MBO : A Solution to improve Memory Bist sharing

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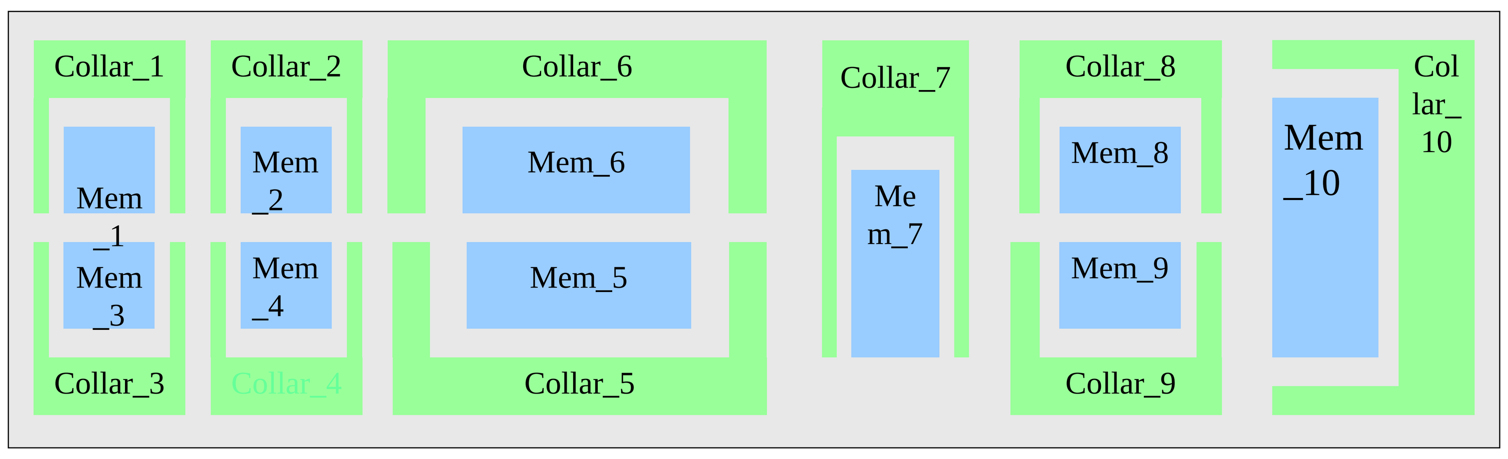
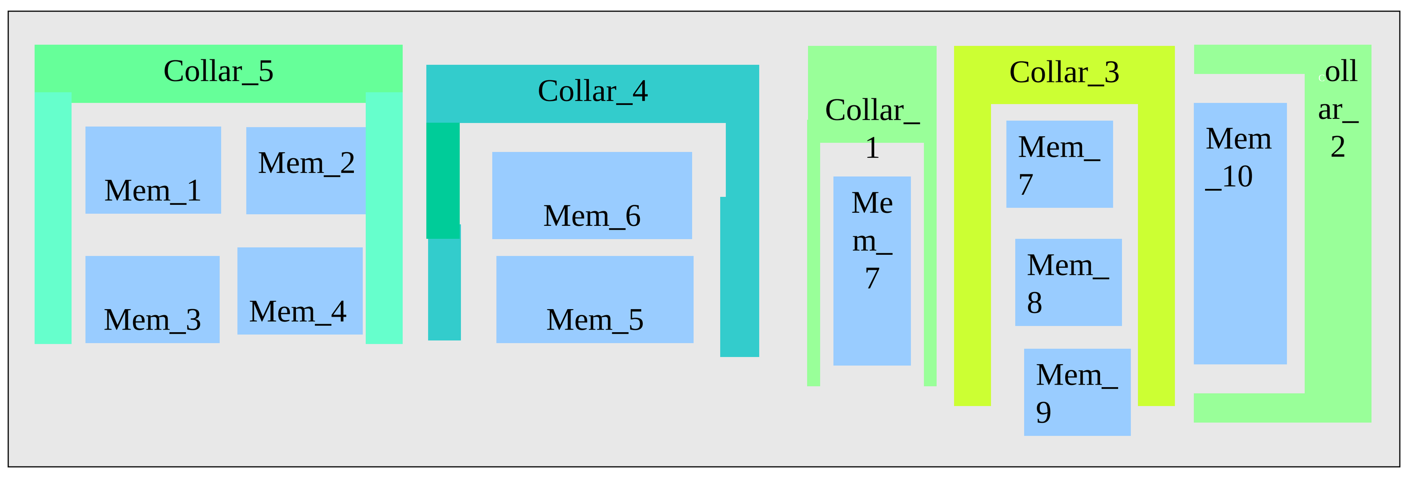
MBO Optimizes simultaneously area, power and test time for Memory Bist sharing

A dedicated Bist Architecture :



An optimized Bist Architecture :



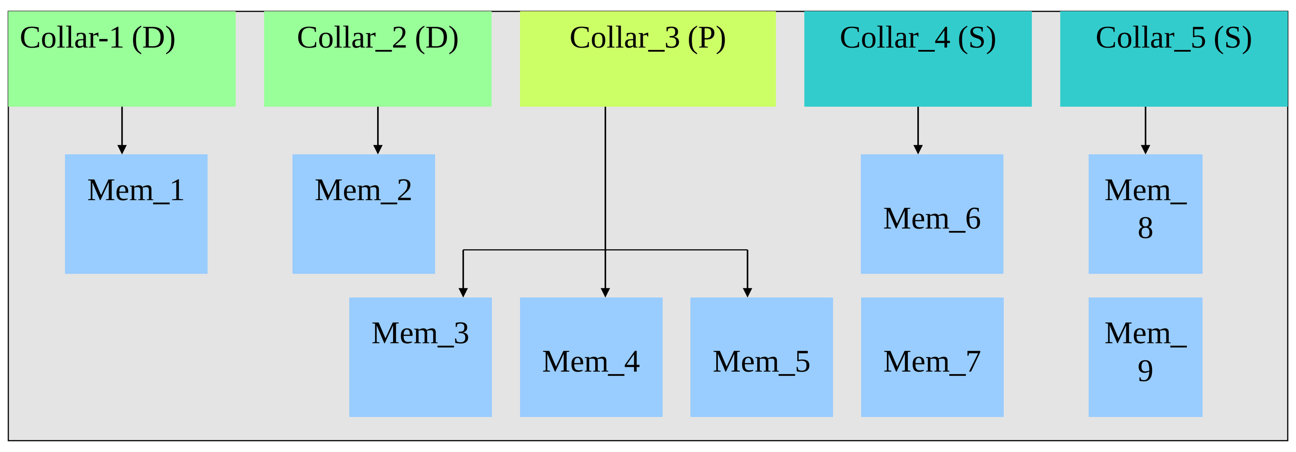
1- What is a memory Bist Architecture?

Each memory needs to be associated with a Bist collar

2- What is our objective?

Optimize shared BIST Architectures:

- **Minimize Area**
- **Minimize test peak Power**
- **Minimize test Time**



3 - How to share ?

Dedicated : worst Area, and power good test time!!!

or

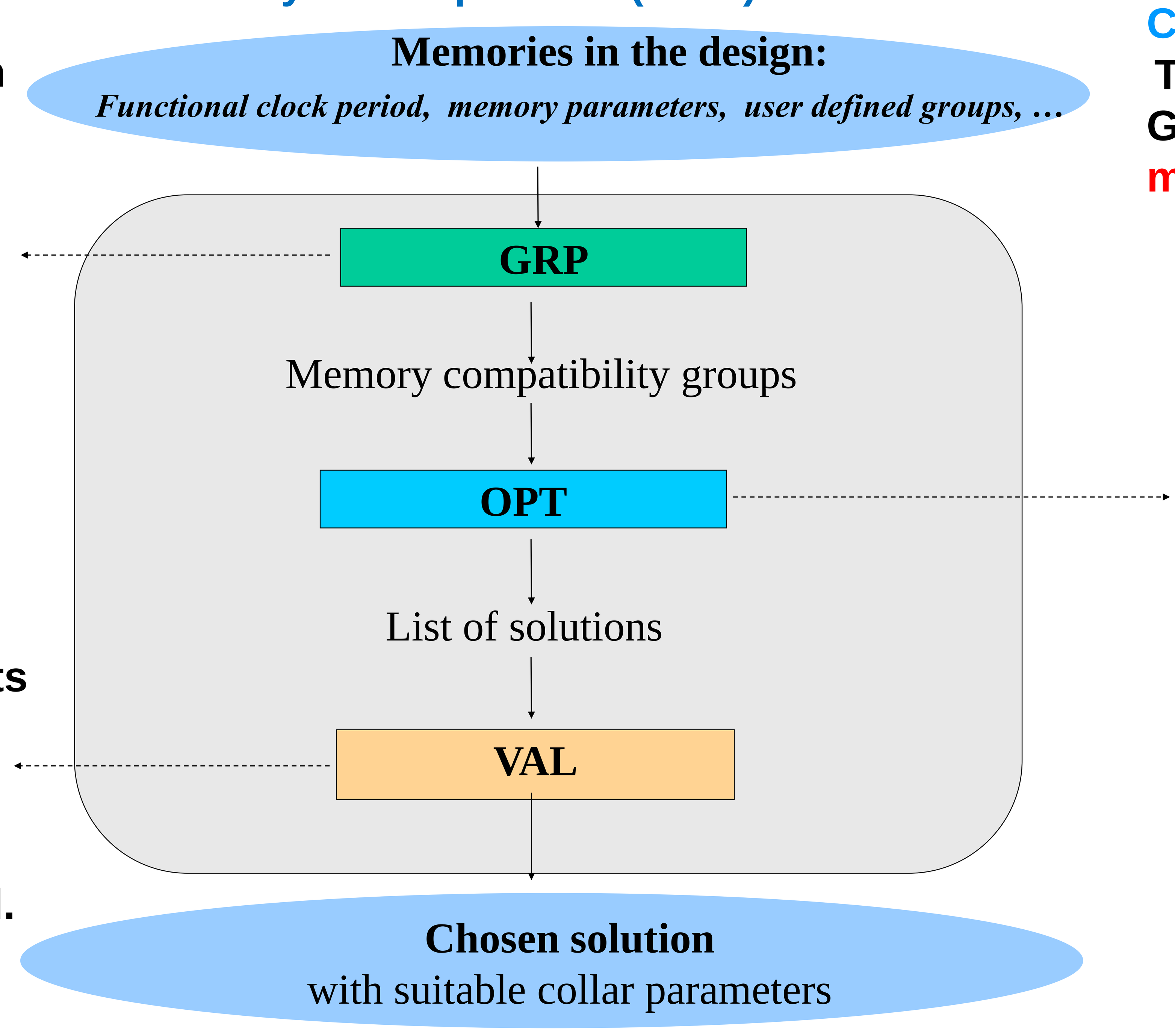
Sequential : Best Power, better area , bad test time

or

Parallel : Best Test time, even better area and bad power

4- Memory Bist Optimizer (MBO) :

Sharing rules for parallel and sequential collars change with each new technology generation.



A- Grouping Module (GRP)

The GRP module generates groups of memories instances that can share same collar for parallel and sequential configurations.

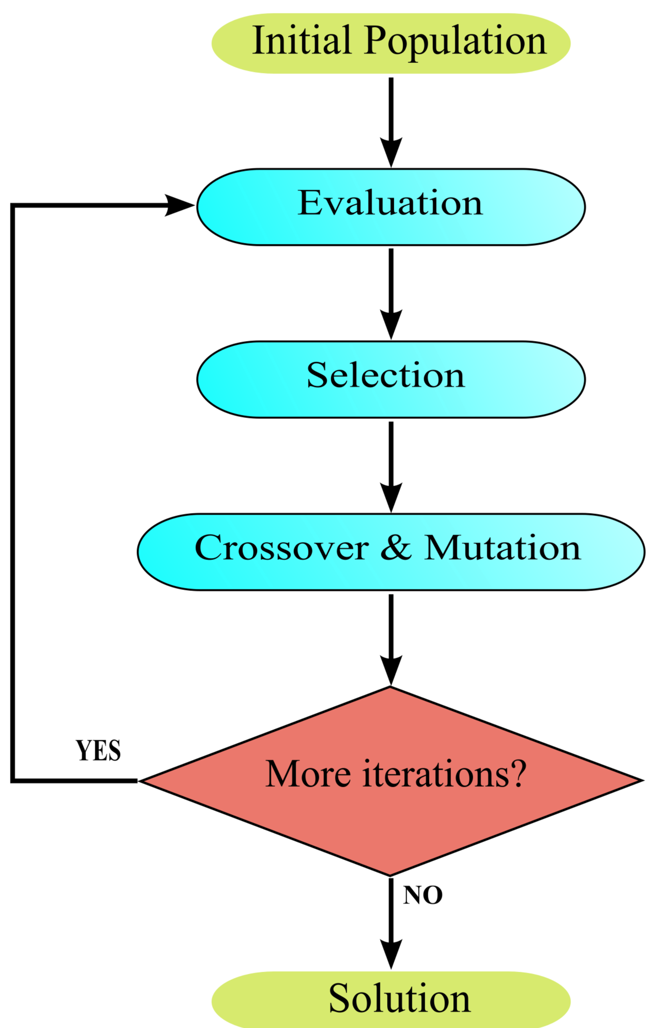
C – Validation Module (VAL)

VAL checks whether the solutions from OPT satisfies all the constraints extracted by GRP and validates them.

VAL also provides the output user interface- either textual or graphical.

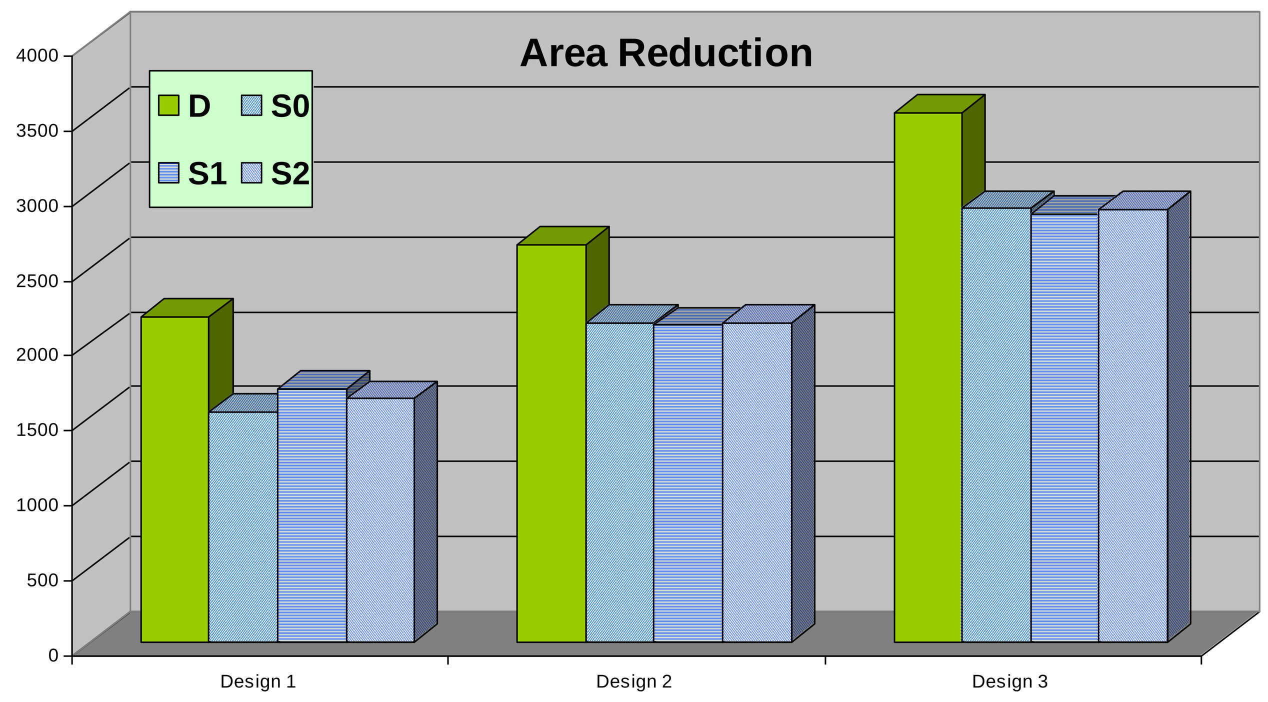
C - Optimizer Module (OPT)

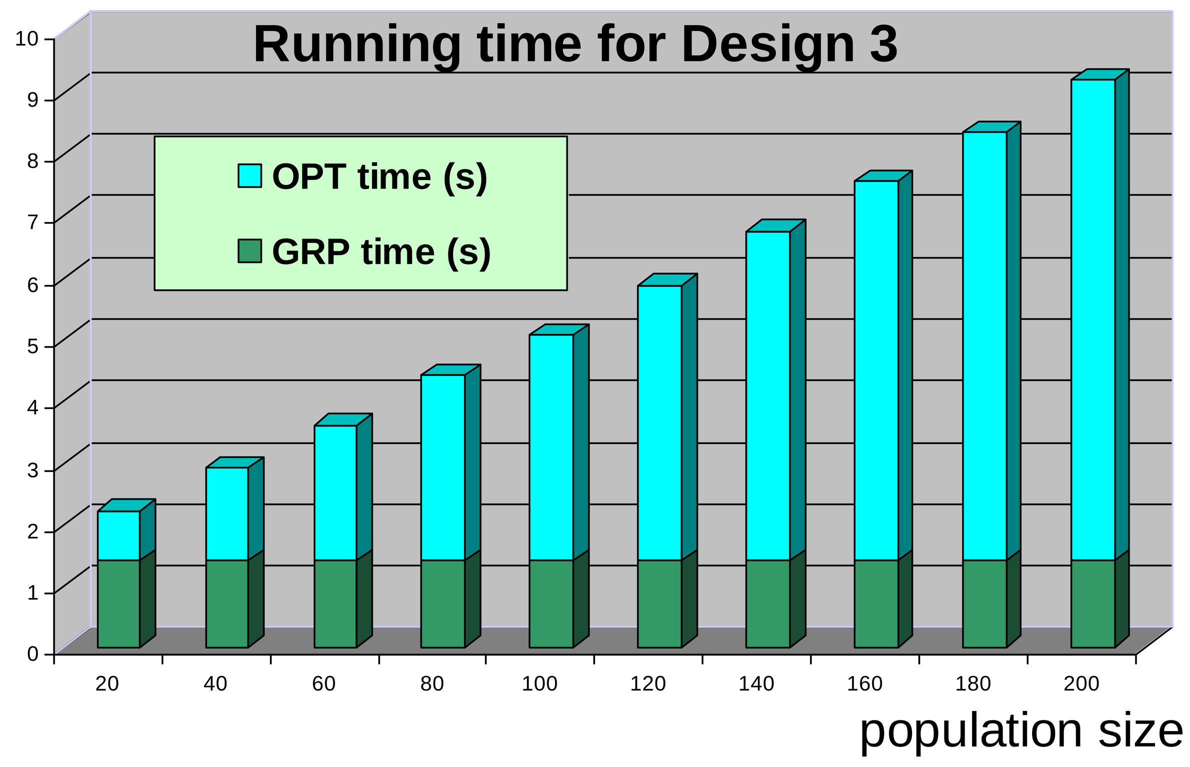
The OPT module finds a set of solutions. Genetic algorithms tailored for multi-objective optimization are used.

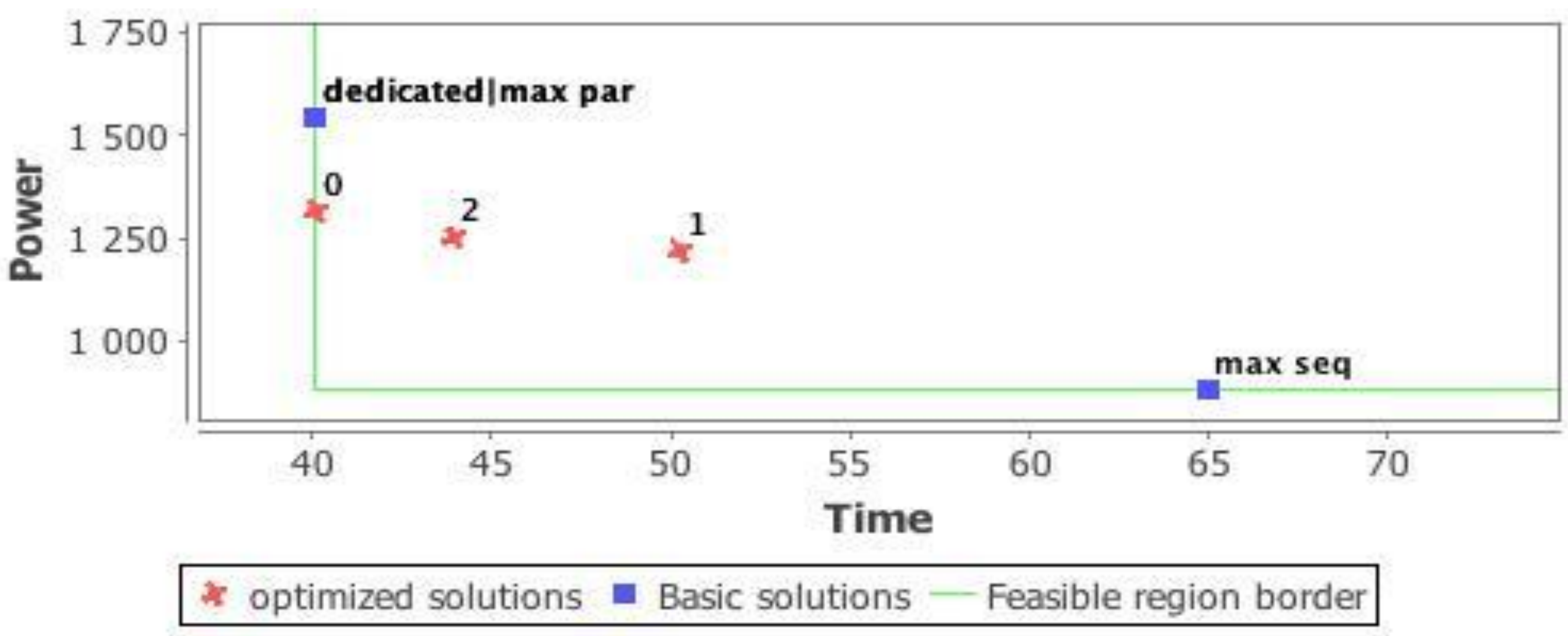


6- Examples

		Ded_Sol	MBO_Sol		
		D	S0	S1	S2
Design 1 65 memories	T	38	40	38	38
	A	2173	1538	1692	1625
	P	973	774	734	786
Design 2 78 memories	T	122	125	122	130
	A	2658	2133	2120	2132
	P	1192	975	1052	972
Design 3 94 memories	T	40	40	50	43
	A	3538	2895	2862	2890
	P	1543	1317	1219	1252







7- Results

- **With an initial population of 200 solutions, computation times are less than 10 seconds for 100 memories.**
- **On all 3 designs, the 3 optimized solutions reduce area by at least 20%.**
- **For the user, the trade-off is between test time and test power.**

Conclusion :

- **The neat separation between the electronic data and the mathematical model allows a technology independent approach.**
- **Genetic algorithms allow the direct handling of multi-objective optimization.**

Contacts

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