


# AZAS DAN TEKNOLOGI INFORMASI MASA DEPAN

## Materi 2. The Principles of IT Development

**What we learn and what we do**

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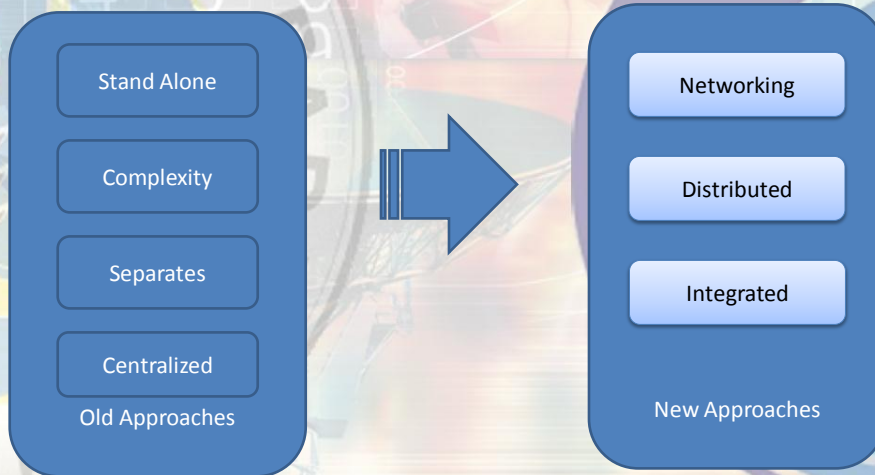
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## Our Topics

- The Shift of Technology
- The Art of Managing Complexity
- Abstraction System
- The Three Y's
- Seven Principles of Technology Development
- Human and Machine System Development
- Characteristic of Technology change
- One Key
- People, Activities, Contexts and Technologies

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## The Shift of Technology Approaches



## THE ART OF MANAGING COMPLEXITY

- One of the characteristics that separates an engineer or computer scientist from a layperson is a systematic approach to managing complexity.
- Modern digital systems are built from millions or billions of transistors
- No human being could understand these systems by writing equations describing the movement of electrons in each transistor and solving all of the equations simultaneously
- The critical technique for managing complexity is *abstraction*

# Abstraction System

Application Software	Programs	To solve of user problems
Operating Systems	Device Drivers	Managing low level detail
Architecture	Instructions Registers	Architecture from Programmer perspective
Micro-architecture	Datapaths Controllers	Logic and Architecture
Logic	Adders Memories	To Think
Digital Circuits	AND gates NOT gates	Represent "0" and "1"
Analog Circuits	Amplifiers Filters	Assembly to create component
Devices	Transistors Diodes	System Construction
Physics	Electrons	Electron quantum theory

- *abstraction*: hiding details when they are not important.
- A system can be viewed from many different levels of abstraction

## The Three -Y's

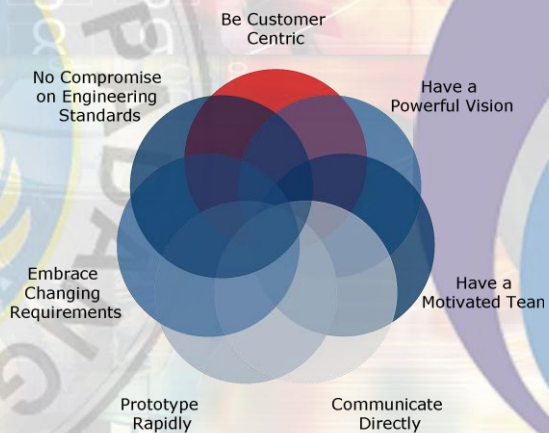
- In addition to abstraction and discipline, designers use the three "-y's" to manage complexity: hierarchy, modularity, and regularity.
- These principles apply to both software and hardware systems.



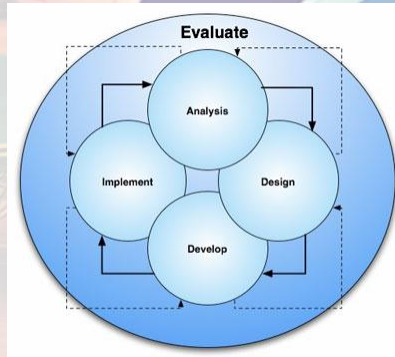
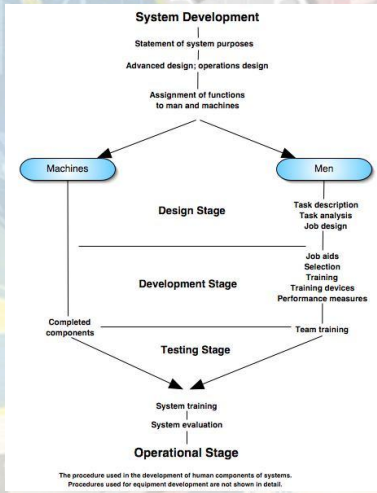
## The Three -Y's ...

The 3 Y	Describe
<i>Hierarchy</i>	involves dividing a system into modules, then further subdividing, each of these modules until the pieces are easy to understand.
<i>Modularity</i>	states that the modules have well-defined functions and interfaces, so that they connect together easily without unanticipated side effects.
<i>Regularity</i>	seeks uniformity among the modules. Common modules are reused many times, reducing the number of distinct modules that must be designed.

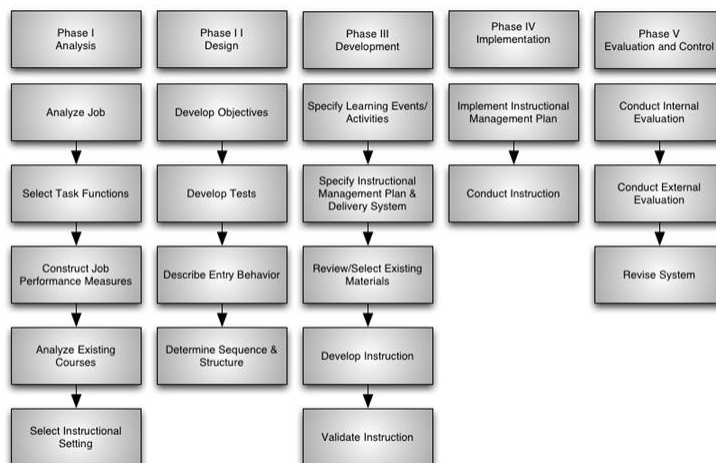
## Seven Principles of Technology Dev



# Human and Machine System Dev



# Development Model



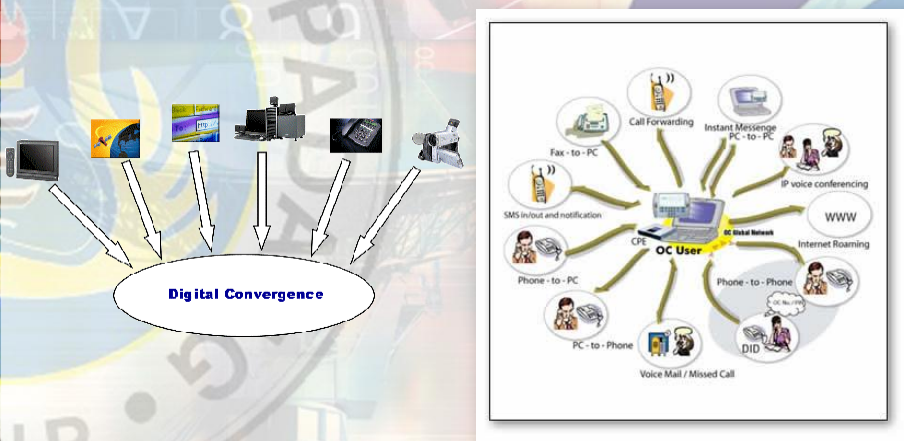
Florida State University Five Phases of ISD (1975)



## Characteristic

- Rapidly Change
  - Next 10 – 15 years technology is not inventing to day
  - We can't predict the future of technology accurately
- The used of high-tech (even for traditional state)
- Interdisipliner problems
  - Can't be solve with one way or one view

## One Key Word on Tech Dev





# The Change of World

Computer

Communication

Content

Entertainment

To Many Technology

➔

Digital Broadcasting

Internet

Mobile Device

The World Change

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# People, Activities, Contexts and Technologies

Requirements

Opportunities

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