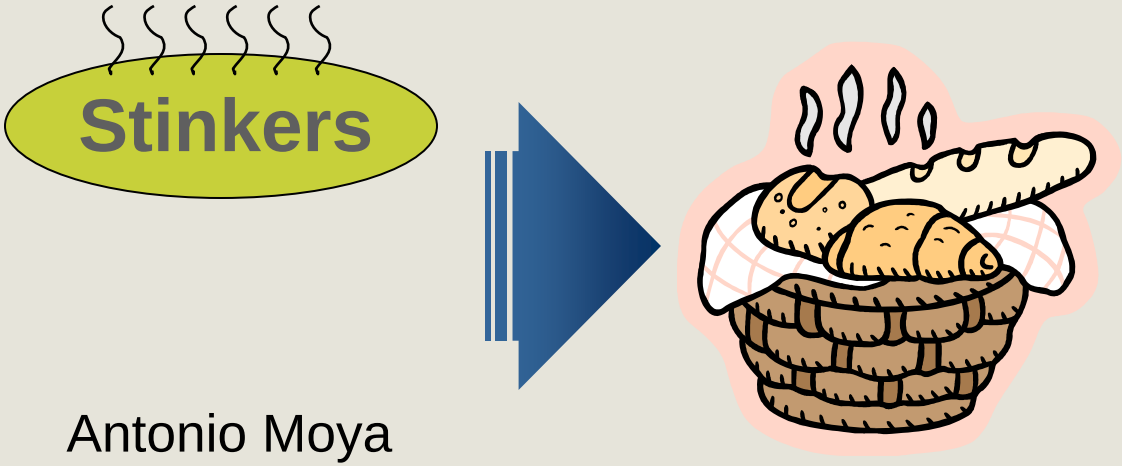
Identification and Control of Potential



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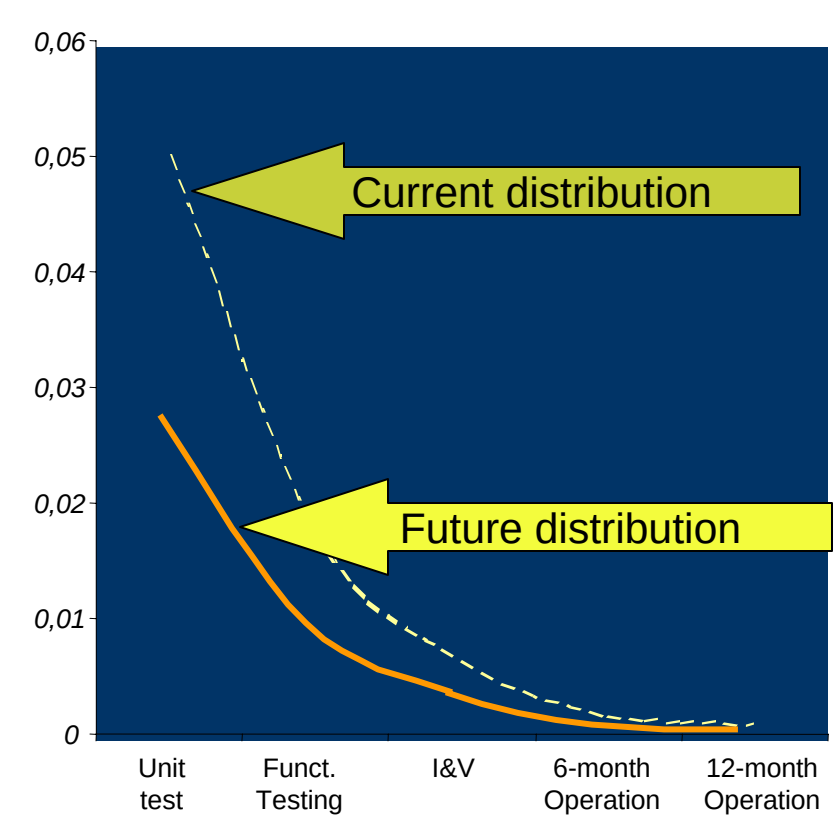
How to improve the organization's performance?



- It is not possible to change drastically by just doing the current things better
- It we want to change the organization's capability, we have to introduce in the process a mechanism that avoids from injecting faults and bugs during design

➔ **Stinker Analysis**

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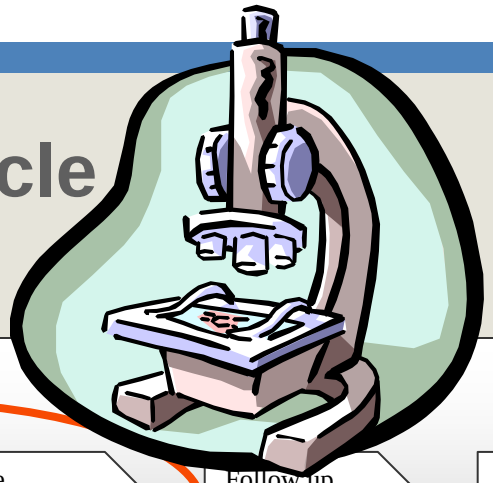
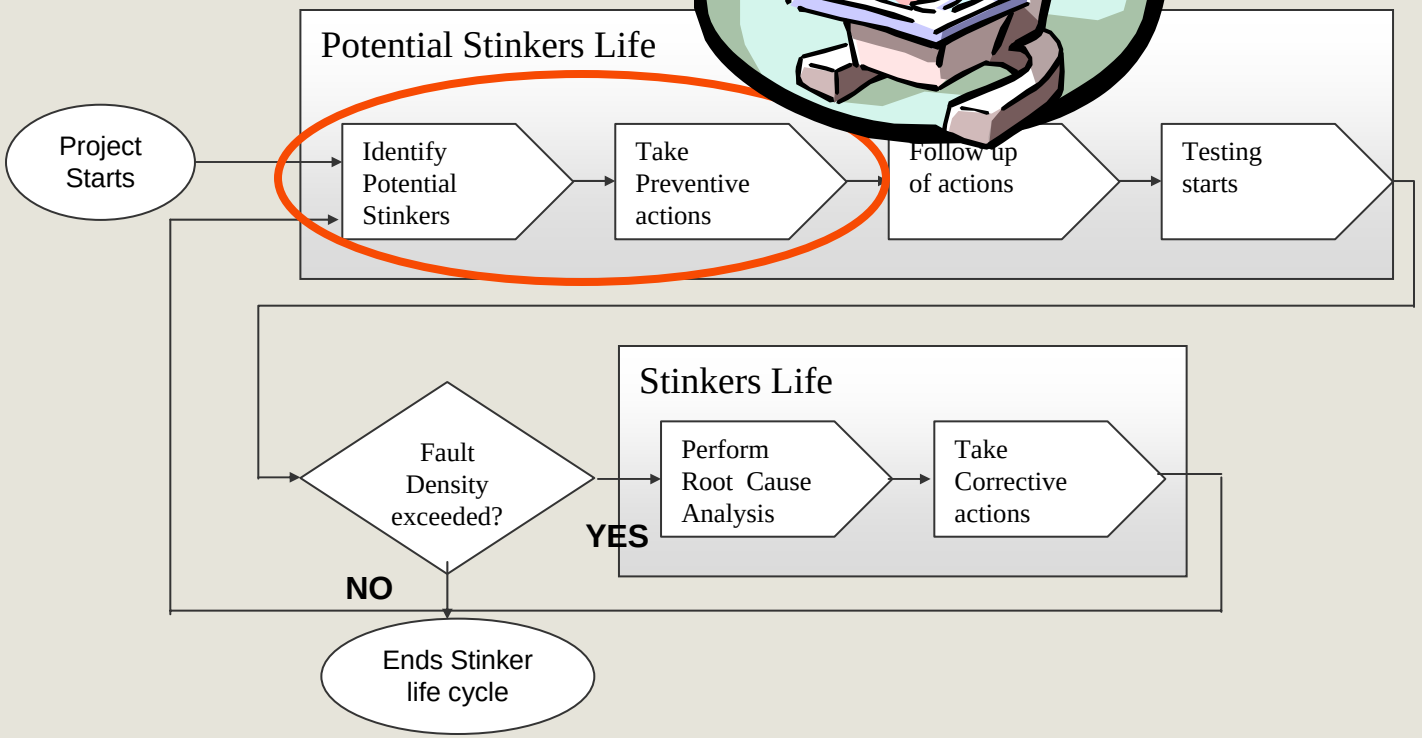
Stinker Management Cycle





A product is considered stinker when its fault density or number of faults or bugs has exceeded the limits defined by the product responsible

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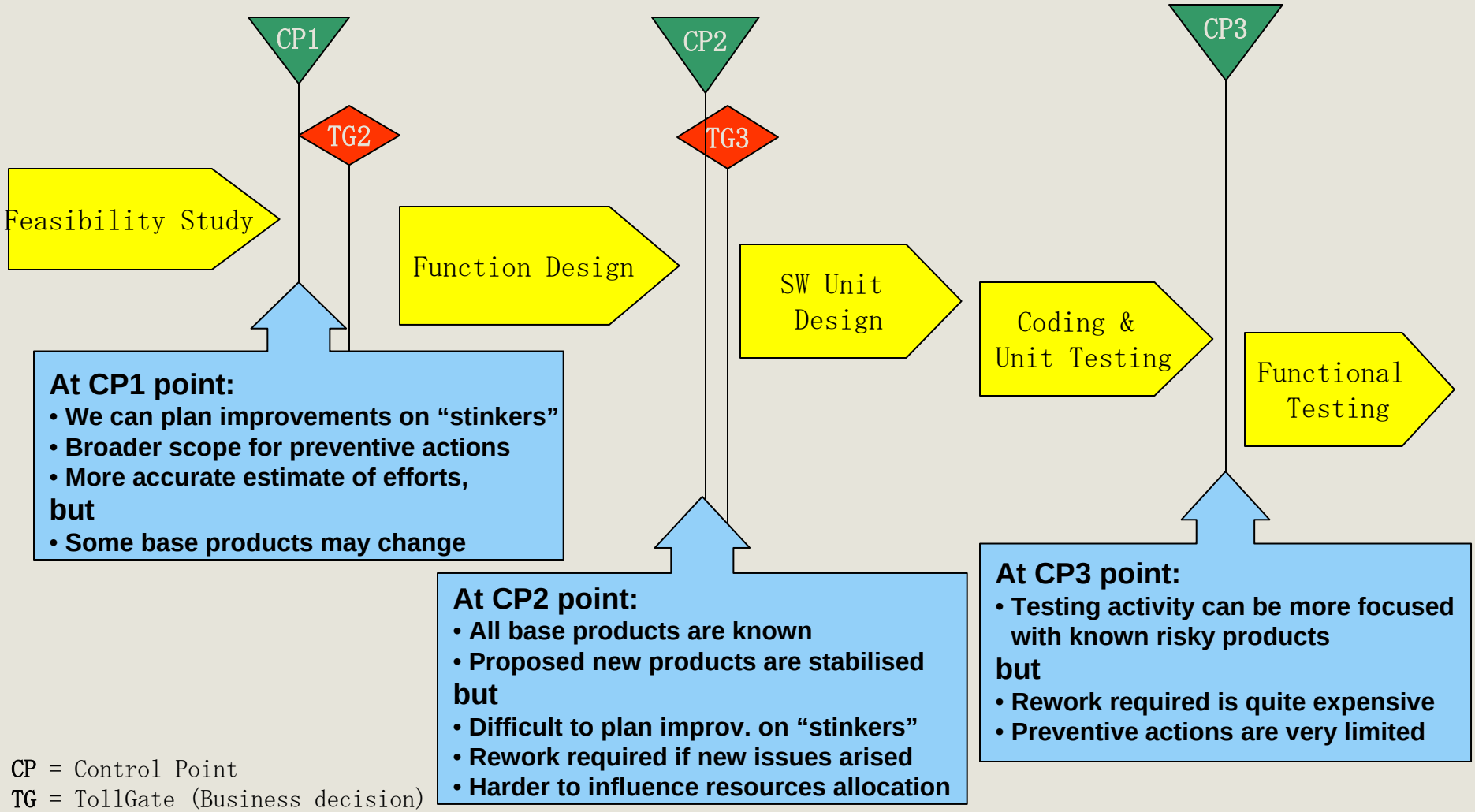
When to Perform the Analysis?



CP = Control Point
TG = TollGate (Business decision)

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The factors and attributes (1)

The model is based on the analysis of different factors and their attributes:

1a) BASE PRODUCT **(Generic Attributes)**

- *Is the based product released?*
- *How critical is the amount of pending faults or bugs to be solved in SW in the project?*
- *Is the **base product a known stinker?***
- *Is the base product in operation?*
- *Is the SW unit behaving differently depending on the markets?*

1b) BASE PRODUCT (**Platform dependant attributes)**

- ***What is the size of the SW unit?***
- *Are there any Approved Corrections on the base product?*
- *Was the SW unit released as a correction CNI?*
- ***Average Complexity level of the SW unit?***
- *Are there any application dependant parameter?*
- *Does the Block contain market specific functionality not parameter driven?*

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The factors and attributes (2)

The model is based on the analysis of different factors and their attributes:

2a) DESIGN COMPLEXITY **(generic attributes)**

- *Is the product to be designed from scratch?*
- *What are the impacts on the base product in terms of effort?*
- ***Are the efforts and leadtime feasible?***
- *Will there be major rework on product documentation?*
- *Judge the impact in terms of complexity*
- *Are interworking products being changed as to impact this product?*
- *How and where the impacts above are going to be implemented?*
- *Is the input to design stable and unambiguous?*
- *Have process exemptions be approved?*
- *Have change requests been granted for this product?*
- *Is the product containing more than one function?*

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The factors and attributes (3)

The model is based on the analysis of different factors and their attributes:

2b) DESIGN COMPLEXITY (**Platform dependant Attributes)**

- *Is the SW unit a traffic unit?*
- *Is the product involved in several main function?*
- *Does the SW unit handle alarms?*
- *Does the SW unit handle command?*
- *Are the command complex –parameters, options?*
- *Does the SW unit handle files?*
- *Is the SW unit adapted to nonblocking function?*
- *Which signal does the SW unit handle?*
- *Can emulator or SFT test the functioanlity completely?*
- *Will the function test be performed with Background Traffic?*
- *Will the SW unit be fully tested in the main build?*
- *Does the new design involve subscription to any standard mechanism?*
- *Does the product have interfaces to other subsystems?*

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The factors and attributes (4)

3) PROJECT CONSIDERATIONS

- *Will more than one person work in the design part?*
- *Will more than one person code in the SW unit?*
- *Will the authors of the base product be available to the designer?*
- *What is the average experience of the designer with the associated products?*
- *Will the authors of the Feasibility study (high level design) be available to the team?*
- *Is the subsystem responsibility in other organisation?*
- *Are design rules and methods available an frozen?*
- *How is the time frame dictated for the project?*
- *What is the average experience of the design team?*
- *Has the design leader experience in technical coordination?*
- *How much design experience has the design leader?*
- *How familiar are the design team with the functional area?*
- *Is the project being simultaneously impacted by the design of more than one function?*
- *Are associated product developed by the same project?*
- *Will some product be developed outside the organisation?*
- *Will the product be part of different systems with different characteristics?*

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Risk Management

- R = 0 Very unlikely to cause problems
- R = 1 Small risk of problems
- R = 2 Quite likely to be a cause of problems
- R = 3 High risk
- R = 4 Very High risk

Risk Factor

Risk Value (RV)

RV = R x W

Weighting Impact

- W = 0 No impact, question is irrelevant
- W = 1 Minor impact to quality or schedule
- W = 2 Medium impact to quality or schedule
- W = 3 Major impact
- W = 4 Critical

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Stinkers Analysis (example of evaluation)

QUESTIONS	ANSWERS	WEIGHT	RISK	RESULTS
1		1	0	0
2		4	0	0
3		4	0	0
4		2	0	0
5		1	0	0
6		4	1	4
7		3	4	12
8		4	3	12
9		2	0	0
10		2	3	6
11		2	3	6
12		4	3	12
13		4	0	0
14		2	3	6
15		3	0	0
16		3	1	3
17		3	0	0
18		2	3	6
19		3	3	9
20		2	0	0
21		3	0	0
22		1	0	0
23		2	0	0
24		4	2	8
25		4	3	12
26		1	1	1
27		1	1	1
28		2	3	6
29		3	2	6
30		2	1	2
31		2	0	0
32		2	0	0

QUESTIONS	ANSWERS	WEIGHT	RISK	RESULTS
33		2	3	6
34		3	0	0
35		3	0	0
36		3	0	0
37		2	0	3
38		2	3	6
39		2	0	0
40		4	4	16
41		4	1	4
42		1	3	3
43		1	0	0
44		1	0	0
45		1	0	0
46		2	0	0
47		1	2	2
48		2	4	8
49		2	1	2
50		3	4	12
51		2	0	0
52		2	1	2
53		3	3	9
54		2	1	2
55		3	1	3
				49%

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Risk Management

Total Risk Value = Σ (R x W)

*The sum of all the risk values, **as a percentage of the maximum risk value**, will yield an indicator as to the potential for the product to become a stinker.*

60% - 100%	**HIGH.** **Definitely Stinker** =>Take immediate corrective action is critical.
50% - 60%	**MEDIUM.** **Potential stinker** => Major problems need to be addressed, most questions had substantial concerns.
30% - 50%	**LOW.** Analyse these results more carefully, to see if many of the concerns can be associated with similar causes and can be dealt with.
less than 30%	**VERY LOW.** The design can be considered to be controllable.

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Risk Management

The actions taken during the Stinker Analysis meeting shall consider the following:

1) *Reasons why a potential stinker cannot be re-designed to reduce its modified size and/or design mhrs.*
2) *Actions taken to reduce the risk of the potential stinker becoming a stinker in the current project.*
3) *Actions taken to reduce the risk of the potential stinker becoming a stinker in future projects.*
4) *Actions taken to improve the quality of a stinker in the project.*
5) *Actions taken to reduce the risk of a stinker to continue as a stinker in future projects.*

These actions should avoid future costs and prevent the design project to produce and deliver a SW unit with bad quality.

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Stinkers Analysis Performance Measurements

In order to measure how effective was the identification done in the analysis and the effectiveness of the planned actions the following measurements are requested to the project:

1) *Number of potential stinkers that did not results in stinker.*
2) *Number of potential stinkers that resulted in stinkers*
3) *Number of stinkers that were not identified as potential stinkers*

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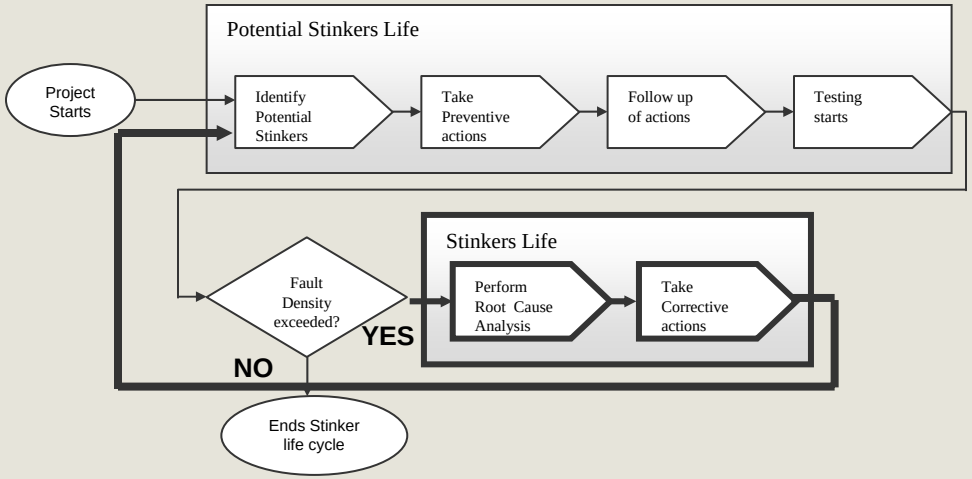
Our results

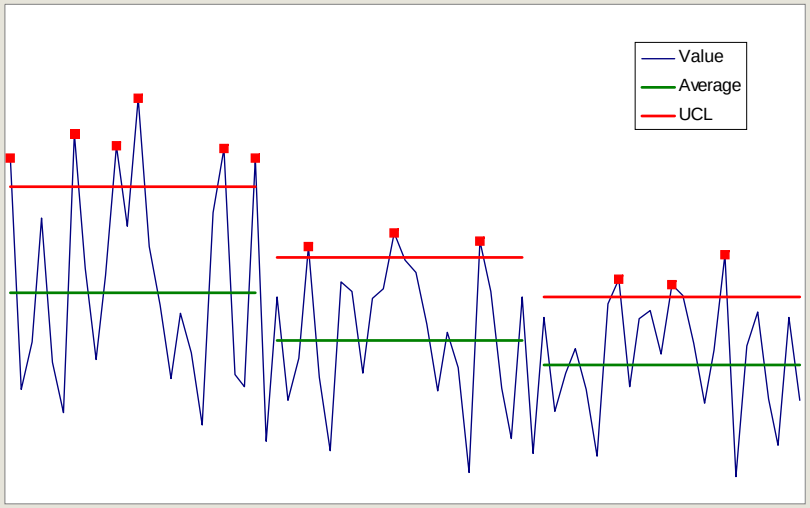
1) *95% of the identified potential stinkers did not result in stinker (mainly due to the actions but also because of the myth that what you measure it always improves).*
2) *Less than 5% of the SW unit identified as stinker or potential stinker becomes stinker at the end of the project*
3) *It is also common that some SW units not identified as potential stinker become stinker (most of the times due to the fact that the fault density decreased project after project).*

Steady improvements



Stinker definition:
A product is considered stinker when its fault density or number of faults or bugs ***has exceeded the limits defined by*** *the product responsible.*

As the limits are established in percentage of the average fault density or number of faults, then we enter in a continuous improvement loop, which has shown steady improvements.



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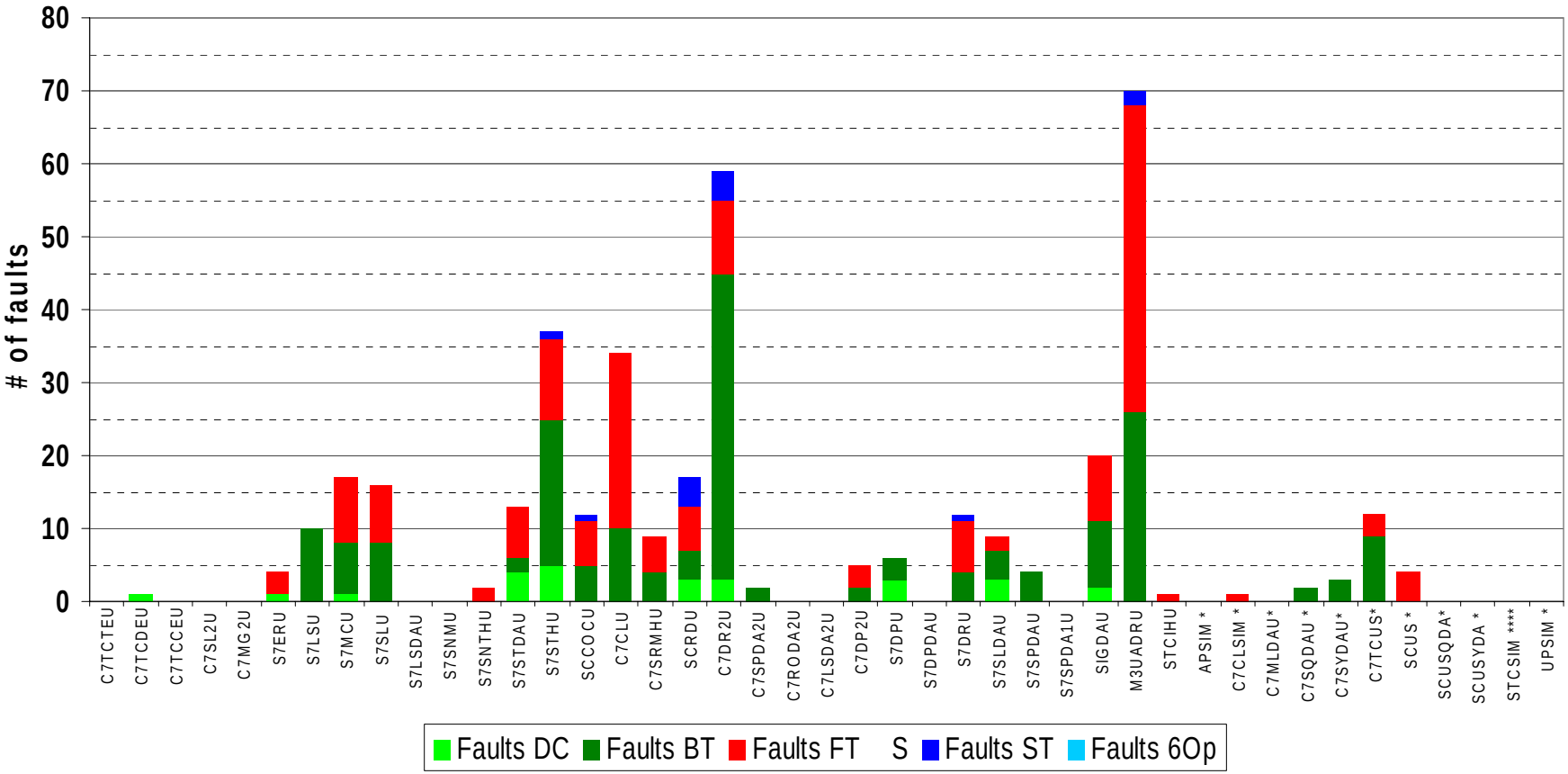
Cervantes project - Faults per SW unit and project phase



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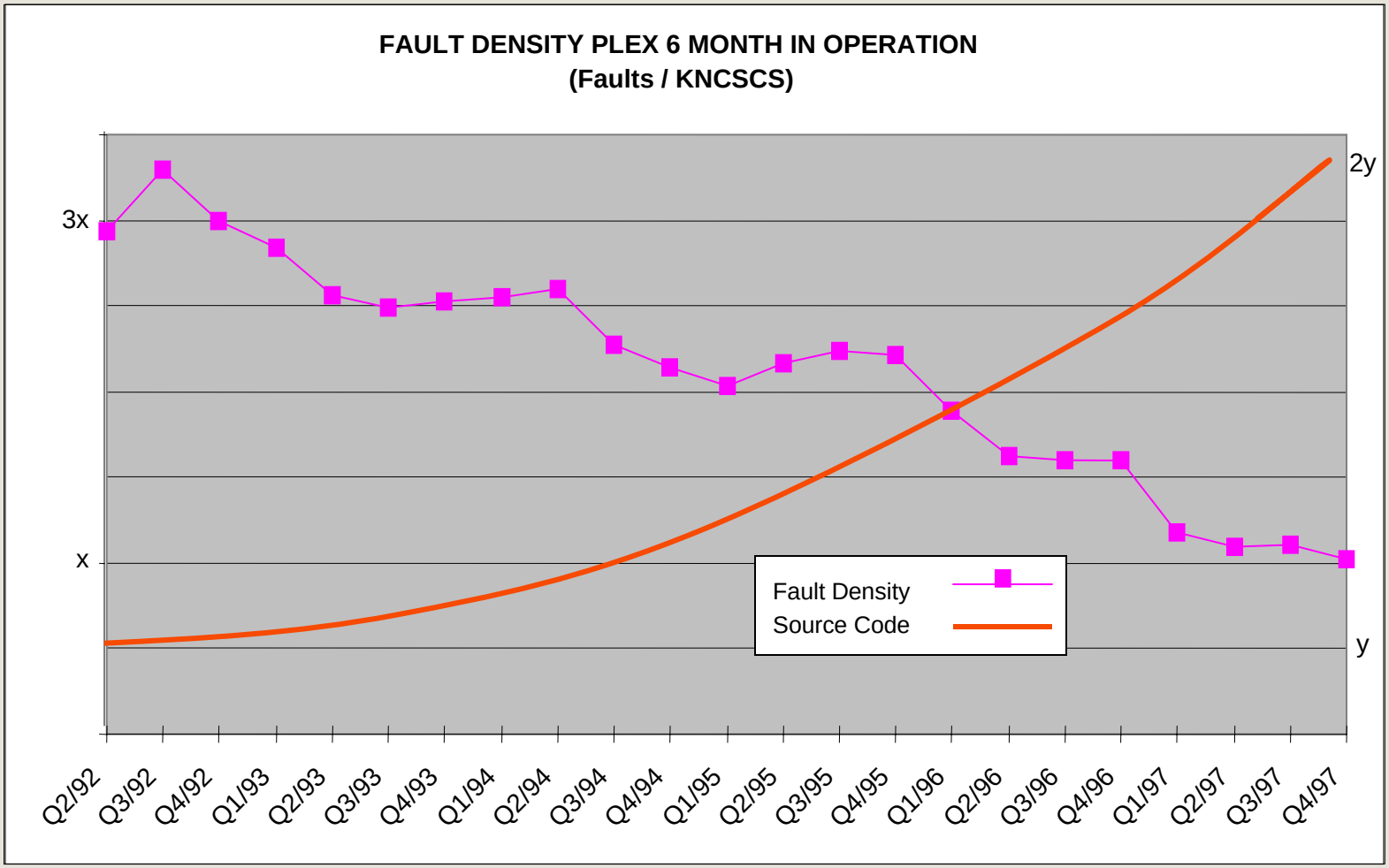
Visible improvements



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Conclusions

- Although we have delivered twice the size in code, we have reduced the fault density by 3.
- We have achieved sustained results along the years
- We have achieved a reliability close to 99.999 in some of the most heavily used nodes in the telecom network:
  - The signalling system (with probably more 100.000 nodes)
  - The real-time databases (with more than 700 nodes).
- The cost of quality has been reduced. The defect prevention has avoided a lot of rework in Function Test, System Test, and more important, in the systems released to the customers.
- The method is easy to use and is based on facts and a few measurements.
- The effectiveness of the method is rapidly evaluated in inspections and testing phases during the same project.