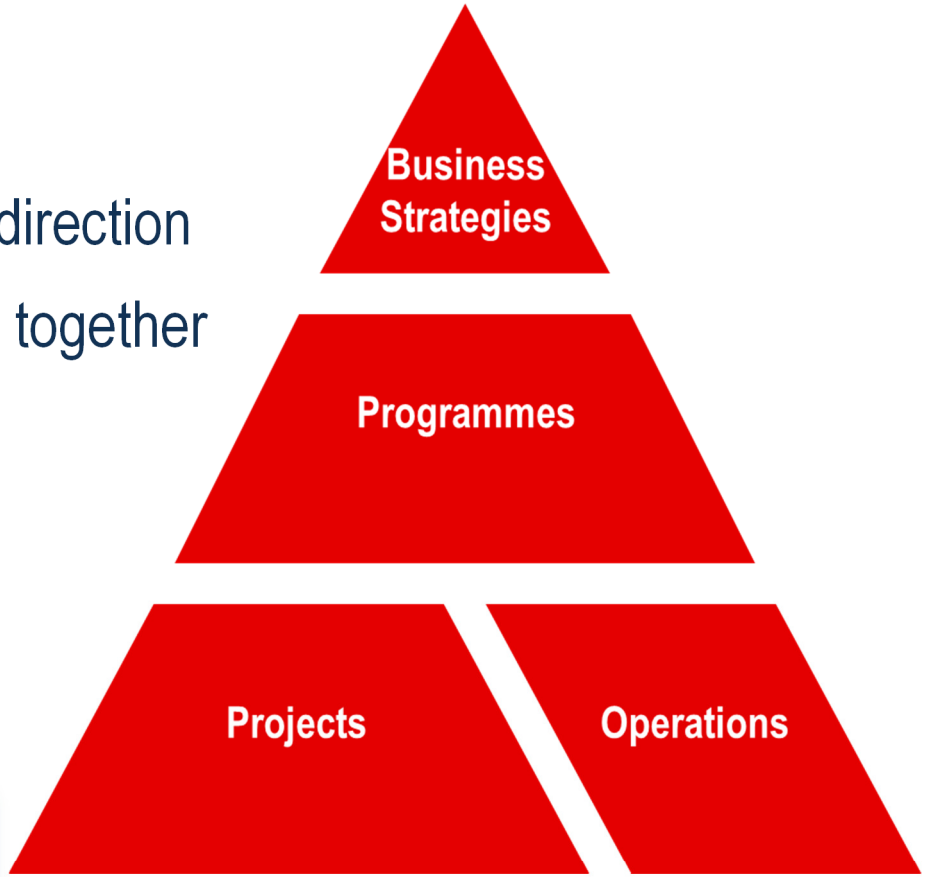
Potential Projects: The Improvement Programme

- meet a strategic need
- require high level leadership and direction
- involve a range of activities which together deliver the outcomes

- Driven by:
  - '**Vision**'
  - '**Compliance**'
  - '**Emerging**' requirement for cohesion



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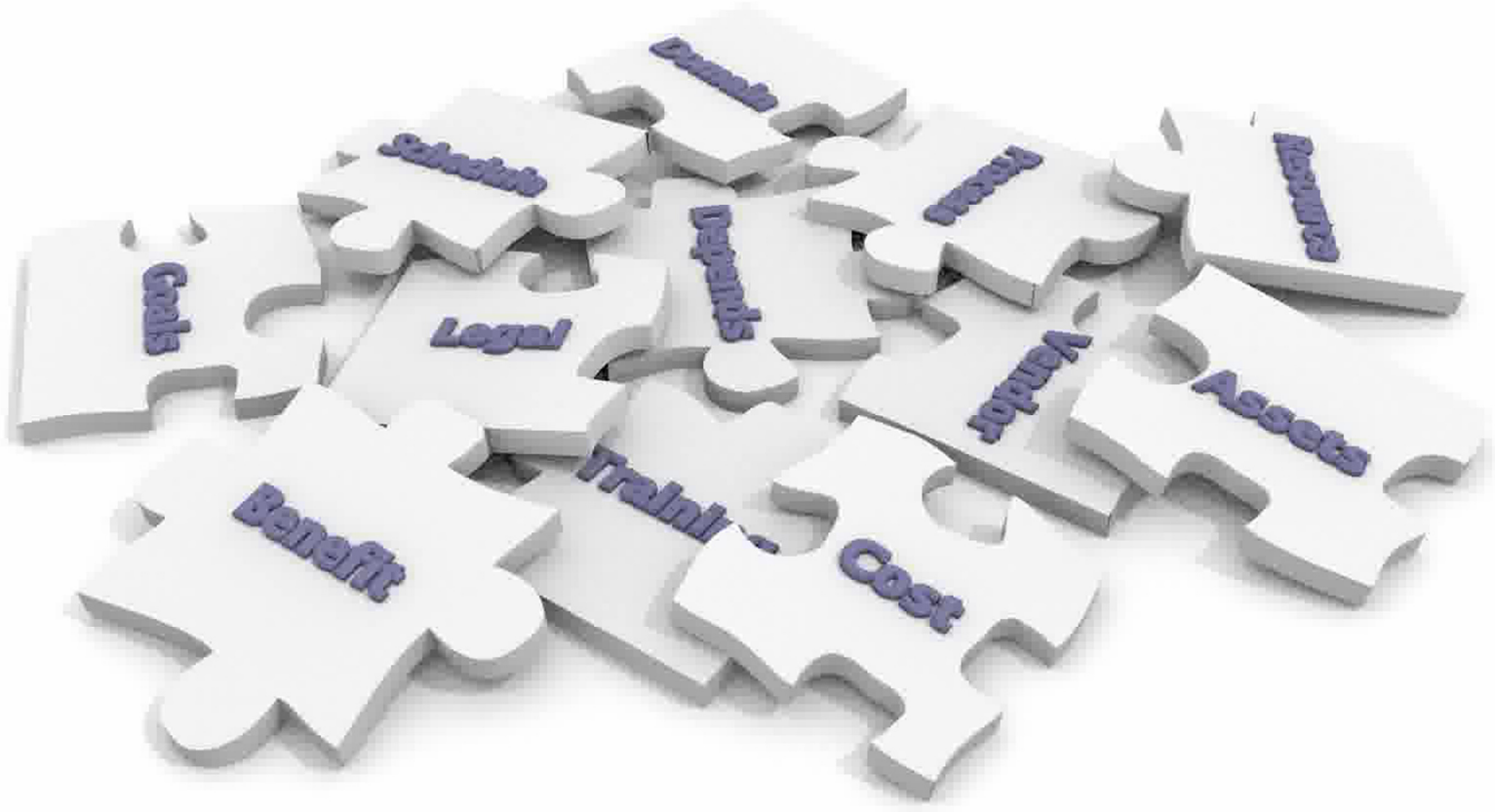
http://www.best-management-practice.com/

The Programme Puzzle



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Conclusion

- In many sectors (but especially in E&P) Enterprise Architecture is now a crucial tool for business
- The benefit from EA comes from
  combining distinct viewpoints

- In the Upstream Oil Industry The Information Layer is:
  - Important, Challenging, Interesting, Achievable

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Questions, Comments or Discussion?

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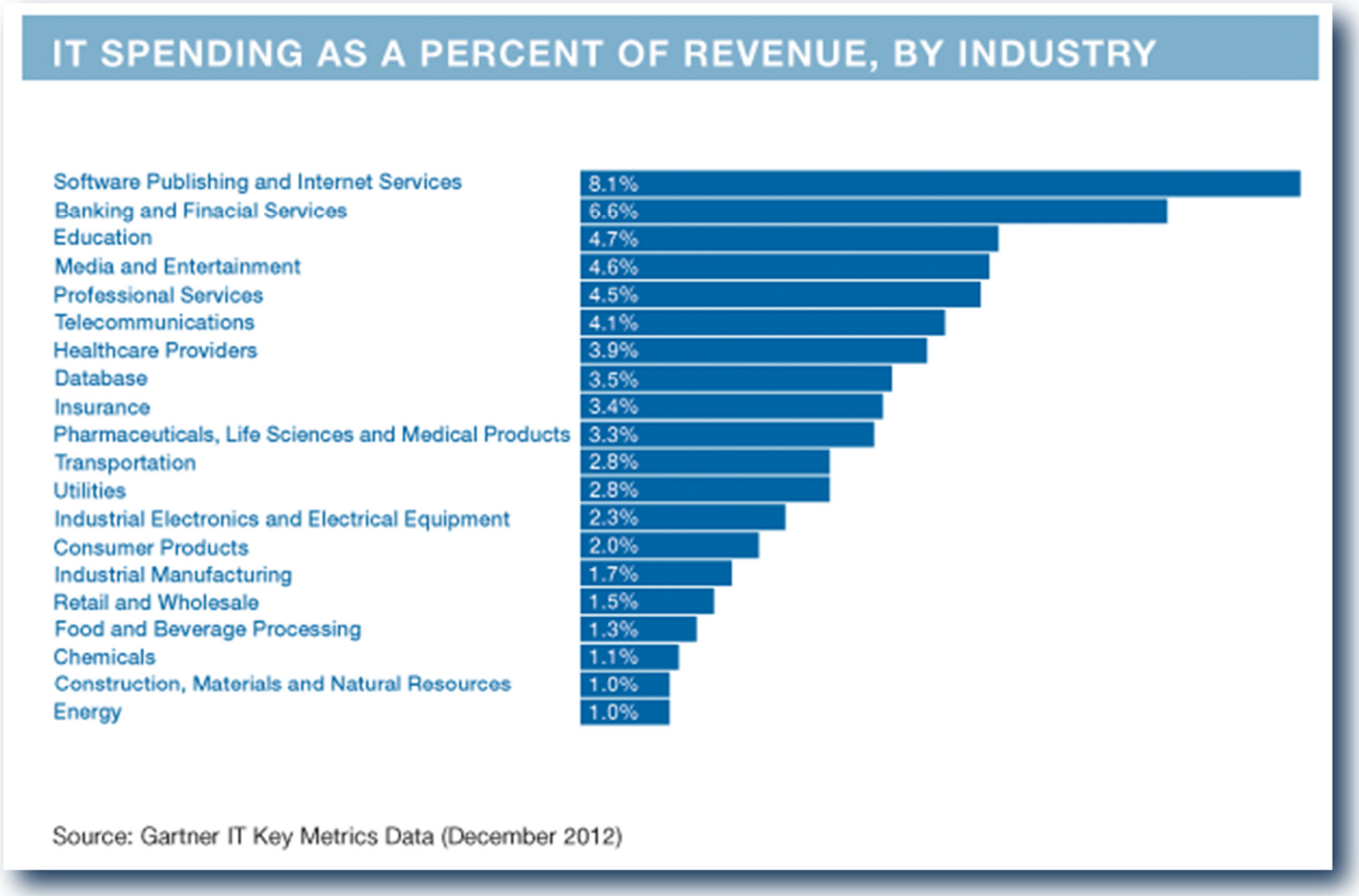
E&P Spend on Information Technology



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