- **Data**
  - XML data with XML database
  - Databases
  - GIS data with ArcGIS
  - Page images with good OCR
  - Plain text with natural language processing

- **Tools**
  - Raw database dump (e.g. CSV or tab-delimited data) viewed in a spreadsheet
  - XML data viewed in an HTML browser
  - Static HTML pages plus browser
  - Plain text (unstructured)
  - Page images without metadata
Digital formats:
- Exact, infinitely repeatable copying: no information loss
- Accurate transmissibility
- Automated conversion and transformation

Issues:
- Granularity: how fine-grained or detailed the data is
- Conversion processes and their lossiness
- Accuracy and utility of modeling
Plain text:

It was a dark and stormy night

Structured text:

```c
{  
  const int i = 10;
  int a[11];
  char b;
  printf("Enter a number: ");
}
```

Binary data:

```
ABCDEFHIJKLMNOPQRSTUVWXYZ0123456789 .';<@#$%^&*()_|\;|{|}~
```

Mapping onto alphanumerical text (ASCII, Unicode)

Binary code: base 2, zeroes and ones

Circuit board with logic pathways: yes/no, on/off, zero or one

Sound

Image

Video

Software

Mapping onto compiled program code and data formats

ETC......
Referenceability

- Identity management
- Unique reference
- Unambiguous pointing and linking
- Access control
- "Thingness", deixis
Referenceability

Processability

Searching
Meaningful results
Applying useful tools
Referenceability

Processability

Structure

Formalization

Categories and hierarchies
Encoding languages
Metadata formats
Ontologies
Referenceability

Processability

Structure

Formalization

Standards

Interoperability

Consistency

Controlled vocabularies

Authority records

Standard classification systems
Referenceability
Processability
Structure
Formalization
Standards
Interoperability
Aggregation

Large scale
Shared structures
Broad queryability and processability