

# Systems Analysis and Design

## 3 Methodologies

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We look at two popular methodologies.

### 3.1 Methodology

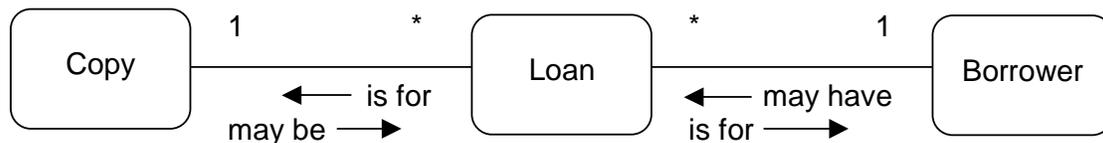
A methodology is a systematic way of conducting systems analysis and design. Commonly used methodologies include:

- structured systems analysis and design (SSADM) and
- object oriented systems analysis and design (OOA and D).

### 3.2 Structured Systems Analysis and Design

SSADM focuses on data. Methods used in SSADM include:

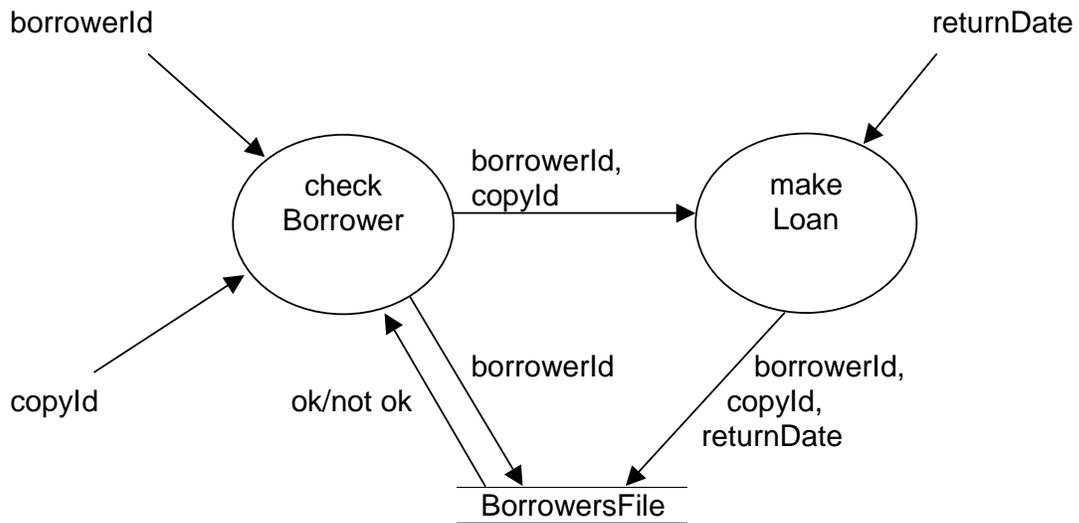
- **Logical Data Modelling** - we look at the items (known as entities) about which we need to record information, and the connections between these entities.



Logical Data Structure Diagram. A Loan is for one Borrower and one Copy. A Borrower may have many Loans in his or her lifetime. A Copy may be loaned many times in its lifetime.

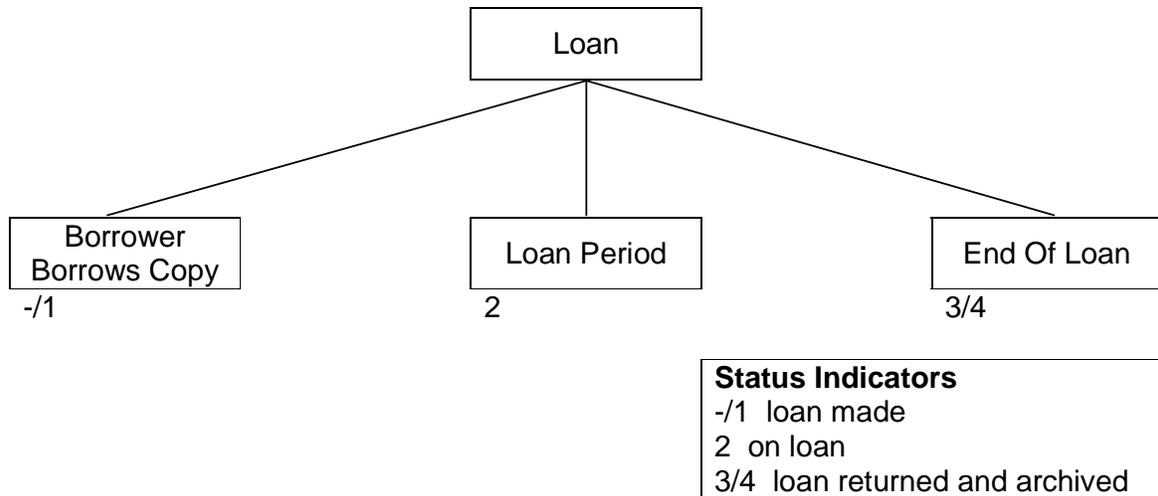
A logical data structure diagram is also known as an entity relationship diagram.

- **Data Flow Modelling** - we look at the flow of data as it passes between processes, into and out of files and into and out of the system.



Data flow Diagram for the Loan Process. The borrowerId and the copyId are entered. A check is made to see whether the borrower with the given id is current and has not reached their borrowing limit by looking at their record in the BorrowersFile. If the report is ok the borrowerId and the copyId are then passed to the makeLoan process. The return date is input and the borrowers record is updated with the copyId and the returnDate.

- **Entity Behaviour Modelling** - we look at the events that affect each entity and the sequence in which these events occur



Entity Life History Diagram. A loan is created when a member borrows a copy and dies when the copy is returned. When the loan is created, the copyId and returnDate is tied in with the borrower's record. When the loan is discharged a return indicator is tied in with the borrower's record and the loan dies.

### 3.3 Object Oriented Analysis and Design

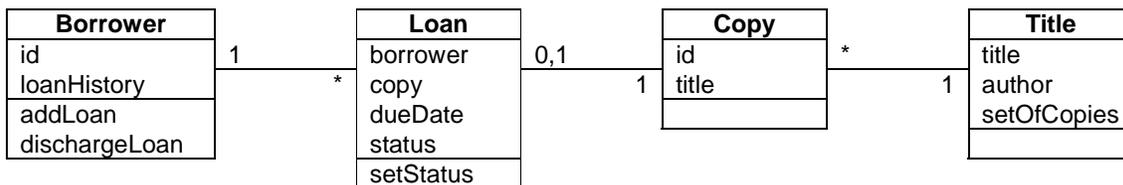
OOA and D focuses on responsibilities, the operations that act on the data.

The Unified Modelling Language (UML) is a notation used for OOA (WHAT a system is to do and OOD (HOW a system is to do it). Methods used include:

- **Use Cases** - describes the interaction between the user and the system. Exceptions deal with the error cases.

<p><b>Use Case:</b> Loan</p> <p><b>Goal:</b> to record the loan of a copy to a borrower</p> <p><b>Main Success Scenario</b></p> <ol style="list-style-type: none"> <li>1 librarian enters borrower id</li> <li>2 system retrieves borrower record</li> <li>3 librarian enters copy id</li> <li>4 system adds copy id and return date to borrowers record</li> <li>5 exit success</li> </ol> <p><b>Exceptions</b></p> <ol style="list-style-type: none"> <li>2a borrower record not found             <ol style="list-style-type: none"> <li>2a1 exit failure</li> </ol> </li> <li>2b borrower loan limit reached             <ol style="list-style-type: none"> <li>2b1 exit failure</li> </ol> </li> </ol>
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- **Class Diagrams** - describe the interaction between objects.



A Borrower has zero, one or many Loans. A Loan is for just one Borrower and one Copy. a Copy may, or may not, be Loaned. A Copy has just one title. But a title may have zero, one or many Copies.

A Borrower has the responsibility of adding a Loan to its loanHistory, and discharging a Loan. A Loan is discharged when the Copy it refers to is returned. When a Copy is returned its status is changed from "on loan" to "returned".

<p><b>Borrower</b></p> <p>id</p> <p>loanHistory</p> <p>addLoan</p> <p>dischargeLoan</p>	<p>the name of the class. All objects of this class have the same operations attributes, what an object has. A Borrower has an id and a loanHistory</p> <p>operations, update and report on values stored in attributes. addLoan adds a new Loan to the loanHistory. dischargeLoan updates a Loan in loanHistory</p>
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## **Bibliography**

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[http://en.wikipedia.org/wiki/Object-oriented\\_analysis\\_and\\_design](http://en.wikipedia.org/wiki/Object-oriented_analysis_and_design) accessed 11 Dec 2007