
Software Maintenance

CS580 Advanced Software Engineering

<http://cs580.yusun.io>

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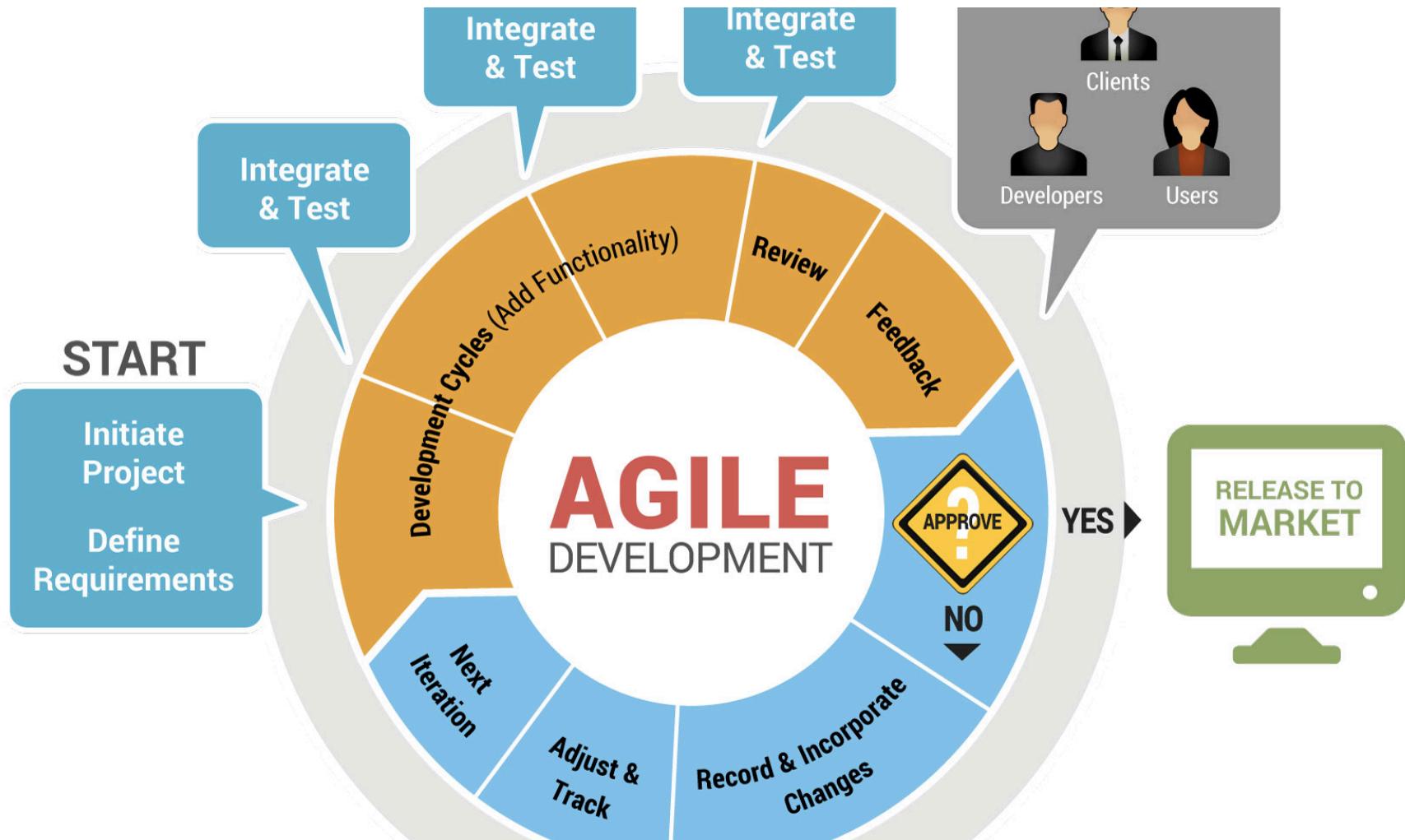
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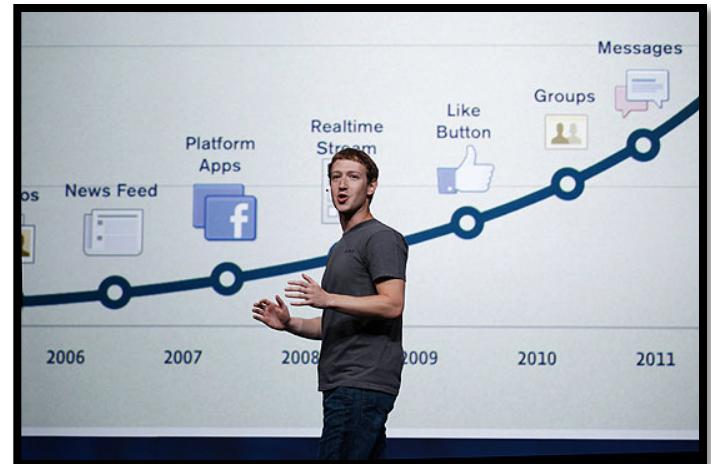


CAL POLY POMONA

Agile Development



Release is NOT the End



Maintenance

- Monitoring



- Bug Fixes



- Optimization



- New Features



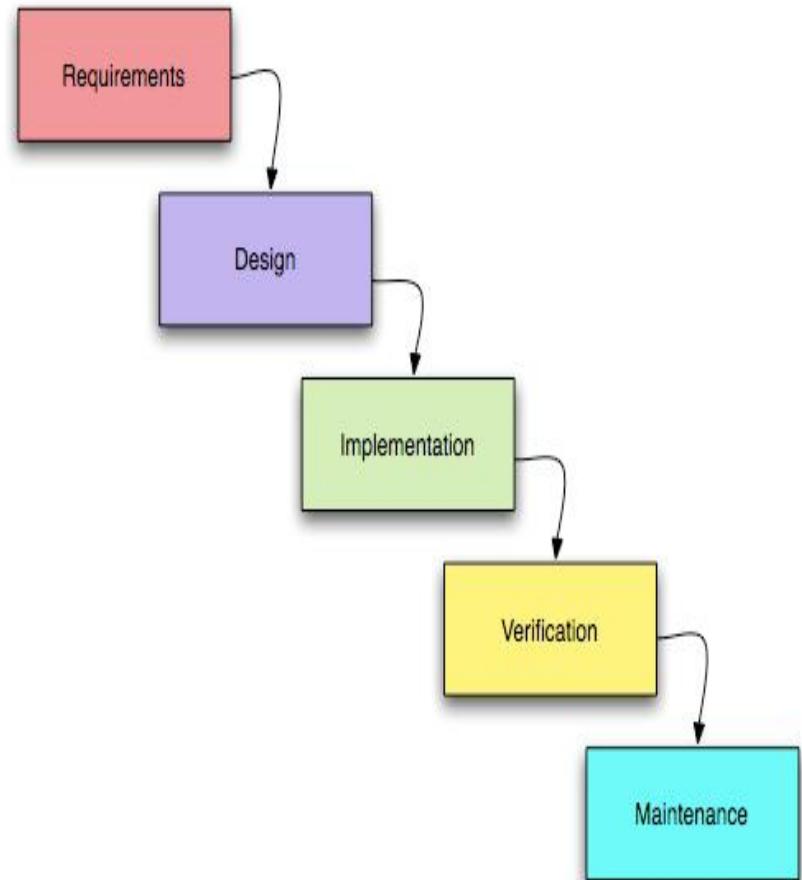
What is Maintenance?

- ◆ The act of keeping, or the expenditure required to keep, an asset in condition to perform efficiently the service for which it is used
- ◆ The modification of a product, after delivery,
 - ◆ to correct faults
 - ◆ to improve performance or other attributes
 - ◆ or to adapt the product to a changed environment



Types of Maintenance

- ◆ Corrective
- ◆ Adaptive
- ◆ Preventive
- ◆ Perfective



Corrective Maintenance

- ◆ Reactive modification of a software product performed after delivery to correct discovered problems
- ◆ Response to malfunctions



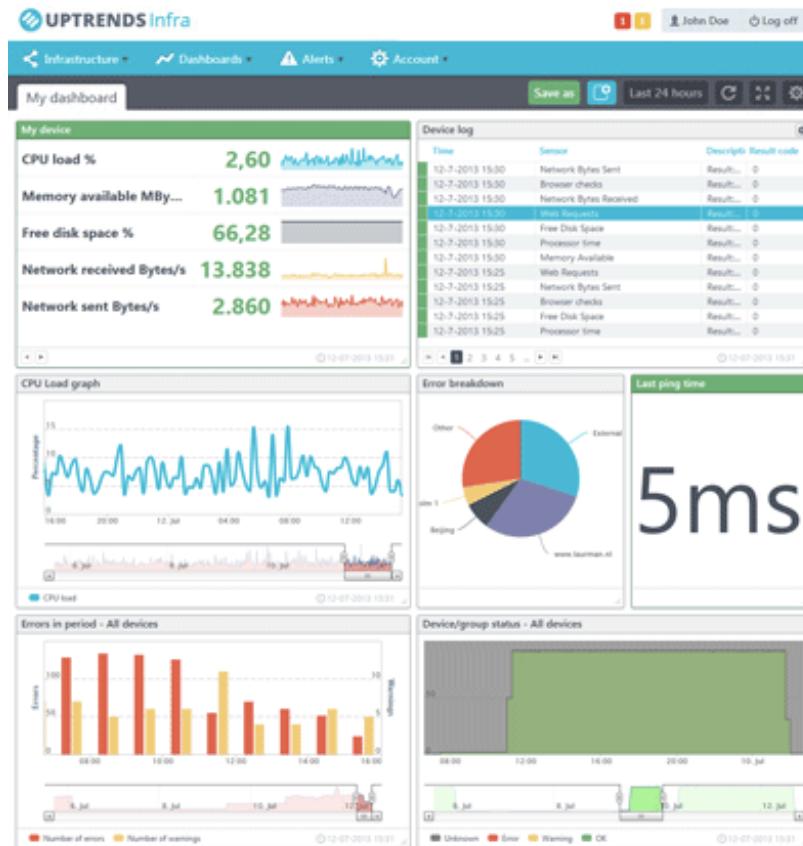
Adaptive Maintenance

- ◆ Modification of a software product performed after delivery to keep a software product usable in a changed or changing environment.



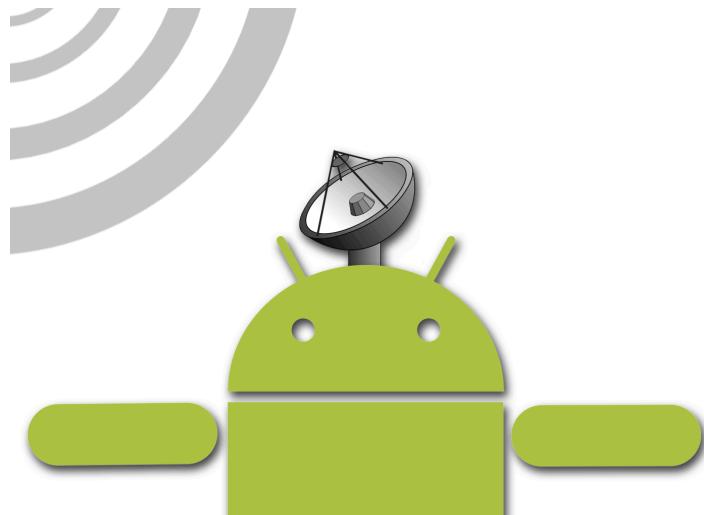
Preventive Maintenance

- ◆ Modification of a software product after delivery to detect and correct latent faults in the software product before they become effective faults.



Perfective Maintenance

- ◆ Modification of a software product after delivery to improve performance or maintainability



FEED ME!



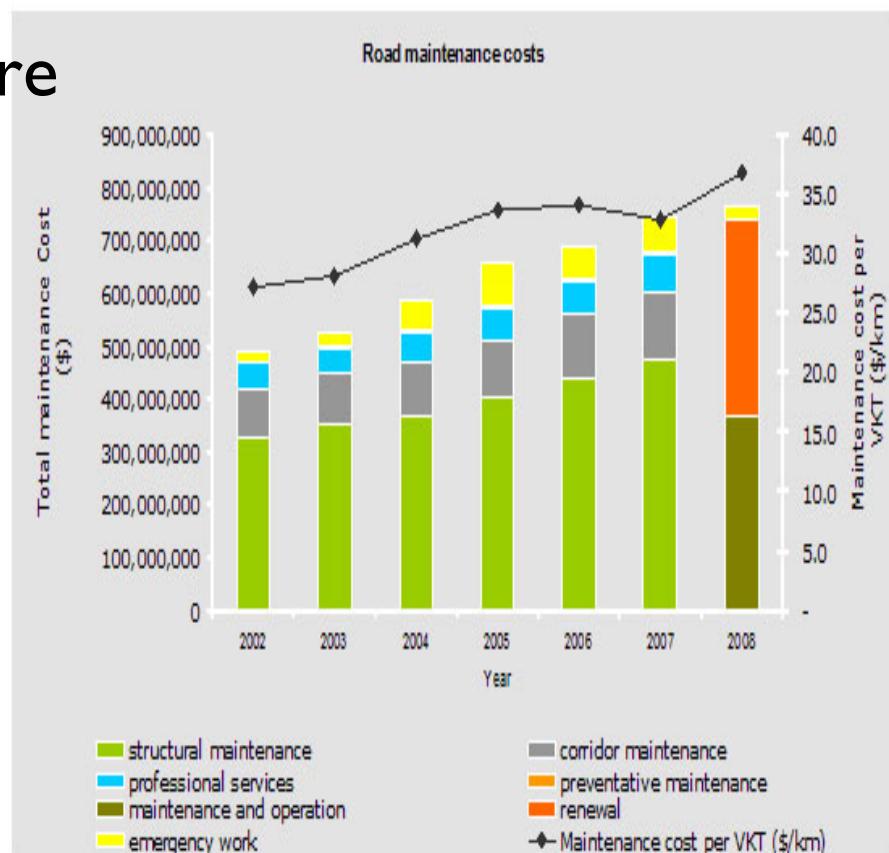
Maintenance Costs

- ◆ Maintenance costs are usually greater than development costs by a factor of 2 to 100
 - ◆ A deployed system is expensive to change
 - ◆ High cost of breaking an already working system
 - ◆ Maintenance costs increase over time as the system evolves
- ◆ Reasons
 - ◆ Maintenance changes, degrades the original system structure
 - ◆ Aging software results in high support costs



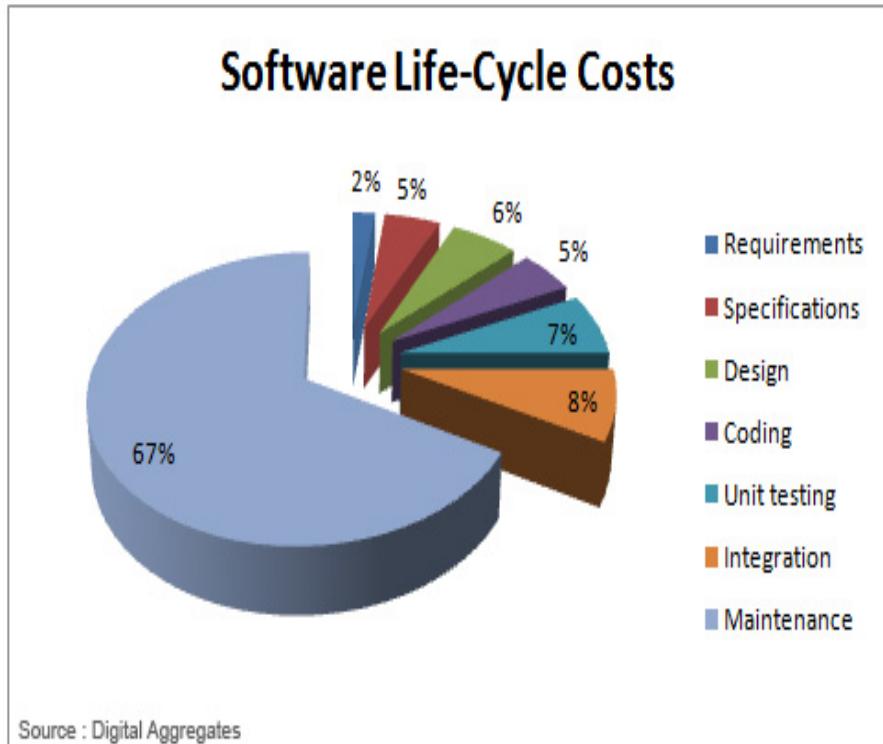
Maintenance Cost Factors

- ◆ Team stability
- ◆ Contractual responsibility
- ◆ Staff skills
- ◆ Program age and structure

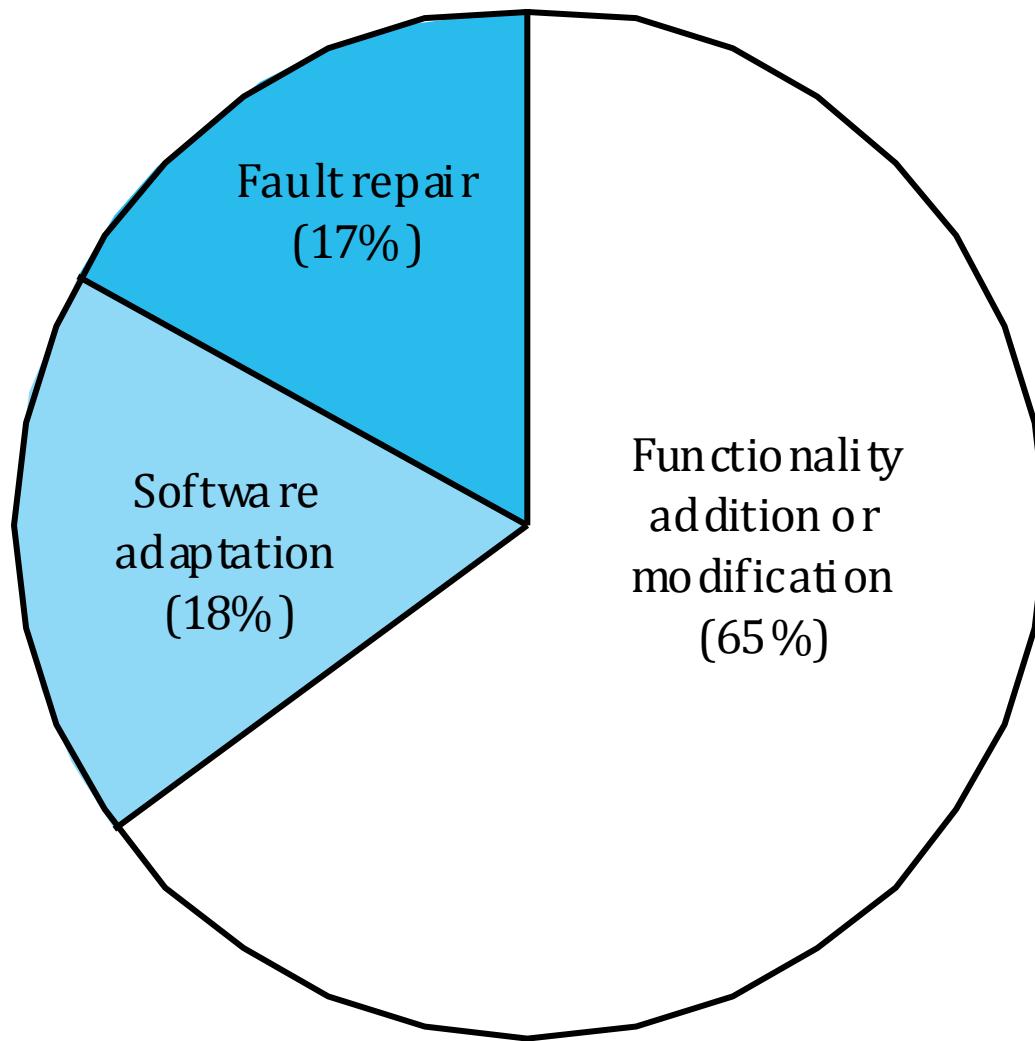


Strategies to Reduce Maintenance Costs

- ◆ Review basic operations (code review, unit tests)
- ◆ Conduct physical analysis (monitoring)
- ◆ Adopt an analytical approach (performance review)
- ◆ Correct slight defects in parts and jigs (refactoring, bug fixes)
- ◆ Ensure basic equipment conditions are maintained (system clean up)



Distribution of Maintenance Effort



Maintenance Problems

- ◆ Someone else's program
- ◆ Developer not available
- ◆ Proper documentation doesn't exist
- ◆ Not designed for change
- ◆ Maintenance activity not highly regarded

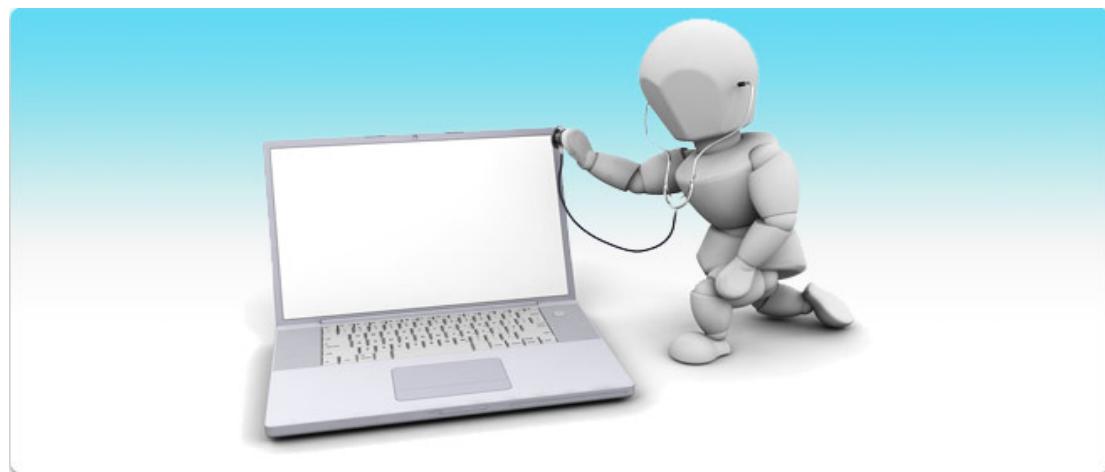


The Rewards of Maintenance

- ◆ Maintenance is a thankless task in every way
- ◆ Maintainers deal with dissatisfied users
- ◆ If the user were happy, the product would not need maintenance
- ◆ The user's problems are often caused by the individuals who developed the product, not the maintainer
 - ◆ The code itself may be badly written
 - ◆ Post delivery maintenance is despised by many software developers

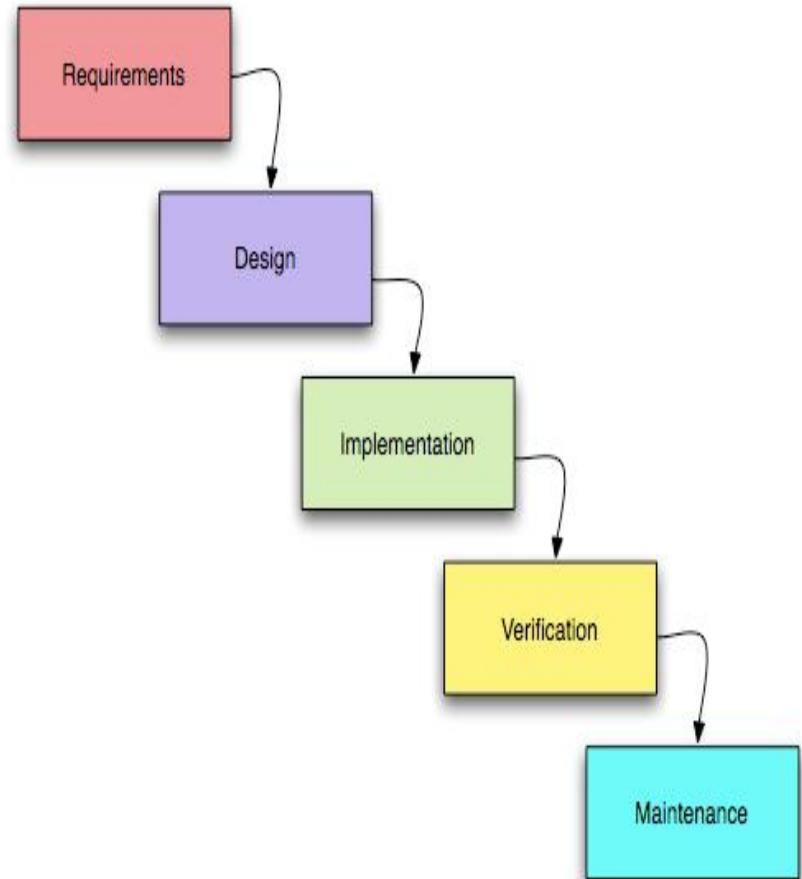
The Rewards of Maintenance

- ◆ Unless good maintenance service is provided, the client will take future development business elsewhere
- ◆ Post delivery maintenance is the most challenging aspect of software production - and the most thankless
- ◆ The user frequently does not understand that maintenance can be difficult, or impossible for some requests



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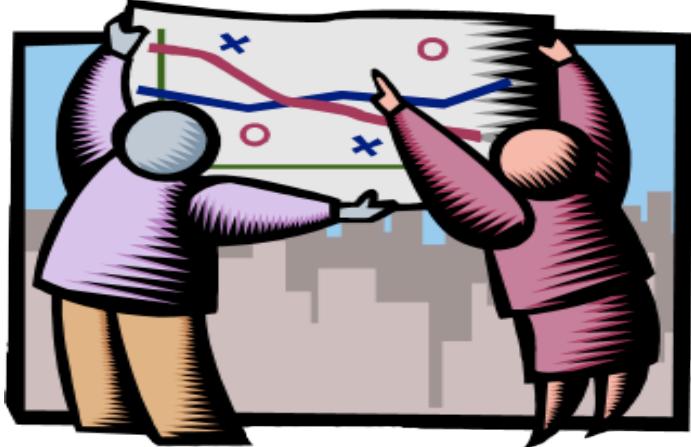


Best Maintenance Practices

■ Loggings

Date	Time	Remote Site	Filename	Description
1/05/2004	11:59:00	PimaSoft dB Server	Data.zip	Wildcard Expanded - 2 files
1/05/2004	11:59:06	PimaSoft dB Server	Data 20031015...	Uploaded [00:00:05] 256,771 bytes
1/05/2004	11:59:11	PimaSoft dB Server	Data 20031224...	Uploaded [00:00:05] 250,036 bytes
1/05/2004	12:02:58	PimaSoft dB Server	32hpore.exe	Downloaded [00:00:27] 2,307,176 bytes
1/05/2004	12:03:24	PimaSoft dB Server	32hpore.zip	Downloaded [00:00:25] 2,210,260 bytes
1/05/2004	12:03:49	PimaSoft dB Server	32hpore_reg.zip	Downloaded [00:00:24] 2,208,033 bytes
1/05/2004	12:04:20	PimaSoft dB Server	32hpore.exe	Downloaded [00:00:30] 2,736,351 bytes
1/05/2004	12:04:49	PimaSoft dB Server	32hpiper.zip	Downloaded [00:00:28] 2,637,460 bytes
1/05/2004	12:05:19	PimaSoft dB Server	32hpiper_reg.zip	Downloaded [00:00:30] 2,635,275 bytes
1/05/2004	12:05:44	PimaSoft dB Server	32hpip.exe	Downloaded [00:00:24] 2,232,543 bytes
1/05/2004	12:06:10	PimaSoft dB Server	32hpip.zip	Downloaded [00:00:25] 2,136,252 bytes
1/05/2004	12:06:42	PimaSoft dB Server	32hpip_reg.zip	Downloaded [00:00:30] 2,134,034 bytes
1/05/2004	12:07:13	PimaSoft dB Server	32pprem_reg1.zip	Downloaded [00:00:30] 1,415,752 bytes
1/05/2004	12:07:23	PimaSoft dB Server	32pprem_reg2.zip	Downloaded [00:00:09] 792,923 bytes
1/05/2004	13:36:47	PimaSoft ServerPath	ltp_service.htm	Uploaded [00:00:02] 16,064 bytes
1/05/2004	13:36:49	PimaSoft ServerPath	32hpore.htm	Uploaded [00:00:01] 15,978 bytes
1/05/2004	13:36:50	PimaSoft ServerPath	32hpore.htm	Uploaded [00:00:01] 14,283 bytes
1/05/2004	13:36:52	PimaSoft ServerPath	ltp_service_buy.htm	Uploaded [00:00:01] 12,325 bytes
1/05/2004	13:36:53	PimaSoft ServerPath	32ppipe_buy.htm	Uploaded [00:00:01] 12,405 bytes
1/05/2004	13:36:55	PimaSoft ServerPath	32hpore_buy.htm	Uploaded [00:00:01] 12,384 bytes

■ Monitoring & Alarms



■ Reporting & Notification

