

ch - 1<sup>st</sup>

## Software Characteristics

1. S/W is dev. or engineered (not manufactured)
2. S/W doesn't wear out
3. industry → component-based assembly.  
most S/W → custom-built.

## Software Application

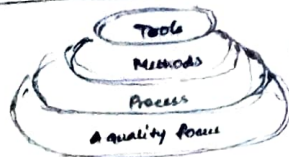
- ↳ sys. S/W
- ↳ Real-time S/W
- ↳ Business S/W
- ↳ Engineering & Scientific S/W
- ↳ Embedded S/W
- ↳ Personal comp. S/W
- ↳ web-based S/W
- ↳ AI S/W

## SW: Crisis on Horizon?

- ↳ "The most likely way for world to be destroyed is by accident. That's where we come in... we comp. professionals cause accident."

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## Process, Methods, tools

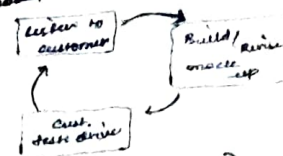


SW engineering layers

## SW Process Models

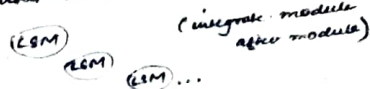
- ① ↳ Linear seq. Model (waterfall)  
Analysis → Design → Code → Test → LSM

- ② ↳ Prototyping model

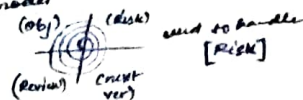


- ③ ↳ RAD model (Rapid Application Dev)  
[20-30 days] with 1+ teams.

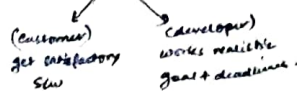
- ④ ↳ Incremental model



- ⑤ ↳ Spiral model



- ⑥ ↳ WINWIN Spiral model



- ⑦ ↳ Concurrent model  
(if work less review & dev.)

## Process maturity levels are defined →

- Level 1. Initial
- Level 2. Repeatable
- Level 3. Defined
- Level 4. Managed
- Level 5. Optimized

## Each KPA (Key process area) is described by identifying →

- (i) Goals
- (ii) Commitment
- (iii) Abilities
- (iv) Activities
- (v) Methods for monitoring implementation
- (vi) Method "verifying"

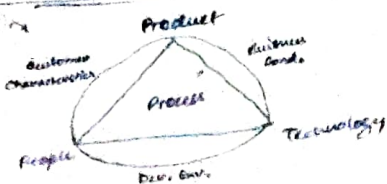
## Maturity under KPA →

- ↳ Process maturity lvl 2 → 5

- SW config. management
- SW quality assurance
- SW - doc -

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## Measures, Metrics & Indicators

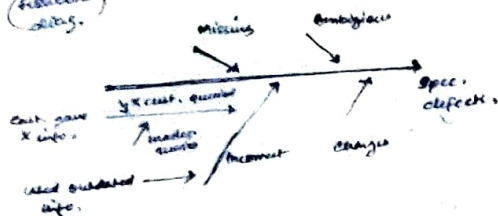


## Failure Analysis

1. All errors/defects categorized by origin.
2. cost to correct error/defect recorded.
3. No. of error/defect in each category counted/recorded.
4. overall cost in each category → computed.
5. Resultant → highest cost to org.
6. Eliminate this (try).

Failure Found	
By dev	SW dev
4 (Errors)	My cost (Effects)

(Failure analysis)



→ SSPI (Statistical SW process improvement)

① Failure Analysis → use SW failure analysis to collect info. about all errors/defects.

→ Project metrics is 2 fold...

- ① metrics used to dev. schedule.
- ② metrics used to assess prod. quality

→ SW Measurements

- ① No. of user I/p → 50
- ② No. of user O/p → 40
- ③ No. of user Inquiries → 35
- ④ No. of files → 66
- ⑤ No. of external I/f → 04

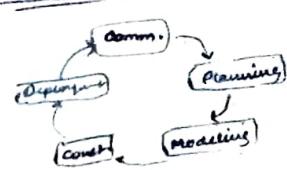
[Fix Point Analysis]

Fix point value?

→ NTK specify → take that  
 else → Avg  
 4 x 4  
 4 x 5  
 4 x 4  
 4 x 10  
 4 x 7  
 AP count.  
 $\sum (A_i)$

Sample	Avg	Complex
3	4	5
4	5	7
3	4	6
7	10	15
5	7	10

→ SDLE (SW dev. life cycle)



→ Extended fix point

index = I + O + Q + E + T + R. → 3D fix point.

(2 dimensions) → Cent.  
 data → Fix

computing weighted value =  $N_{i1}W_{i1} + N_{i2}W_{i2} + N_{i3}W_{i3}$   
 no. of occurrence of element → corresponding weight.

→ Metrics for SW quality

defect removal efficiency (DRE) =  $\frac{E}{E+D}$   
 E → no. of errors  
 D → no. of defects.  
 (ideal value = 1) → no defect!

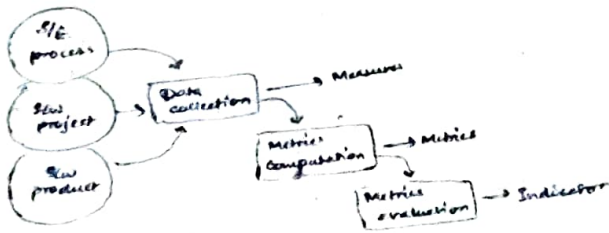
→ Measuring Quality

- Correctness
- Maintainability
- Integrity
- usability

→ Establishing SW metric prog.

1. Identify your business goals
2. Identify what you want to learn/learn
3. your subgoals
4. the entities & attributes related to subgoals
5. X

→ SW metrics collection process



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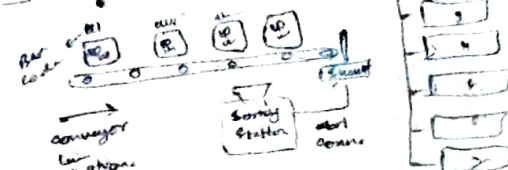
→ SW Scope

- 1st Set of context from R.
- ↳ Who is involved req?
- ↳ Who will use soft?
- ↳ economic benefit?
- ↳ source of soft?

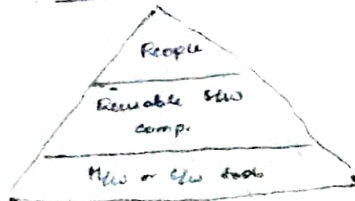
Break the ice  
 1st Questions  
 2nd Set → Metrics

Facilitated Appl. Spec. Techniques

→ CSS (Conveyor line sorting sys)

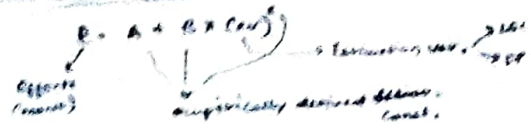


→ Resource

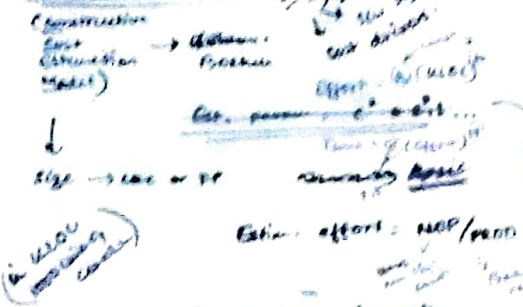


- "fuzzy logic" sizing.
- Function point sizing
- Set comp. sizing
- design sizing.

→ Structure of Est. models



### COCOMO Model



### Flow Eqn

$$E = (1.48 \times \frac{1}{P})^2 \times \left[ \frac{1}{P} \right]$$

Effort      Productivity      Duration



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#### Flow Sizing

- PM's Risk
- Technical Risk
- Business "
- Market "
- Schedule "

#### Flow Force Approach

- Performance Risk
- Cost "
- Support "
- Schedule "



#### Risk Mitigation

Risk mitigation, monitoring & management plan.  
(Accid, monitor, manage & plan)

#### Assessing Risk Impact

- Risk Identification
- Risk Probability
- Risk Impact
- Risk Exposure

#### Risk requirement gen. cond.

1. executable comp. & 3rd party
2. design std. iffy & solid
3. lang. not supported → changed env.

### ch-7

#### Complexity SFC

- when higher deadline
- complexity is defined
- as new deadline.

#### Degree of Rigor

- casual
- structured
- strict
- Quick Repeat.

#### Scheduling

- PERT (Prog. evaluation & review tech.)
- CPM (critical path method)

