

## About Innomantra

Innomantra provides end-to-end solutions for clients focused on building a competitive position through innovation. We assist our clients in nurturing product innovations and intellectual property in a systematic and effective manner.

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# Innomatics™

Information Technology

Product, Process and Business Innovation

# 1

## ELIMINATE

- Can a harmful or non-beneficial component be eliminated?
- Can a useful component be eliminated?

### Subtractive Design

Subtractive design is the process of eliminating unnecessary parts in order to strengthen the core elements. The Google Chrome browser eliminated several extraneous components on other browsers like the menu bar and the search button.

### Elimination of "GO TO" statement

Edsger Dijkstra's 1968 article "Go To Statement Considered Harmful" advocated the structured programming approach where programs could be created using a limited set of instructions, eliminating the need for the "goto" statement.

### The Dell Business Model

Dell revolutionized the PC market by eliminating intermediaries like retailers and distributors and selling directly to the customer.



**Michael Dell**  
founded Dell Inc. in 1984.

# 2

## COMBINE

- Can multiple functions be combined and performed by a single component?
- Can a process involving a series of steps be simplified by combination?

### Pareto Principle in Design

The 80/20 rule can be used for simplifying processes by combining a series of the most common steps into a single step. The use of “shortcuts” enables users to quickly access common functions that would otherwise involve several steps.

### Hardware Devices

The USB (Universal Serial Bus) standard enables computer peripherals to communicate as well as supply electric power. Touch screen displays combine both input and output functions.

### The World Wide Web

Tim Berners-Lee developed a new approach for implementing a distributed hypertext system by combining a simple client-server protocol, markup language, and addressing scheme.



**Tim Berners-Lee**

invented the World Wide Web in 1990 while at the CERN in Geneva.

# 3

## SEPARATE

- Can a component be physically or logically separated from the main body?
- Can multiple functions of one component be separated?

### Distributed Software Development

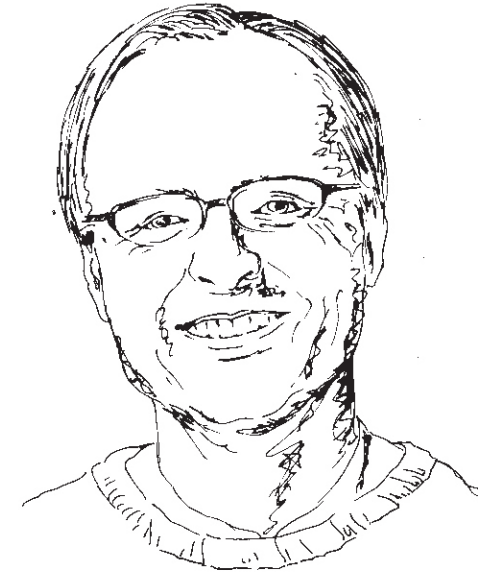
Communication technology now allows developers to work remotely in small offices and at homes.

### Separation of Concern Principle

This involves separating a program into distinct features that do not overlap in functionality. The Model-View-Controller (MVC) is a software engineering architectural pattern that separates the domain logic from the user interface. The MVC implementation in the Smalltalk programming language inspired several later GUI frameworks.

### Separation of Content and Style

CSS (Cascading Style Sheets) was designed to separate the document content (written in HTML) from the document presentation elements like layouts, fonts and colors.



**Håkon Wium Lie**  
proposed the concept of CSS in 1994.

# 4 COPY

- Can a functional component be taken a copied in a different way?
- Can the function of one component be copied into another?

## Improving Safety in Design

Examples of copying a functional component to improve safety and security include confirmation dialogs, Dual authentication, and redundancy techniques like N-version programming, and RAID technology.

## Pair Programming

The Extreme Programming technique of using two programmers on one workstation has been shown to produce 15% fewer bugs.

## Creating Virtual Copies

An Emulator is a program that copies the functions of a computer system into a different system. It is widely used in the development and testing of mobile applications.

## Multi-tab Interface

The NeWS (Network extensible Window System) co-authored by James Gosling pioneered the use of multi-tab windows in 1988.



**James Gosling,**  
father of the Java Language.

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## SEGMENT

- Can a component be segmented or made modular?
- Can a function be segmented?

### Packet-switching

Packaging data into relatively small units of data called “packets” formed the foundation for the design of ARPANET and forms the fundamental basis of the Internet.

### Pseudo Code Machine

In the BPCL programming language, developed by Martin Richards in 1966, the compiler was split into two parts. The code is first translated into an intermediate pseudo code and then into the machine code. The Java Programming Language is based on this approach.

### Timesharing

In 1957, John McCarthy at Stanford University proposed time-sharing operating systems where multiple users could concurrently use a single computer.

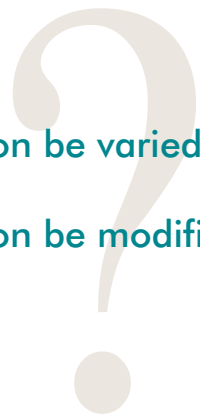


**John McCarthy**

coined the term Artificial Intelligence, and invented the Lisp programming language.

# 6

## VARY



- Can a function be varied based on input?
- Can a function be modified by a user?

### Font Generation Algorithms

In 1978, Peter Karow developed Ikarus, the first program with algorithms that allow users to vary font size and type.

### Dynamic Web Ads

Google AdSense displays advertisements in the Google Network based on website content, user location and other factors.

### User Generated Functions

When it began in 2006, the microblogging site Twitter had virtually no features apart from the system to post 140 character messages. Features like hashtags and @replies were created by users.

### VisiCalc :The First Spreadsheet

VisiCalc allowed the user to change any cell and have the entire sheet automatically recalculated. It is credited with transforming the microcomputer from a hobbyist's gadget to a ubiquitous business tool.



**Dan Bricklin**  
co-created VisiCalc in 1979.

# 7

## INVERT

- Can a function be inverted for the same result?
- Can a top-down function be made bottom up?

### Inversion of Control Principle

Based on the “Hollywood Principle”, it is a design methodology where systems do not directly go and find other systems but are instead wired together by an external agent.

### Bottom-up Design

This approach of software design involves designing the lowest level modules first, and then progressing upward. Bottom up design often leads to code that is smaller and easier to re-use.

### User Generated Content (UGC)

Websites like Youtube demonstrates functional inversion where users generate and share content. Many mainstream media companies broadcast companies use UGCs on their programs. Wikipedia, the online encyclopaedia that 'anyone can edit' inverted several basic principles of traditional encyclopaedias.



**Jimmy Wales**

launched Wikipedia in 2001 along with Larry Sanger.

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## MAXIMIZE

- Can variability in a function be reduced to a high degree?
- Can a valued aspect of a function be maximized?

### Consistency Principle in UI Design

Highly consistent User Interface Design can help users reduce learning burden, mental effort and misuse. It also makes it easier for users to detect important differences.

### Specialised Software

Software applications intended for specific application tend to maximise on a few highly valued aspects of its functions.

### Oracle Database

In spite of the availability of several inexpensive databases, Oracle ensures that its product remains a popular choice for large enterprises by focusing on maximising highly valued functional aspects like consistency, reliability and service.



**Larry Ellison**

founded Software Development Laboratories (SDL) in 1977.  
It was renamed Oracle after its flagship product.

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## ADAPT

- Can functions be adapted based on unrelated systems?
- Can scientific or mathematical principles be used to modify functions?

### Metaphors in Design

Interface metaphors in software exploit the user's knowledge and experience in other domains. Xerox's Alto, developed in 1973, was the first to employ the "desktop" metaphor with the use of terms like document and folder.

### Adaptation from Bio-systems

Algorithms based on Swarm Intelligence like the Ant Colony Optimization (ACO) and Firefly Algorithm have been used in applications like Image processing and Data mining.

### PostScript & Bezier Curves

PostScript is known for its fly rasterization where everything is specified in terms of cubic Bézier curves and straight lines. Bézier curves were previously found only in CAD applications.



**John Warnock**

co-created PostScript in 1976 and later went on to found Adobe Systems along with Charles Geschke.

# 10 IMPORT

- 
- **Can an external function be imported onto the system?**
  - **Can a complementary function be imported?**

## **Information Tools**

Some of the informational tools that can be imported into existing software applications include tooltips, throbbers, status bars and toasts.

## **Desire Paths**

Adding desire paths help users understand the actions of previous users. Examples include in-site searches, Heat Maps, Click Paths, Analytics, Tagging and Ratings. Amazon's Customer Reviews help users gauge the popularity of the listed item by reviewing the feedback of customers who have bought the product.

## **Complementary Product or Services**

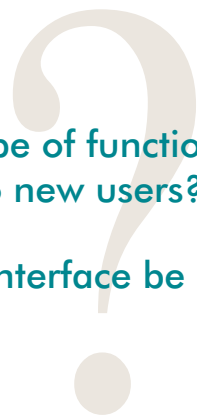
Amazon.com developed Kindle as a complementary product that would help strengthen its position among its existing customers.



**Jeff Bezos**  
founded Amazon.com in 1994.

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## MAGNIFY



- **Can the scope of functional system be magnified to new users?**
- **Can a new interface be provided?**

### Cloud Computing

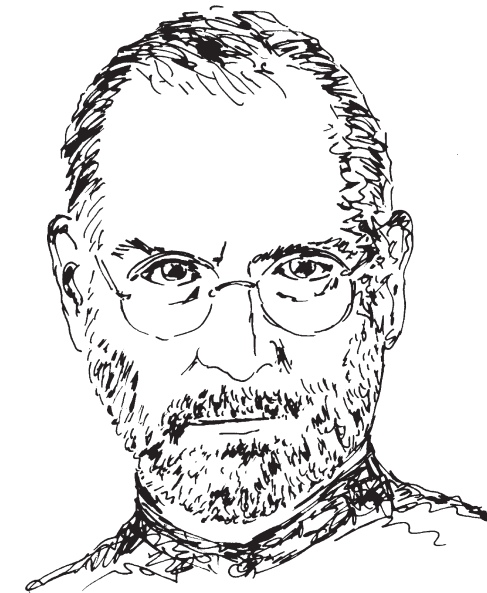
Cloud applications like Salesforce.com magnified the scope of existing enterprise software to new users like small businesses by offering Software as a Service (SaaS).

### NCSA Mosaic

Released in 1993, the Mosaic web browser popularized the World Wide Web by providing an easy-to-use interface for the general public. Most browsers today retain several features of the original Mosaic browser.

### Finding a Mass Market

Apple Computer's success largely lay in magnifying the scope of existing products. OS-X was Unix for the masses, MacOS introduced in 1984 was the first GUI for the mass market, and Newton aimed at putting a computer in everybody's pocket.



**Steve Jobs**

co-founded Apple computers in 1976  
along with Steve Wozniak and Ron Wayne.

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