


**Learning from Past
Trial and Error:**


**Some History of
Reverse Engineering
to Requirements**



Elliot Chikofsky
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Pittsburgh PA



e.chikofsky@computer.org
+1 781-272-0049



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Some History

- **“Requirements Engineering” tools;
“Systems Analysis and Design”**
 - PSL / PSA (Univ Michigan ISDOS)
 - RSL - REVS - SREM (TRW)
- **Computer-Aided Software Engineering (CASE)**
 - Excelerator; KnowledgeWare; Bachman; Popkin
- **IBM’s AD/Cycle initiative**
 - IBM Repository; Enterprise Model
 - Fight over the inclusion of a Requirement object

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WCRE-inventing the Wheel

- ▲ Circa 1980 [PSL/PSA; mainframe CASE]:
 - ▲ Rev Engr from Object Code
 - ▲ Automatic documentation by code reverse engr
 - ▲ Data collection from many kinds of multiple artifacts
 - ▲ Process matching defect reports and software code artifacts found to recovered architecture framework



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Levels of Abstraction

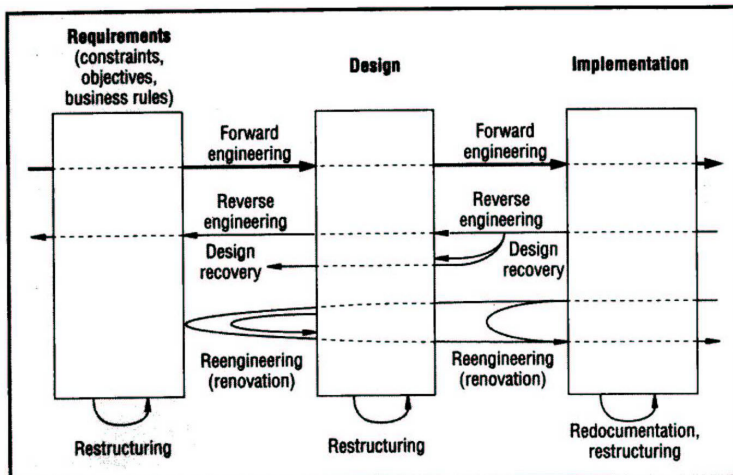
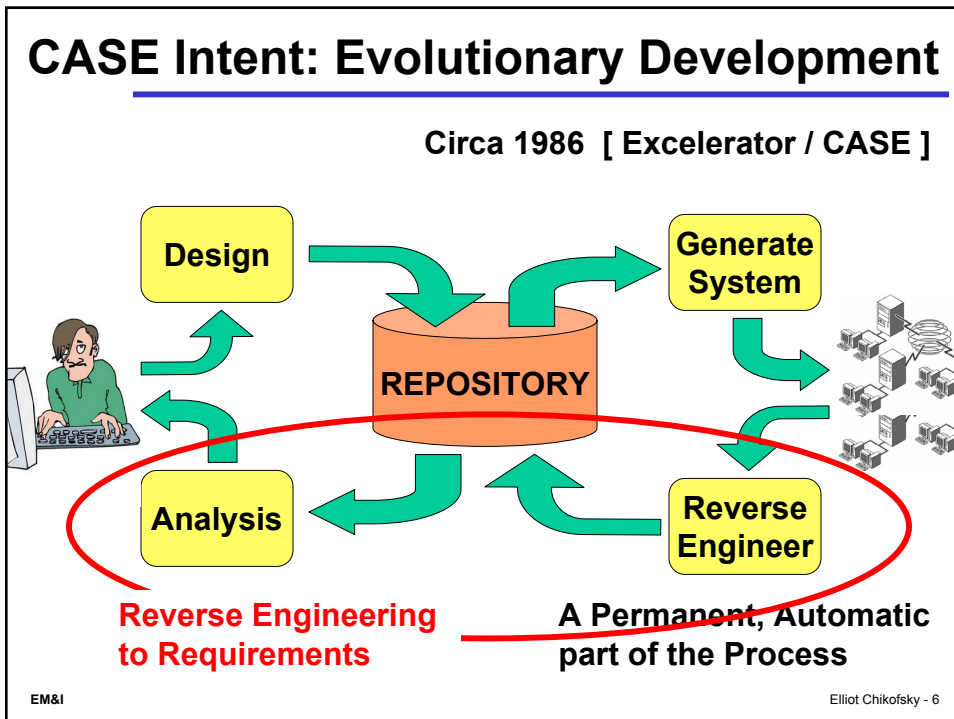
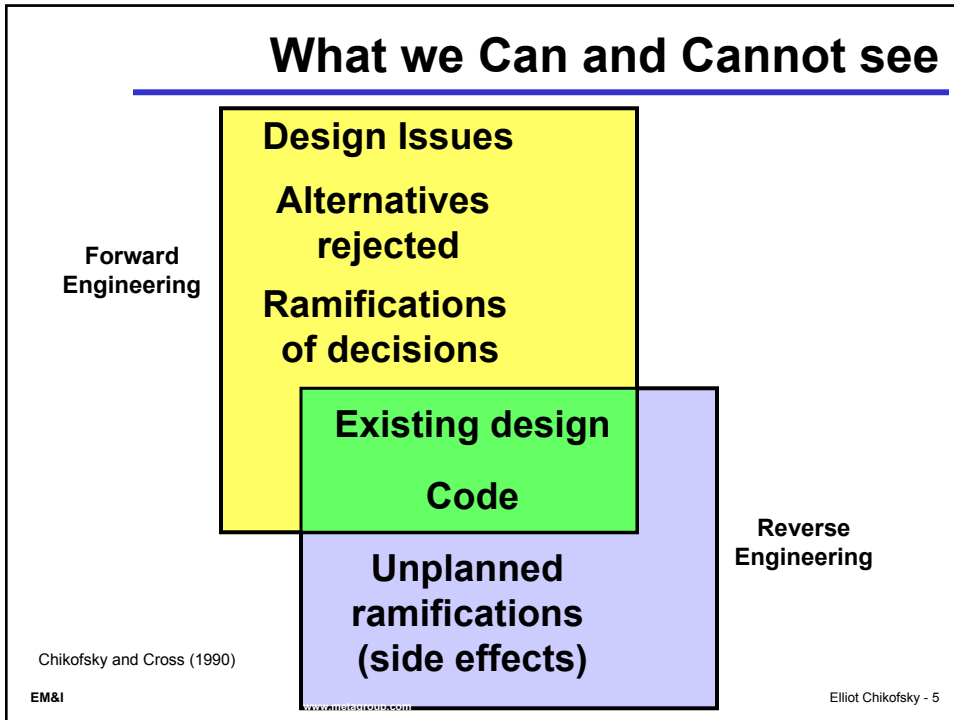


Figure 1. Relationship between terms. Reverse engineering and related processes are transformations between or within abstraction levels, represented here in terms of life-cycle phases.

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Chikofsky and Cross (1990)

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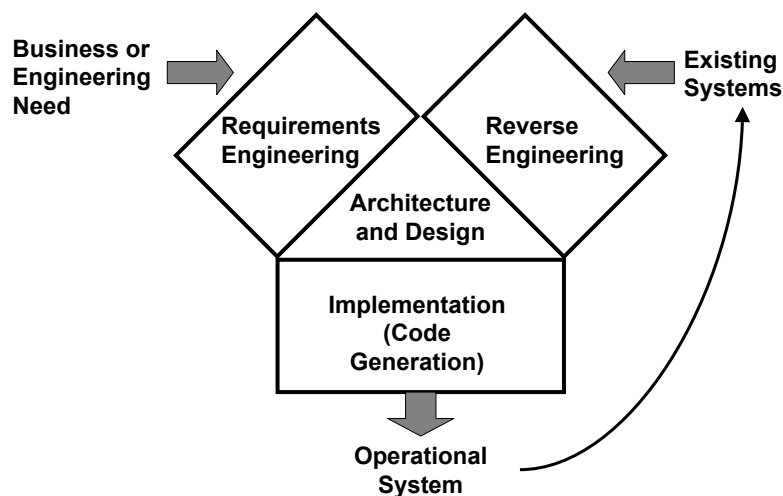
Evolution of WHY to Reverse Engineer

- **Software Maintenance Support**
- **CASE for Existing Systems**
- **Design Recovery**
- **Migration to <fill-in-your-favorite>**
- **Program Understanding / Comprehension**
- **Year 2000**
- **Asset Recovery**
- **Defensive / Offensive Obfuscation**

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Engineering Processes



ref. Index Technology, early 1990s

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Do we understand original constraints?



“If we do not bother taking soil samples, we can save 5,000 Lira and two weeks.”

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RETR Challenges

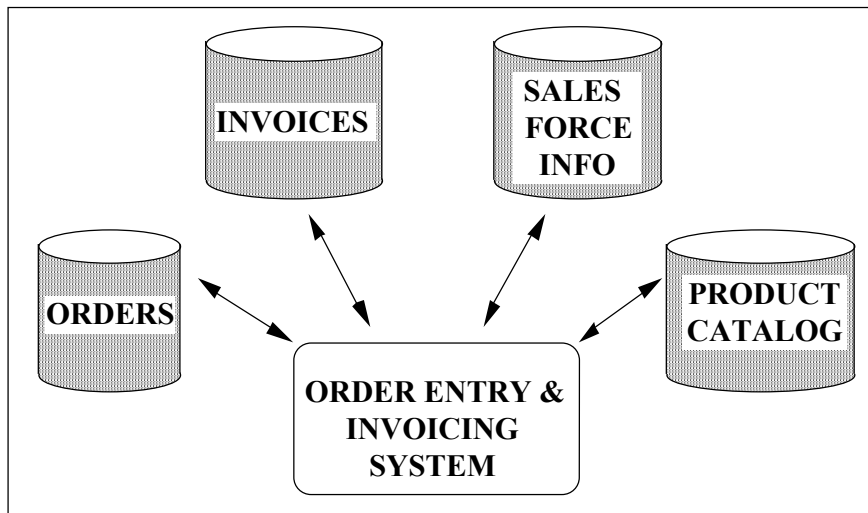
- **What kind of requirements?**
 - Functional Requirements; Engineering Requirements; Interface Requirements; Environmental Requirements
- **Getting from Physical models to Logical models**
- **Whose requirements are they?**
 - Achieving meaning for the functional users
- **Coping with incompleteness**
- **Understanding the ramifications of not knowing the original constraints**



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American Flange



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Data Structures

```

FD SALESFORCE-FILE.
01 SALESPERSON-REC.
05 COMMISSION-RATE PIC 99V999.
05 SALESPERSON-NAME PIC X(30).

FD INVOICES-FILE.
01 INVOICE-REC.
05 INVOICE-NUMBER PIC 9(6).
05 DATE-PAID.
10 YY-PAID PIC YYYY.
10 MM-PAID PIC YY.
10 DD-PAID PIC YY.
05 ORDER-NUMBER-2 PIC 9(5).
05 AMOUNT PIC 9(5)V99.
05 SALESPERSON-NAME-2 PIC X(30).

FD ORDERS-FILE.
01 ORDER-REC.
05 ORDER-NUMBER PIC 9(5).
05 CUSTOMER-NUMBER.
10 CUST-LETTER PIC X.
10 CUST-SEQ PIC 9(4).
05 CUSTOMER-NAME PIC X(30).
05 ADDRESS PIC X(90).
05 ORDER-DATE.
10 YEAR PIC YYYY.
10 MONTH PIC YY.
10 DAY PIC YY.

01 LINE-ITEM-REC.
05 ITEM-NUMBER-2 PIC 9(5).
05 ORDER-NUMBER-3 PIC 9(5).
05 QUANTITY PIC 9(5).
05 PRICE PIC 9(4)V99.

FD CATALOG-FILE.
01 CATALOG-REC.
05 ITEM-NUMBER PIC 9(5).
05 QUANTITY-ON-HAND PIC 9(6).
05 D PIC X.
05 SUPPLIER PIC X(30).
05 COST PIC 9(4)V999.
  
```

```

SALESPERSON
Salesperson-Name      Primary Key      String 30
Commission-Rate       ---              Real

INVOICE
Invoice-Number        Primary Key      Integer
Amount                ---              Real
Date-Paid              ---              Date
Order-Number           Foreign Key      Integer
Salesperson-Name      Foreign Key      String 30

ORDER
Order-Number           Primary Key      Integer
Date                  ---              Date
Customer-Number        ---              Combined
Customer-Name          ---              String 30
Address                ---              String 90

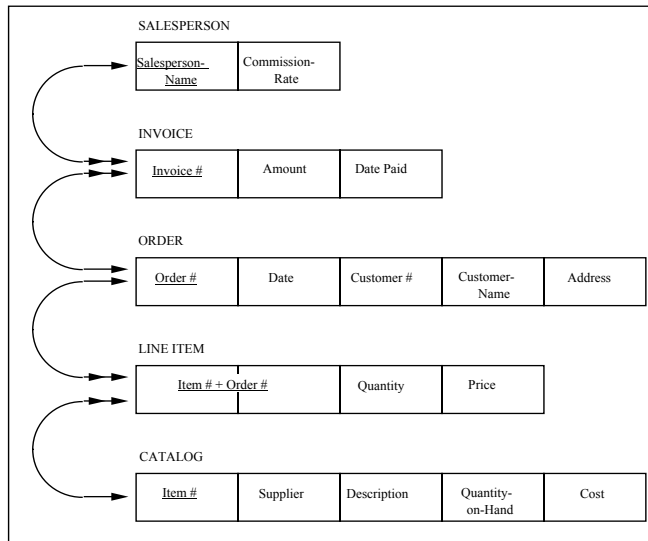
LINE-ITEM
Item-Number            Part of Key; Foreign Key Integer
Order-Number           Part of Key; Foreign Key Integer
Quantity               ---              Integer
Price                  ---              Real

CATALOG
Item-Number            Primary Key      Integer
Quantity-on-Hand       ---              Integer
Supplier               ---              String 30
Description             ---              String 50
Cost                   ---              Real
  
```

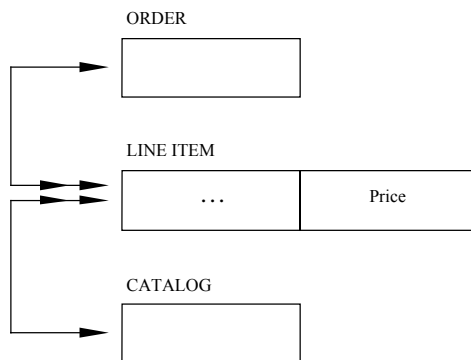
E

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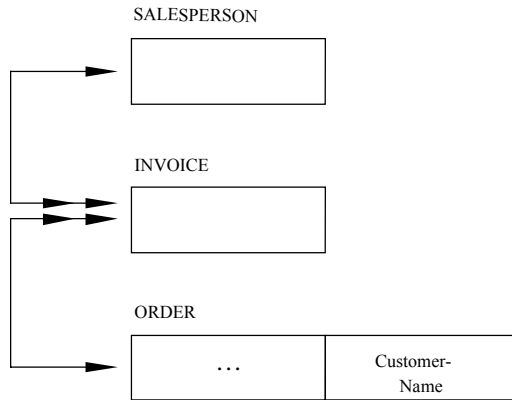
Data Model



Pricing Model



Sales & Order Management



Catalog

CATALOG

<u>Item #</u>	Supplier	Description	Quantity-on-Hand	Cost
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