New EDLS architecture for small Mars landers

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Mission Scenario

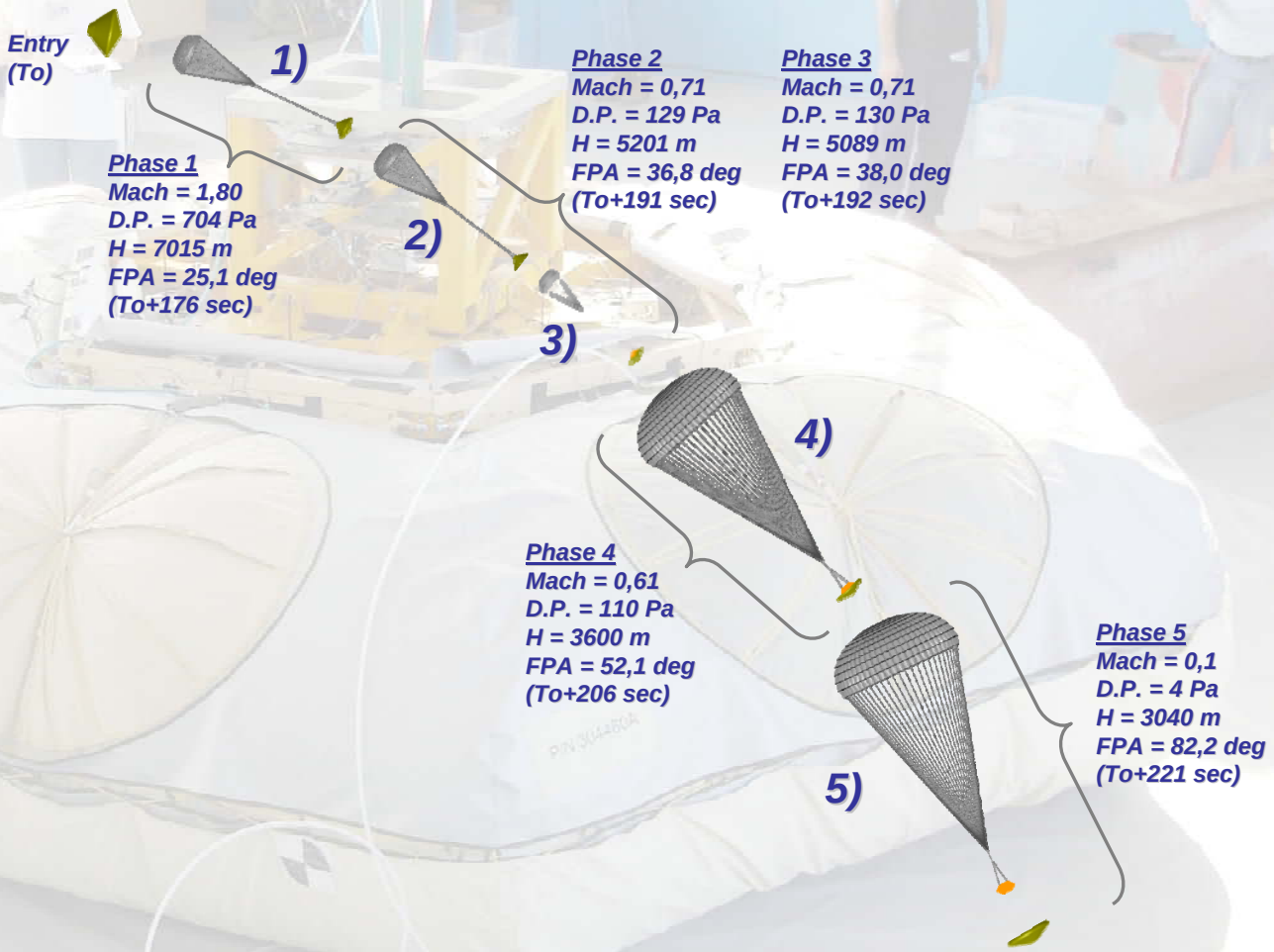
In order to maximize the commonality with near future missions such as Network Science an optional mission scenario has been analyzed

<u>Key driver</u> ***simple descent and landing systems for a small lander (~200kg) – limited GNC complexity***

Mission Scenario

Mission timeline

1) FP (DGB) mortar deployment
2) Back-shell separation
3) Front shield and lander stabilization with pilot chute (DGB)
4) MP (Ringsail) deployed by pilot chute
5) Front shield separation
6) Non vented airbag inflation
7) Lander release



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6)

Phase 6
Mach = 0,08
D.P. = 2 Pa
H = 180 m
FPA = 90,0 deg
(To+367 sec)

7)

Phase 7
Mach = 0,08
D.P. = 2 Pa
H = 10 m
FPA = 90,0 deg
(To+376 sec)

Mission Scenario

ENTRY

	Phase 1		
probe	M	600	kg
	Mach	1,8	
	Dprobe	2,4	m
	CD sup	1,68	
	CD sub	1,2	
parachute	Parachute	DGB	
	Do	8	m
	CD	0,6	
	CDSo	30,2	m^2
	B.C.	***19,9***	***kg/m^2***

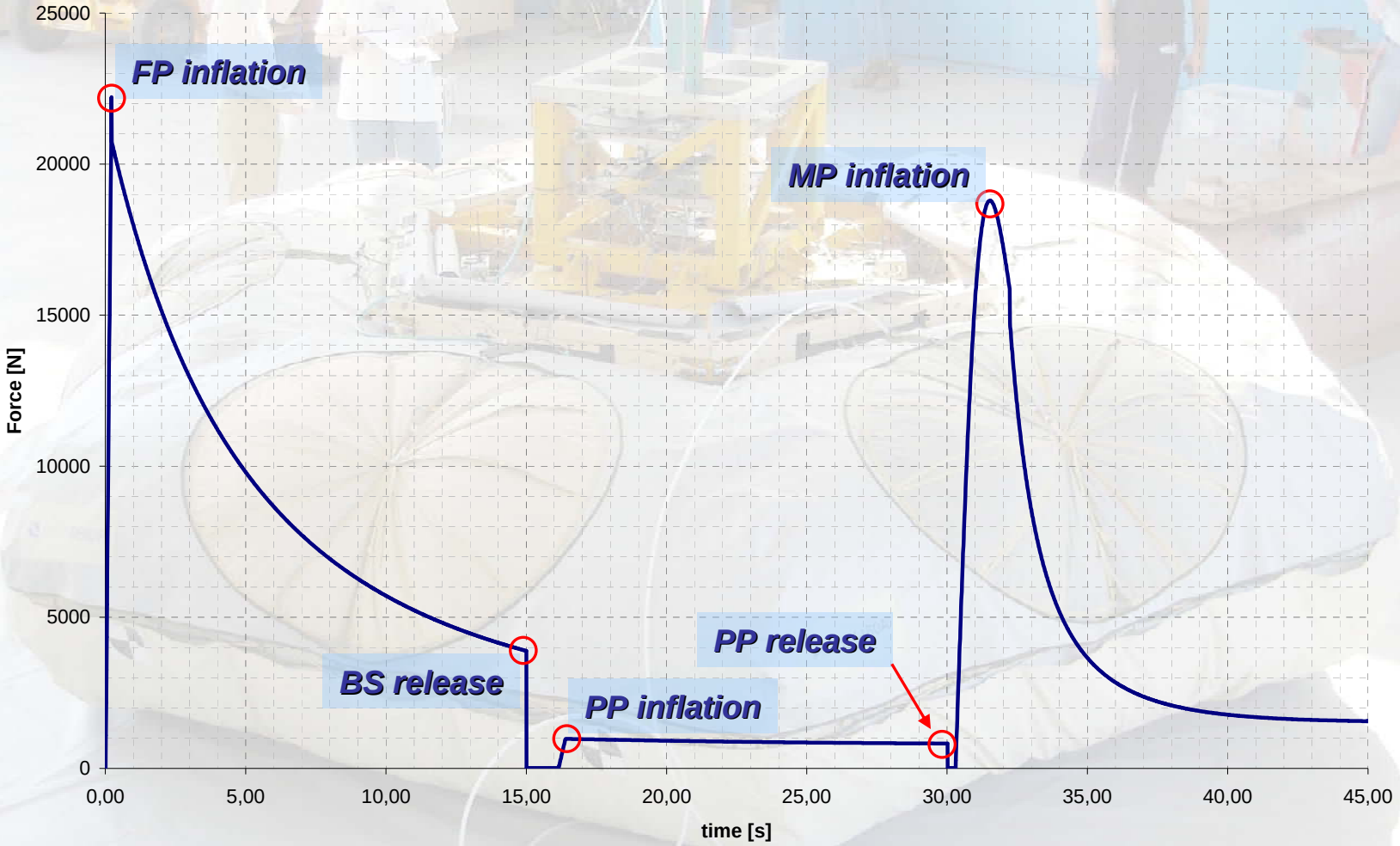
BACK-SHELL SEPARATION

	Phase 2		
probe	M payload	420	kg
	M backshell	180	kg
	Mach	0,8	
	Dprobe	2,4	m
	CD sup	1,68	
	CD sub	1,2	
parachute	Parachute	DGB	
	Do	4	m
	CD	0,6	
	CDSo	7,5	m^2
	B.C. payload	***55,7***	***kg/m^2***
	B.C. backshell	***6,0***	***kg/m^2***
	Ratio	***9,3***	

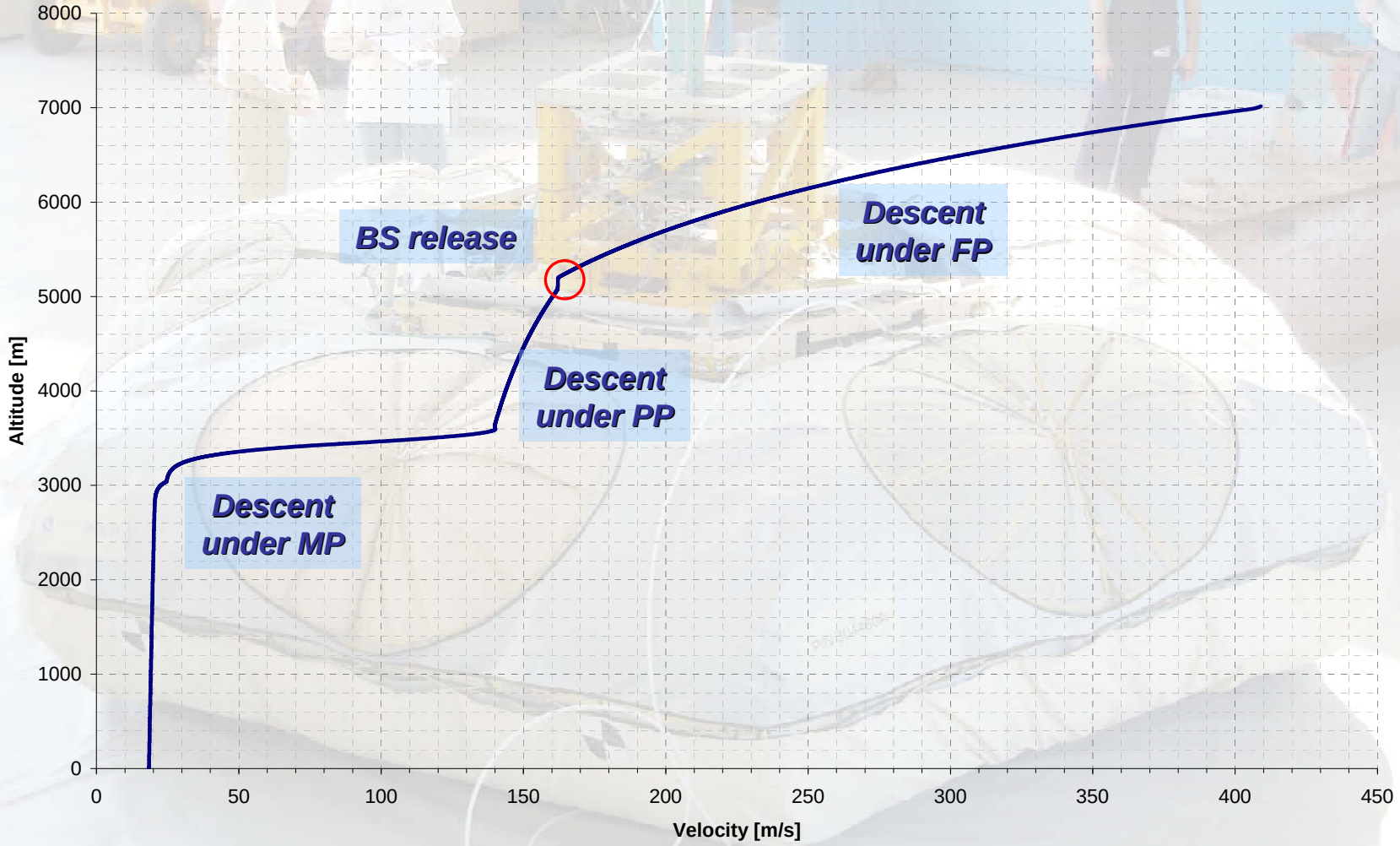
FRONT SHIELD SEPARATION

	Phase 3		
probe	M payload	300	kg
	M frontshell	120	kg
	Mach	0,6	
	Dprobe	2,4	m
	CD sup	1,68	
	CD sub	1,2	
parachute	Parachute	Ringsail	
	Do	25	m
	CD	0,9	
	CDSo	441,8	m^2
	B.C. payload	***0,7***	***kg/m^2***
	B.C. front shield	***22,1***	***kg/m^2***
	Ratio	***32,6***	

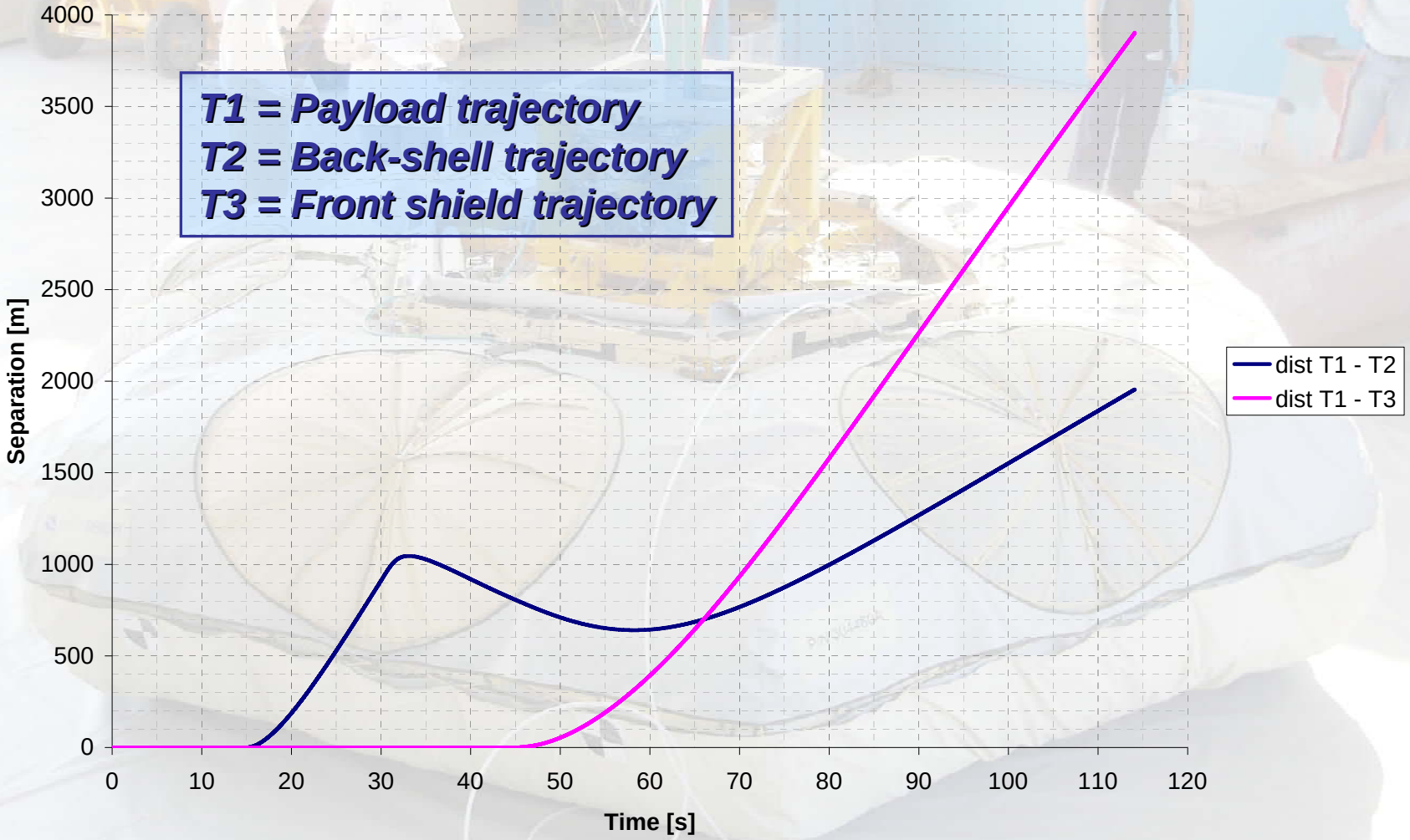
Mission Scenario



Mission Scenario



Mission Scenario



Mission Scenario

Mass budget (20% margin included)

• FP (DGB 8 m) including mortar:	13,4	kg
• Pilot parachute (DGB 4 m):	1,9	kg
• Main parachute (ringsail 25 m):	41,5	kg
• Airbag (non vented):	84,6	kg
• TOTAL MASS:	141,4	kg