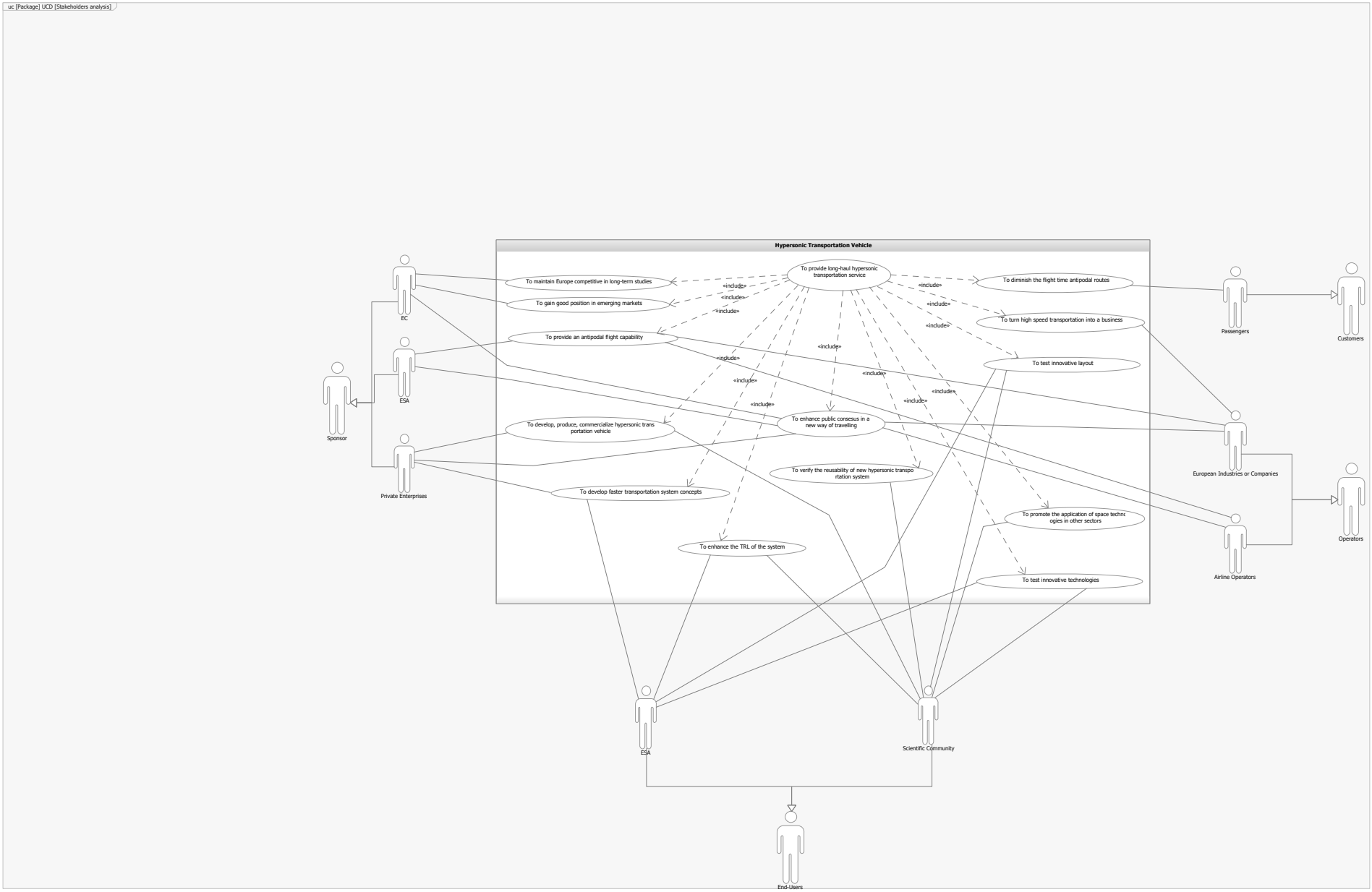
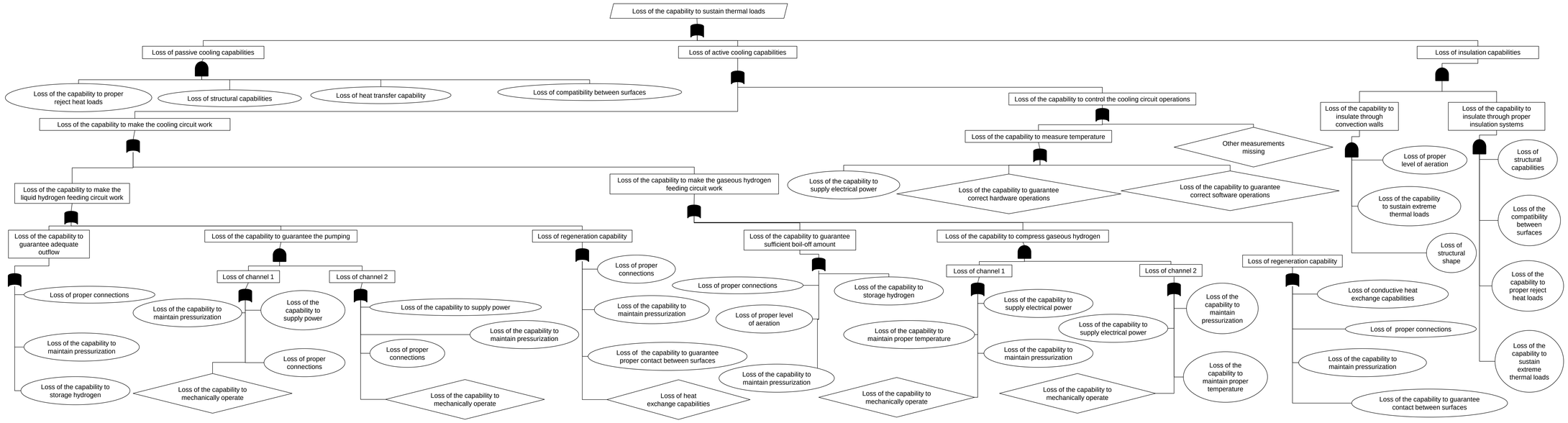

uc [Package] UCD [Stakeholders analysis]
Hypersonic Transportation Vehicle
To provide long-haul hypersonic transportation service
To maintain Europe competitive in long-term studies
To gain good position in emerging markets
To provide an antipodal flight capability
To develop, produce, commercialize hypersonic transportation vehicle
To enhance public consesus in a new way of travelling
To verify the reusability of new hypersonic transportation system
To develop faster transportation system concepts
To enhance the TRL of the system
To diminish the flight time antipodal routes
To turn high speed transportation into a business
To test innovative layout
To promote the application of space technologies in other sectors
To test innovative technologies
«include»
EC
ESA
Sponsor
Private Enterprises
ESA
Scientific Community
End-Users
Passengers
Customers
European Industries or Companies
Operators
Airline Operators

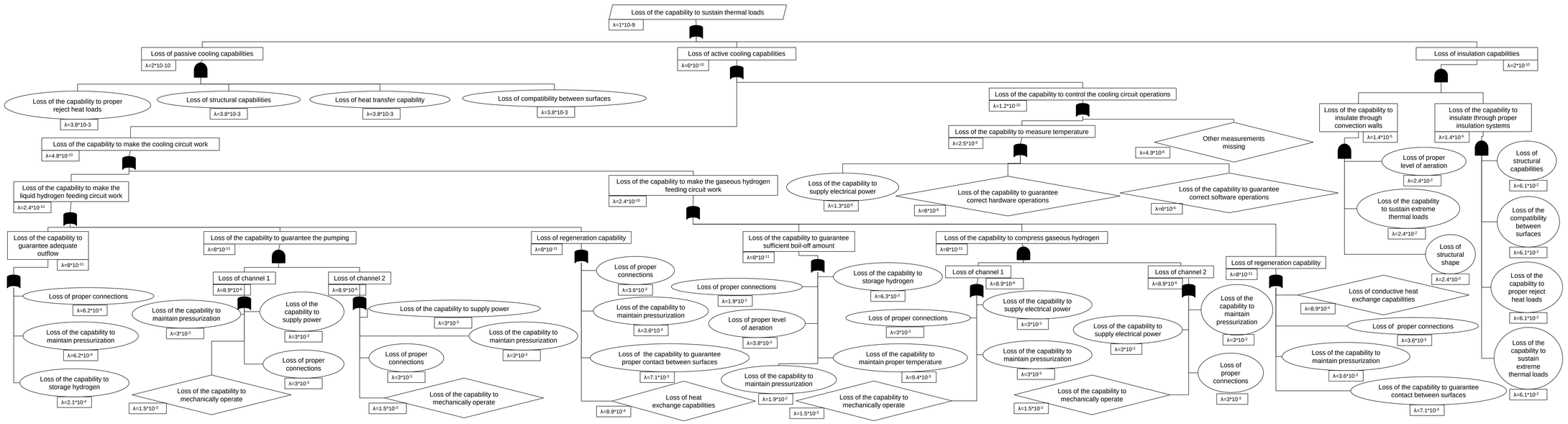
FHA

FUNCTION	FAILURE CONDITION	PHASE	CLASSIFICATION	FAILURE EFFECT
To maintain thermal equilibrium	loss of the capability to sustain thermal loads	climb, cruise	A	the vehicle is exposed to unbalanced thermal loads and overheating
	loss of the capability to cool engines	climb, cruise	A	loss of propulsion system
	loss of the capability to cool the vehicle primary structure	climb, cruise	A	the airframe cannot bear extreme thermal loads
	loss of the capability to cool systems	climb, cruise	A	severe damages to on-board system
To board propellant	loss of the capability to storage the required propellant	taxi	E	the vehicle cannot fulfil the starting check
	loss of the capability to transfer fuel at a proper rate	take off	C	the vehicle cannot perform the running
	loss of the capability to transfer fuel at a proper rate	climb/cruise/descent	A	the engines cannot be fed and lose thrust
	loss of the capability to transfer fuel at a proper rate	landing	C	the vehicle cannot approach and land properly
	unable to maintain the correct relative pressure	all	B	the vehicle cannot provide the sufficient motive flow
	loss of the capability to supply a continuous fuel at proper temperature	all	B	the vehicle cannot work at the desired conditions
	loss of the capability to refuel the tanks	taxi	E	the vehicle cannot operate
	loss of the capability to refuel the tanks	cruise	B	the vehicle cannot operate
	loss of the capability to ensure sufficient fuel in the main tanks to perform an emergency landing	all	B	the vehicle cannot face an emergency condition
To perform HTO	loss of the capability to perform take-off	taxi	E	the vehicle cannot get in position on the runway and cannot start the running
	loss of the capability to generate thrust on ground	take off	C	the vehicle cannot perform the running properly
	loss of the capability to perform taking off acceleration	take off	B	the crew cannot make the aircraft reach the speed V1 necessary for lifting off
To support HTO	unable to reach the proper position on the runway	taxi	D	the crew cannot control the aircraft on ground
	unable to perform straight taking off running on the ground	take off	C	the vehicle cannot maintain runway centerline
	unable to support the taking off manoeuvre	take off	B	the crew cannot perform the rotation manoeuvre
	unable to retract the landing gear	take off	C	Aerodynamic configuration of the vehicle is compromised
To perform HL	loss of the capability to perform the approach for hl	descent	C	the vehicle cannot maintain the descent rate
	loss of the capability to decelerate	landing	B	the vehicle cannot decelerate safely on final
To support HL	unable to perform braking	landing	C	speed cannot be controlled during taxi
	unable to perform steering	taxi	C	loss of aircraft control during taxi
To perform the acceleration phases	loss of the capability to perform the acceleration phases	climb	D	the vehicle cannot meet the acceleration profile
To support the acceleration phases	unable to guarantee the desired fuel mass flow rate	climb	C	severe to moderate degradation of powerplant performance
To perform the initial subsonic cruise	loss of the capability to perform the initial subsonic cruise	cruise	D	the vehicle cannot reach the expected speed and altitude
To support the initial subsonic cruise	loss of all the flight primary surfaces	cruise	B	the vehicle cannot perform any manoeuvres
	loss of any flight primary surfaces	cruise	C	the vehicle encounters a partial degradation of the control
To perform a cruise at 35km	loss of the capability to perform a cruise at 35km	cruise	D	the vehicle cannot get to the expected altitude
To perform a cruise at Mach 8	loss of the capability to perform a cruise at Mach 8	cruise	D	the vehicle cannot reach the expected hypersonic speed
To sustain structural loads	loss of the capability to bear weight and aerodynamic forces	take off/climb/cruise/landing	A	the vehicle encounters a total loss of the primary structure
To safely accommodate passengers and attendants	loss of the capability to accommodate passengers and attendants	taxi	D	passengers and attendants cannot have their own seat and safety equipment
	loss of the capability to accommodate passengers and attendants	take off/climb/cruise/ descent/landing	A	passengers and attendants cannot have their own seat and safety equipment in emergency operational conditions
	loss of the capability to accommodate passengers and attendants	take off/climb/cruise/ descent/landing	C	passengers and attendants cannot have their own seat and safety equipment in nominal operational conditions
To safely accommodate the crew	loss of the capability to accommodate the crew	taxi	E	the crew cannot have its own seat and drive the vehicle
	loss of the capability to accommodate the crew	take off/climb/cruise/landing	A	the crew cannot have its own seat and drive the vehicle in emergency operational conditions
	loss of the capability to accommodate the crew	take off/climb/cruise/landing	B	the crew cannot have its own seat and drive the vehicle in nominal operational conditions
To guarantee communication				
To transmit/receive signals	loss of the capability to transmit/receive signals to/from ground station	taxi	E	the vehicle cannot get in position on the runway
	loss of the capability to communicate the authorization	take off	D	the vehicle cannot start the take off
	loss of the capability to transmit/receive signals to/from ground station	climb, cruise, descent	B	the vehicle cannot exchange any kind of information with the ground
	loss of the capability to communicate the authorization	landing	B	the vehicle cannot land with the assistance of the ground station
	loss of the capability to reach the correct gate	taxi	E	the vehicle cannot take place and passengers cannot get off
To store data	unable to memorize data	all	E	the vehicle cannot collect information
To transmit emergency signal to be localized	loss of the capability to transmit emergency signal	all	B	the vehicle cannot be localized in case of emergency
To inform in case of system failure	unable to warn in case of system failure	all	A	the crew cannot be notified about system failure
To guarantee inner communication	loss of the capability to guarantee inner communications during flight	all	E	the crew cannot communicate with attendants and passengers
To guarantee navigation and guidance				
To acquire navigation data	loss of the capability to acquire navigation data	take off/landing	B	the system cannot calculate distances
	loss of the capability to acquire navigation data	climb/cruise/descent	C	the system cannot calculate distances
To acquire environmental data	loss of the capability to acquire environmental data	climb/cruise/descent	C	the crew cannot know data from the airspace around
To acquire flight data	loss of the capability to acquire flight data	all	C	the system cannot calculate speed and acceleration
To store and process data	loss of the capability to determine the state vector	all	C	the crew cannot know location and speed
	unable to have a database and to upgrade new data	all	D	the crew cannot manage the best route
To manage navigation data	loss of the capability to guarantee automatic guidance	cruise	C	the crew cannot activate autopilot
	loss of the capability to guarantee manual guidance	all	C	the crew cannot control the stick properly and perform manouevres
	loss of the capability to activate a radionavigation	landing	C	the vehicle cannot be supported during landing
To inform the crew	loss of the capability to guarantee guidance and navigation	all	C	the vehicle cannot reach a desired state (specified by a target)
To perform surveillance and identification				
To carry out identification by ground station	loss of the capability to be identified on the runway	taxi	C	the vehicle cannot be tracked
	loss of the capability to be interrogated by radars	take off	D	the ground station cannot authorize the take off
	loss of the capability to be interrogated by radars	climb, cruise, descent	C	the vehicle cannot be recognised by ground station
	loss of the capability to be interrogated by radars	landing	C	the ground station cannot authorize the landing
To carry out identification by other airplanes	loss of the capability to be interrogated by radars	take off	D	the vehicle cannot be recognised by other aircrafts
	loss of the capability to be interrogated by radars	climb, cruise, descent	C	the vehicle cannot be recognised by other aircrafts
	loss of the capability to be interrogated by radars	landing	D	the vehicle cannot be recognised by other aircrafts
To carry out surveillance in the airspace around	loss of the capability to carry out surveillance	climb, cruise, descent	C	the vehicle cannot supervise the flight zone around
To control the system in atmospheric environment	loss of the capability to control the system in atmospheric environment	take off/landing	A	the vehicle cannot perform manoeuvres
	loss of the capability to control the system in atmospheric environment	climb/cruise/descent	A	the vehicle cannot perform manoeuvres
	loss of the capability to guarantee control in case of emergency	take off/climb/cruise/ descent/landing	A	the vehicle cannot perform manoeuvres
To perform unpowered descent	loss of the capability to perform unpowered descent	descent	B	the vehicle cannot switch off the engines
To support unpowered descent	unable to support unpowered descent	descent	B	the vehicle cannot extend the landing gear
To guarantee human habitability	loss of the capability to guarantee human need of temperature pression and oxygen concentration	all	A	passengers, attendants and crew cannot bear unproper environmental conditions
To supply electrical power				
To supply electrical power to vital users	loss of the capability to supply electrical power to vital users	all	A	the vehicle cannot guarantee power distribution
	loss of the capability to supply electrical power to vital users	all	A	the vehicle cannot manage electric loads
	loss of the capability to supply electrical power to vital users	all	A	the vehicle cannot guarantee vital users
	loss of the capability to activate emergency devices	all	A	the vehicle cannot face emergency situations
To supply electrical power to essential users	loss of the capability to supply electrical power to actuators	all	A	the vehicle cannot perform manouevres
	loss of the capability to supply electrical power to on board computers	all	B	the vehicle cannot be controlled and properly drive
	loss of the capability to supply electrical power to essential users	take off/landing	B	the vehicle cannot retract/extract the landing gear
To supply electrical power to non-essential users	loss of the capability to supply electrical power to non-essential users	all	E	the vehicle cannot offer passenger accomodations

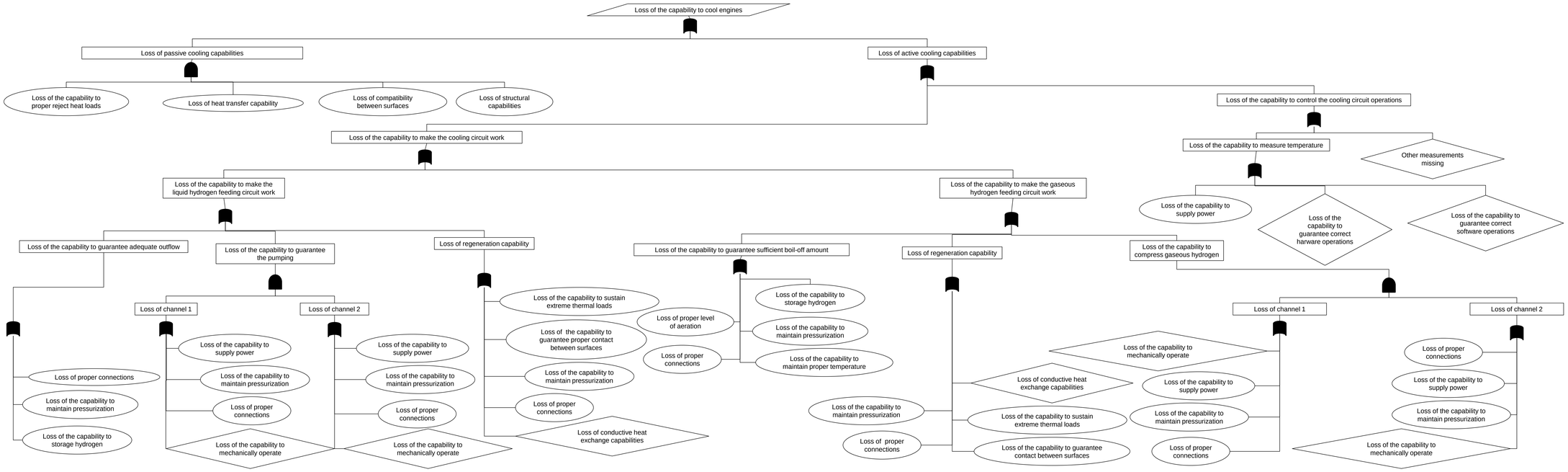
FTA: Loss of the capability to sustain thermal loads



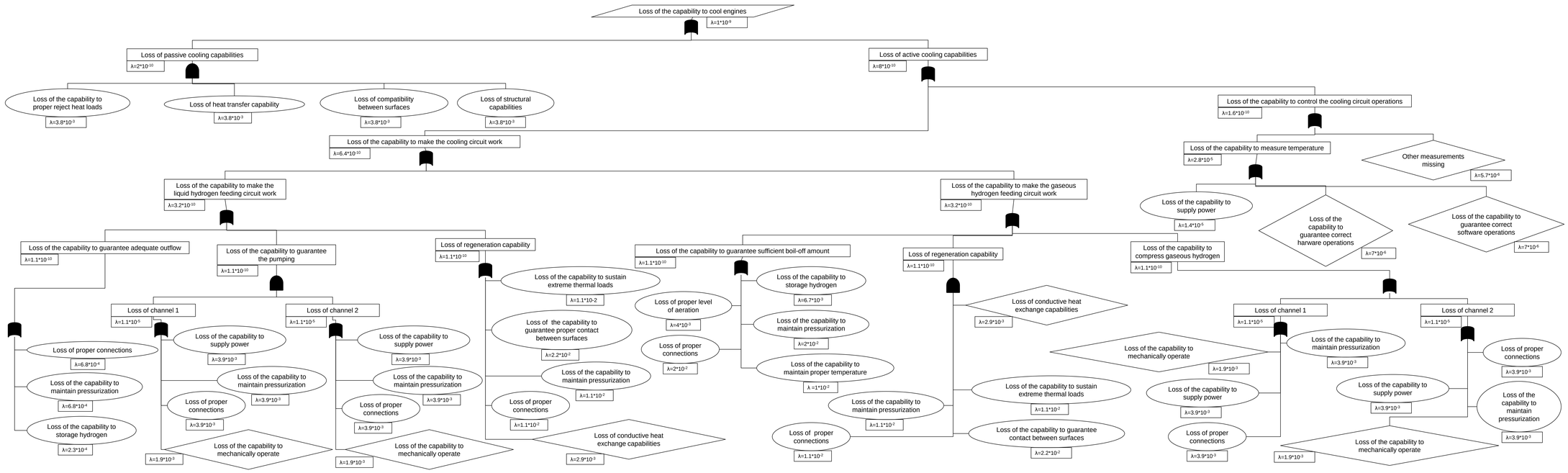
FTA: Loss of the capability to sustain thermal loads (Top-down approach)



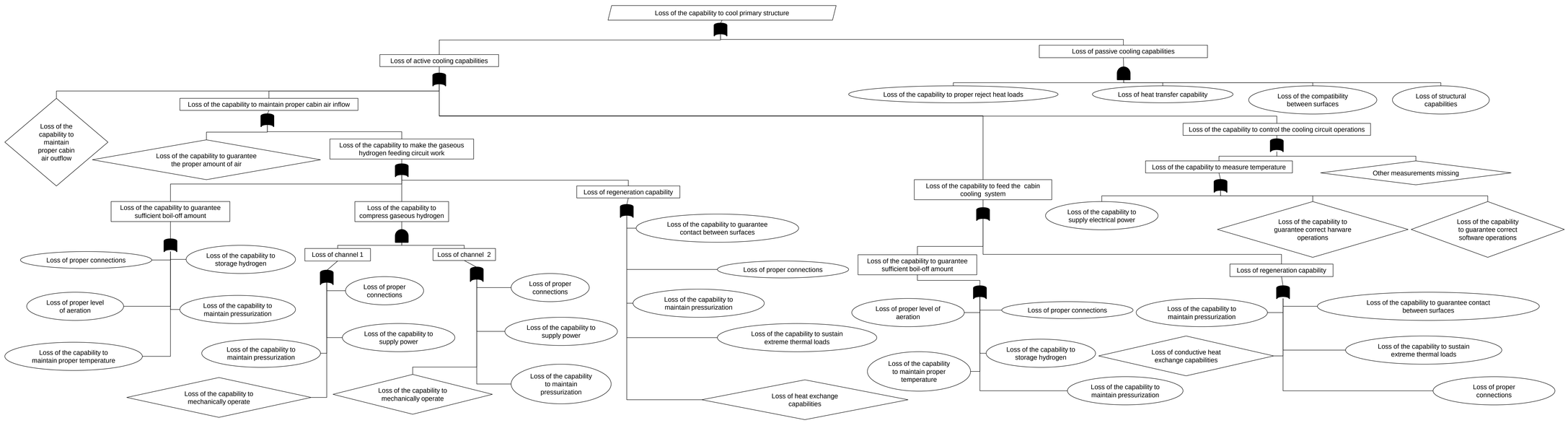
FTA: Loss of the capability to cool the engines



FTA: Loss of the capability to cool the engines (Top-down approach)



FTA: Loss of the capability to cool the primary structure



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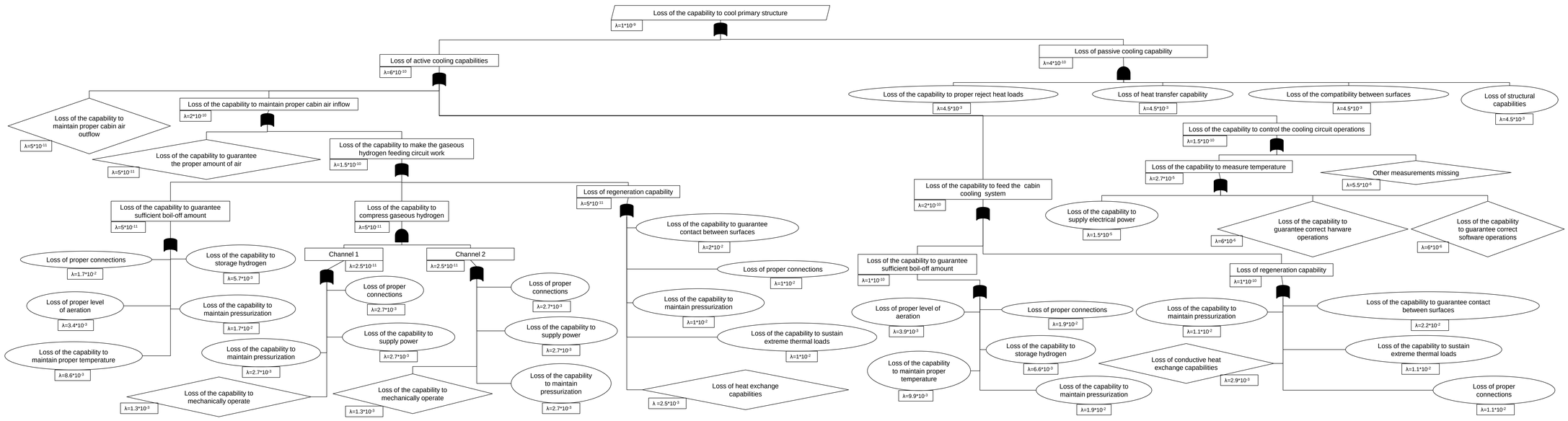
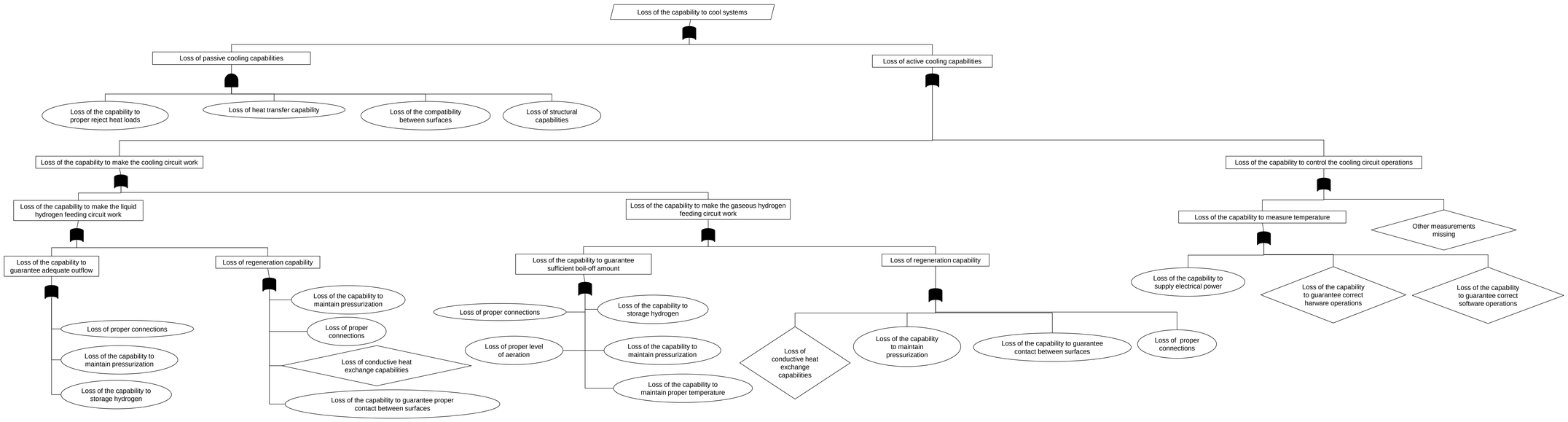


FTA: Loss of the capability to cool the systems



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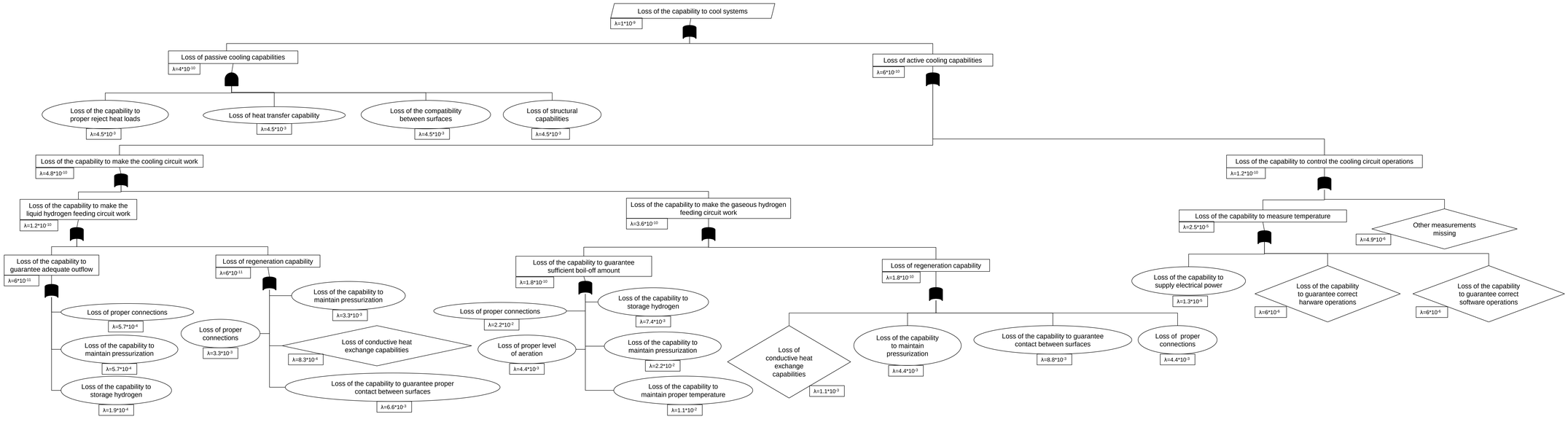

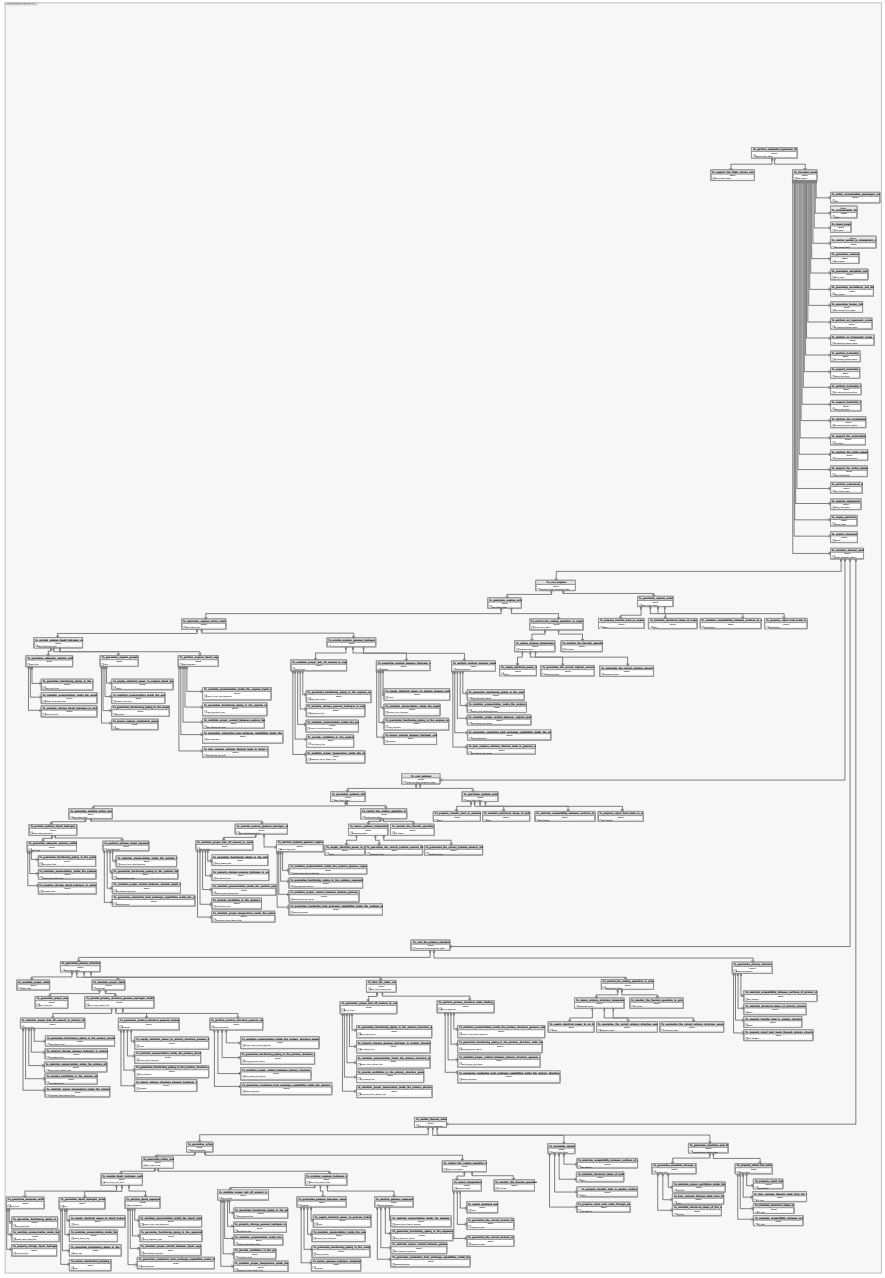

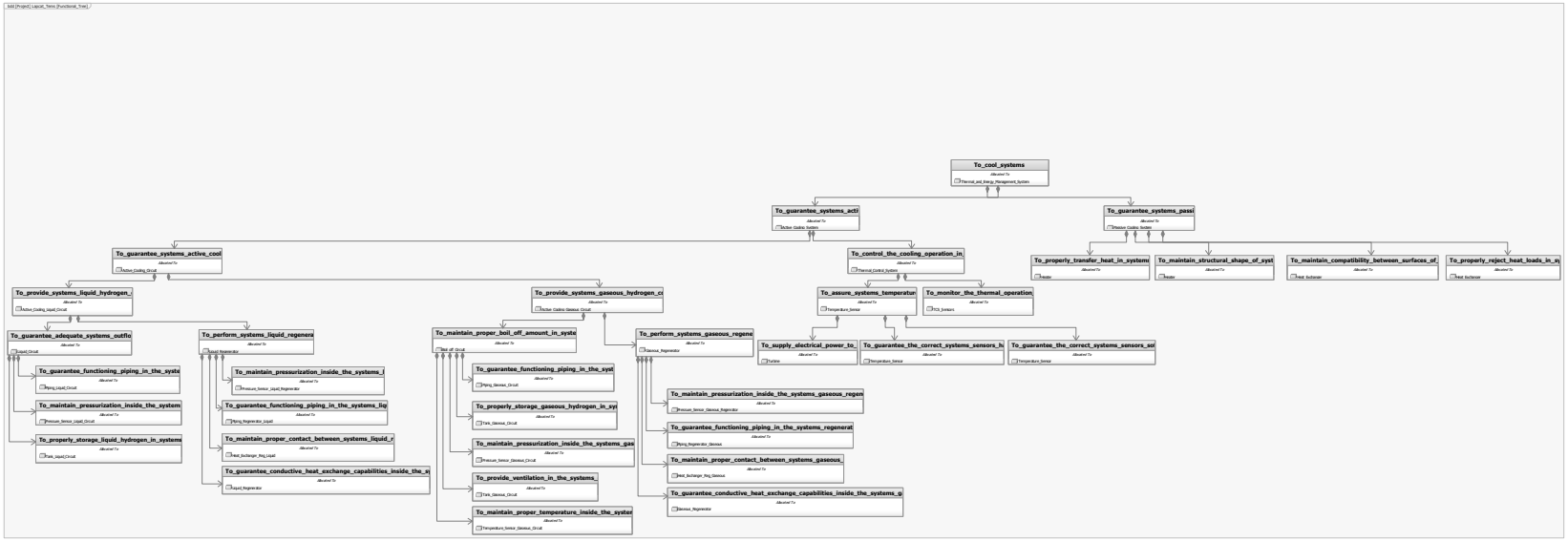
bdd [Project] Logical_Tree [Functional_Tree] /
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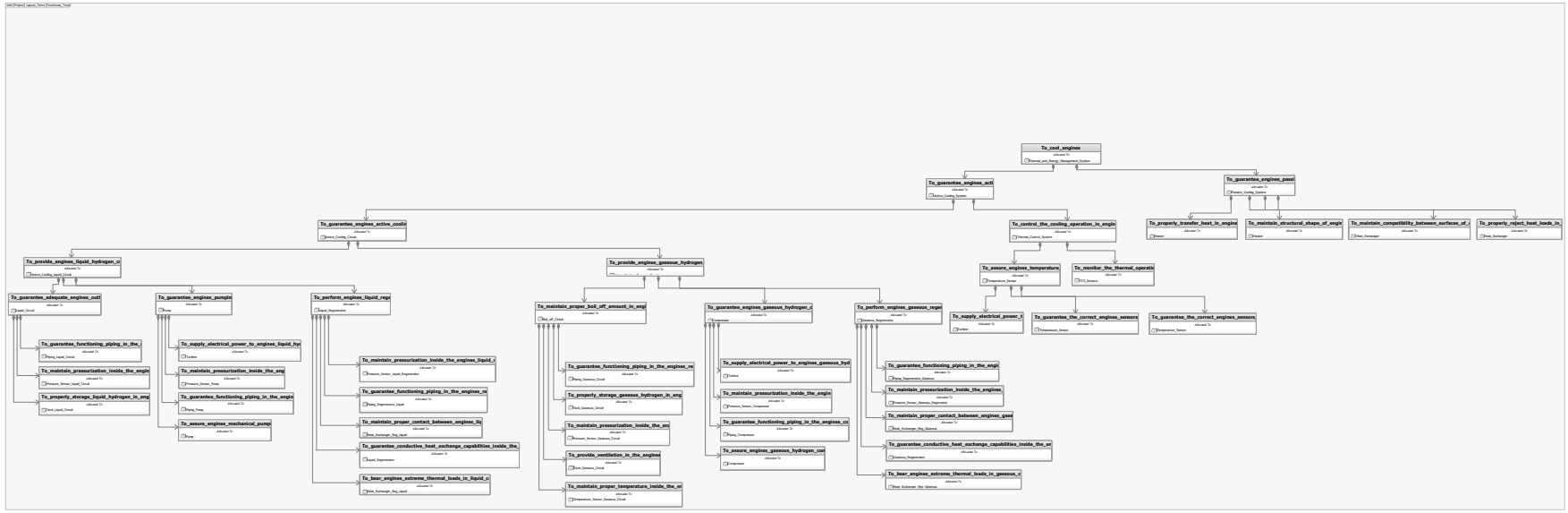
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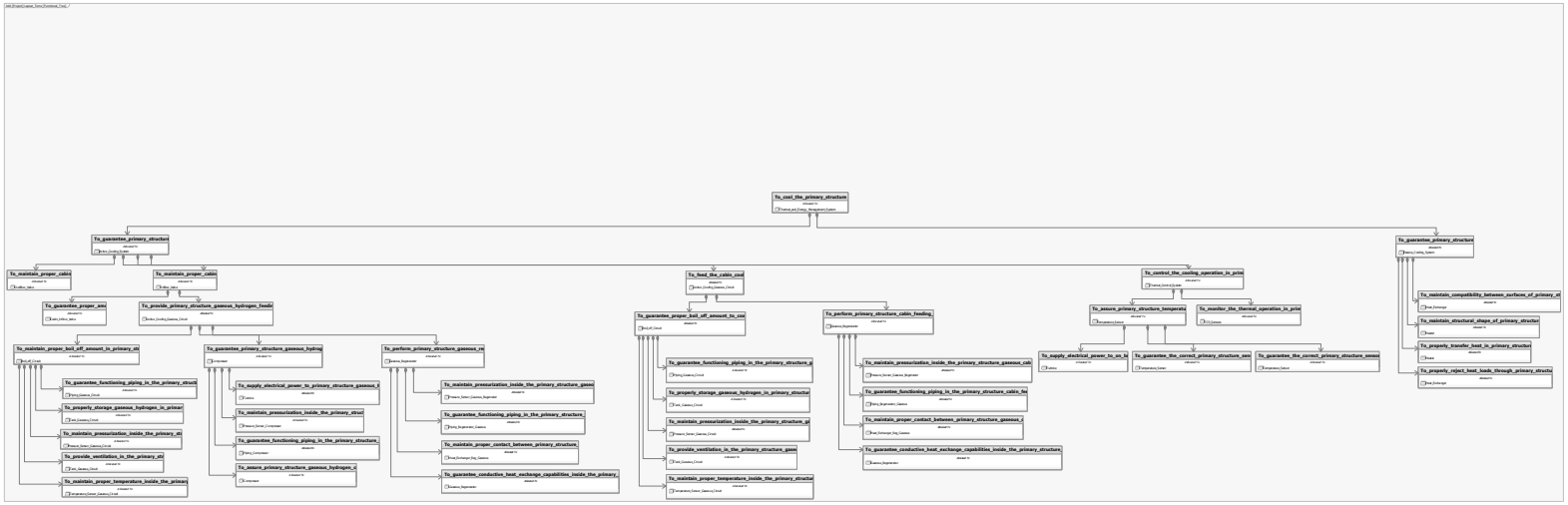
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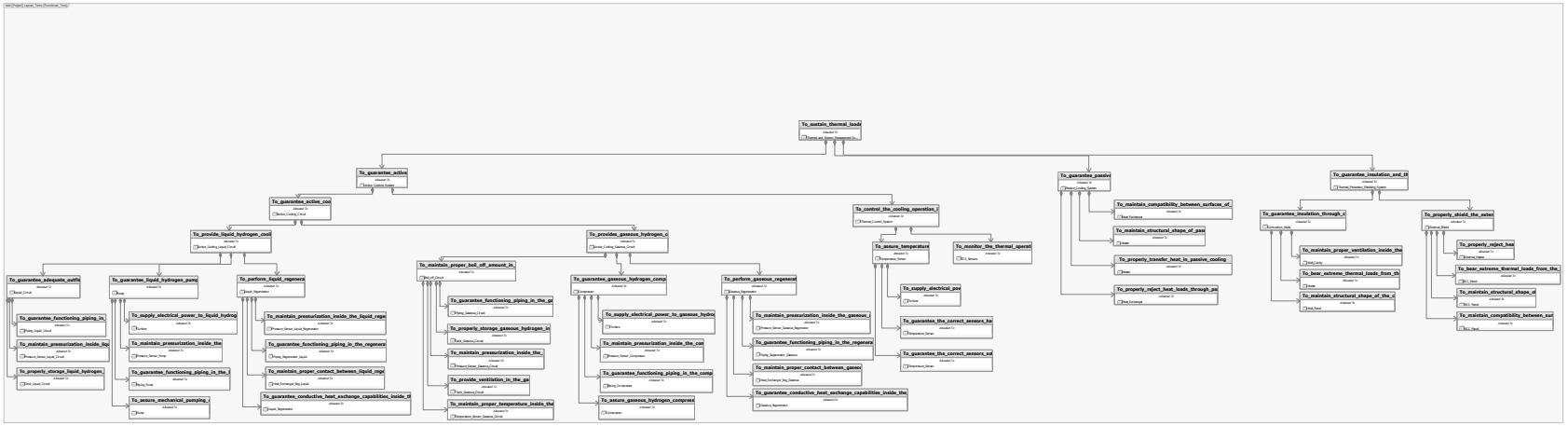
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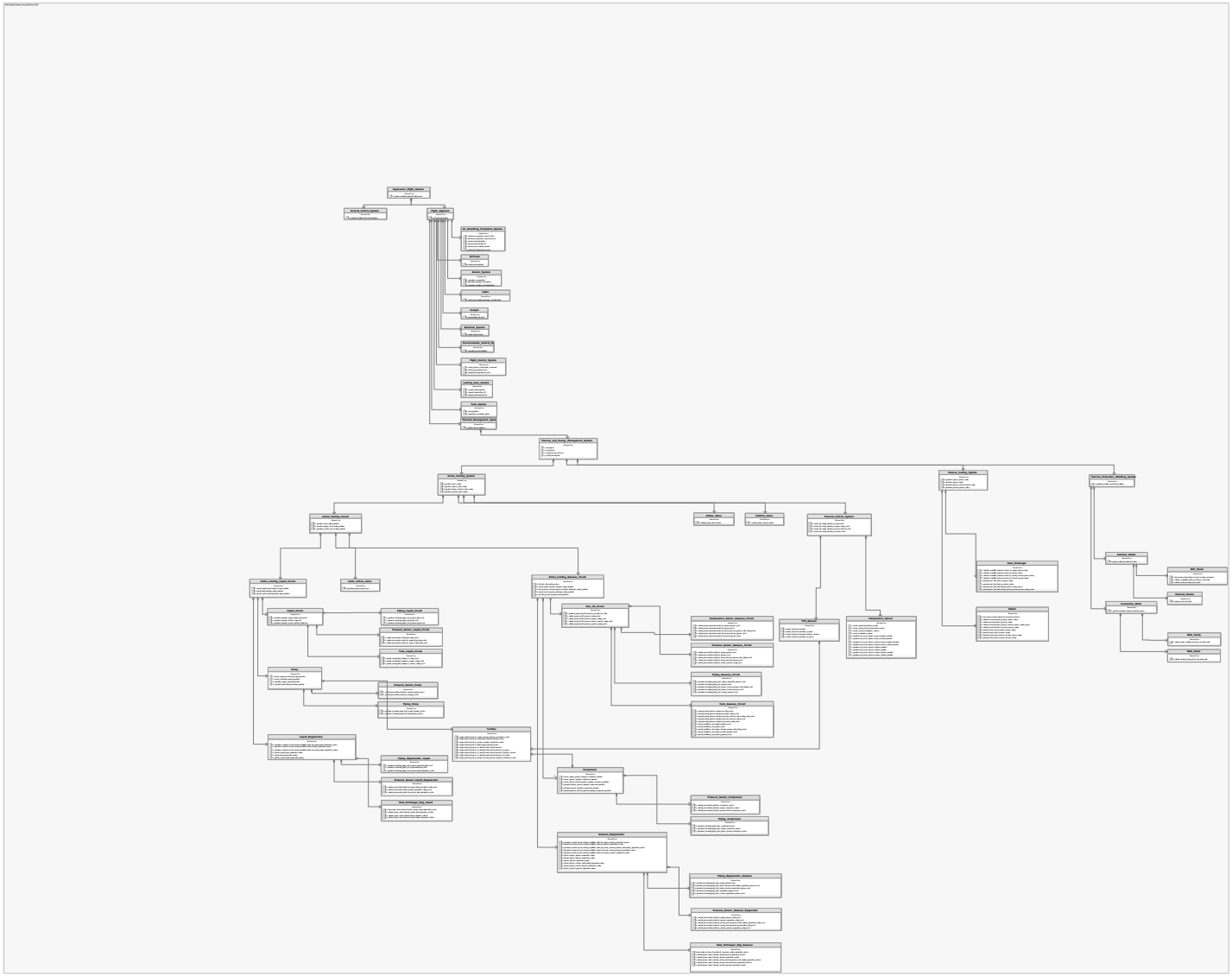
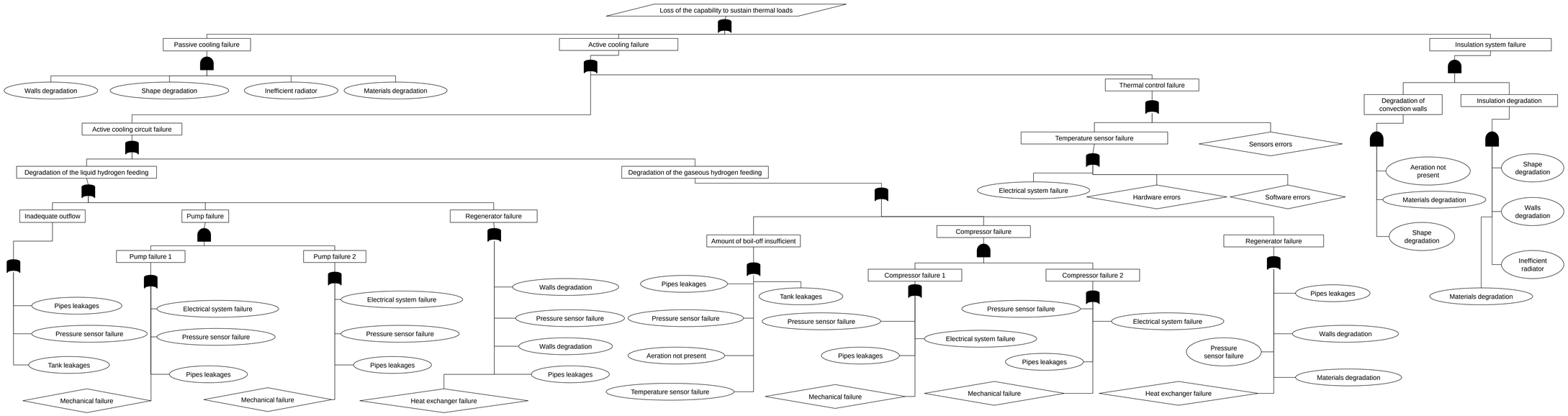
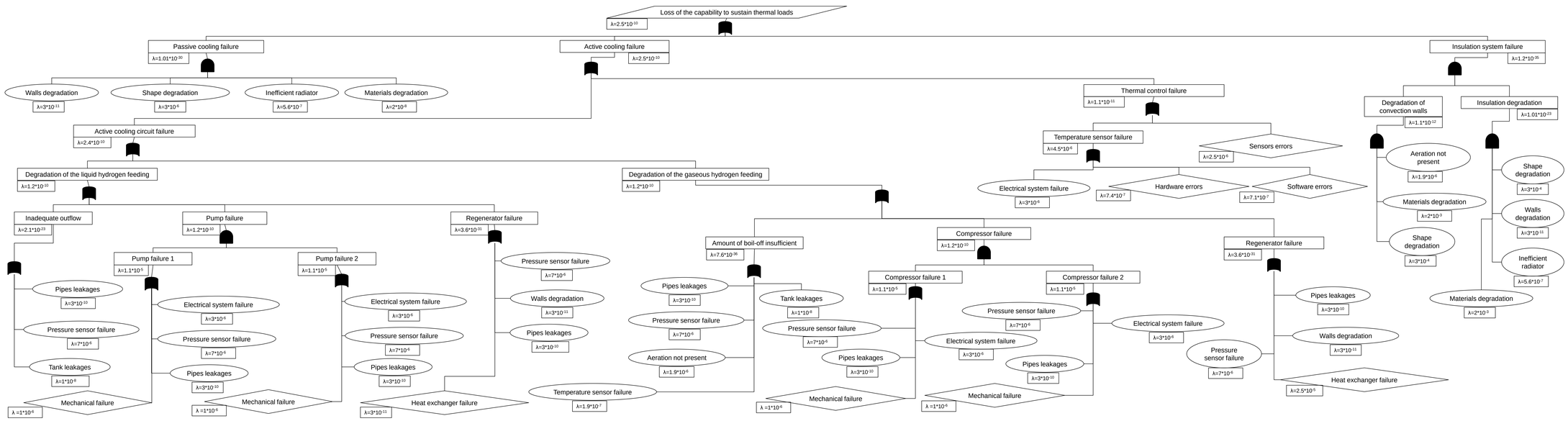


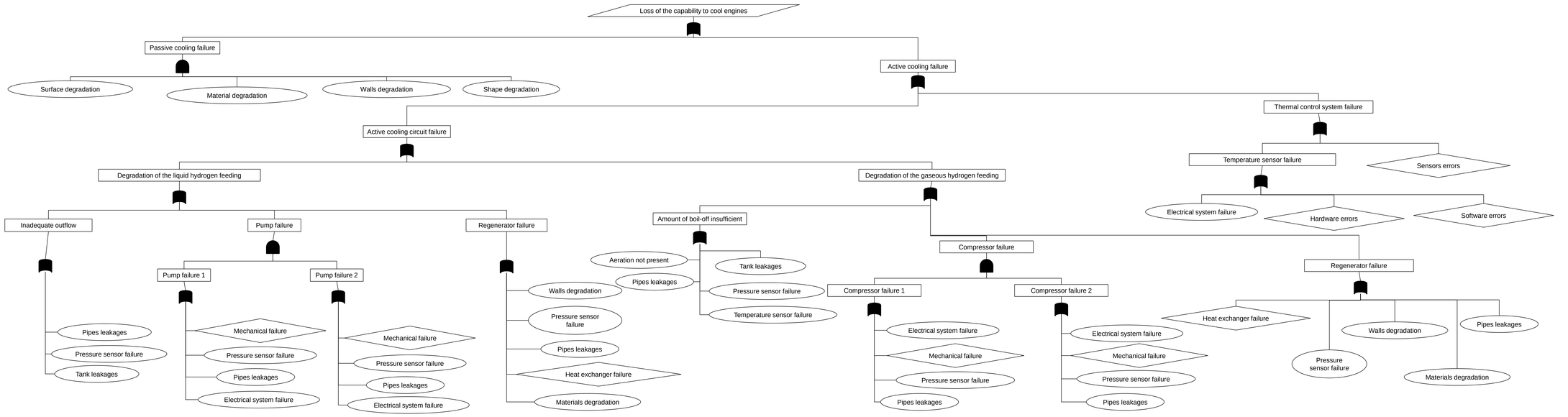
FTA (devices): Loss of the capability to sustain thermal loads



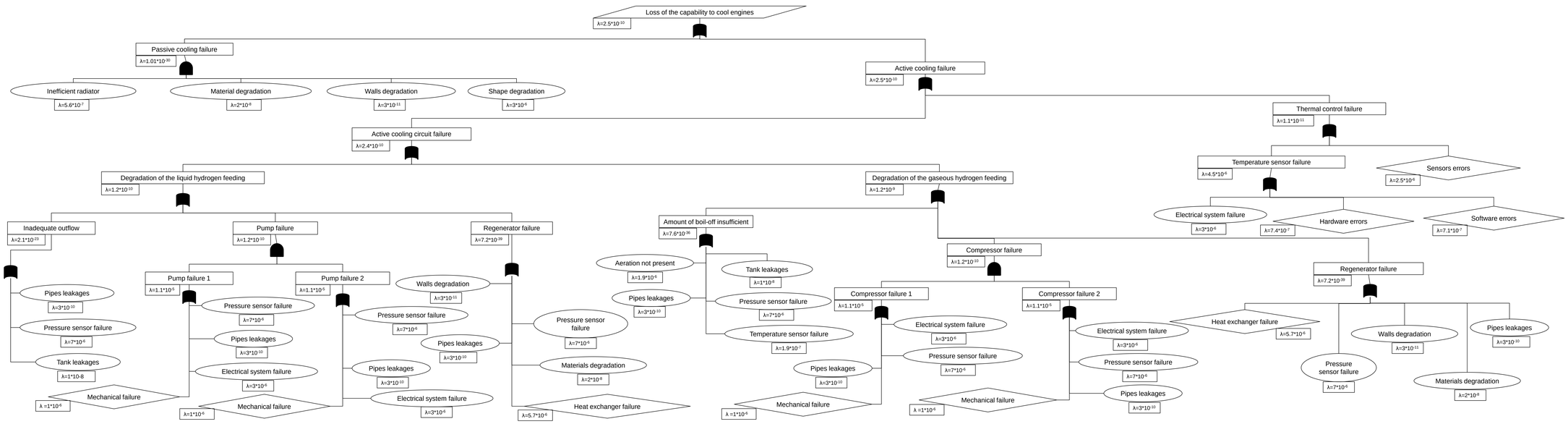
FTA (devices): Loss of the capability to sustain thermal loads (Bottom-up approach)



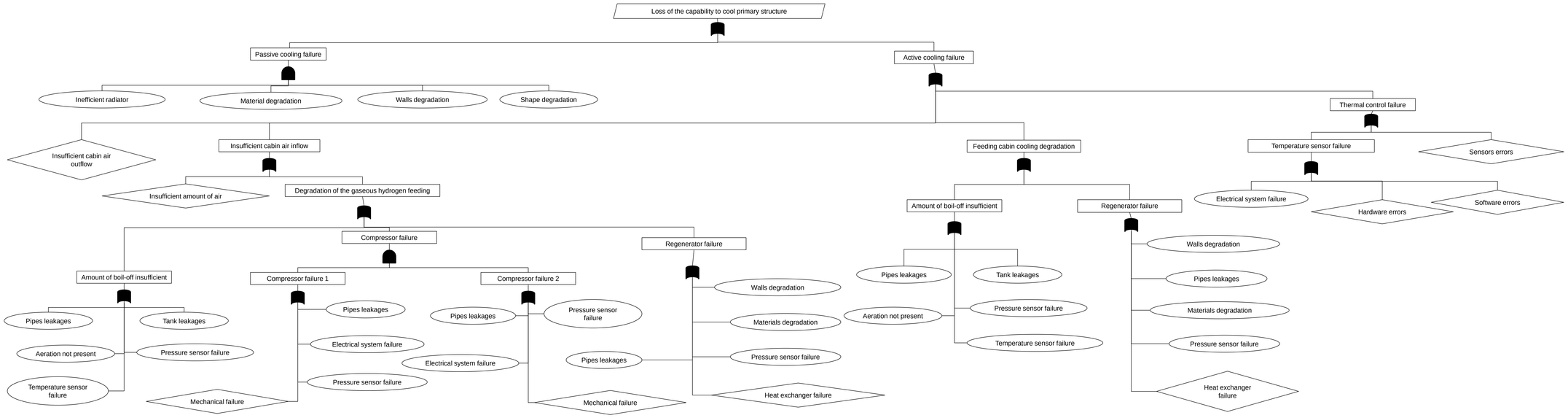
FTA (devices): Loss of the capability to cool the engines



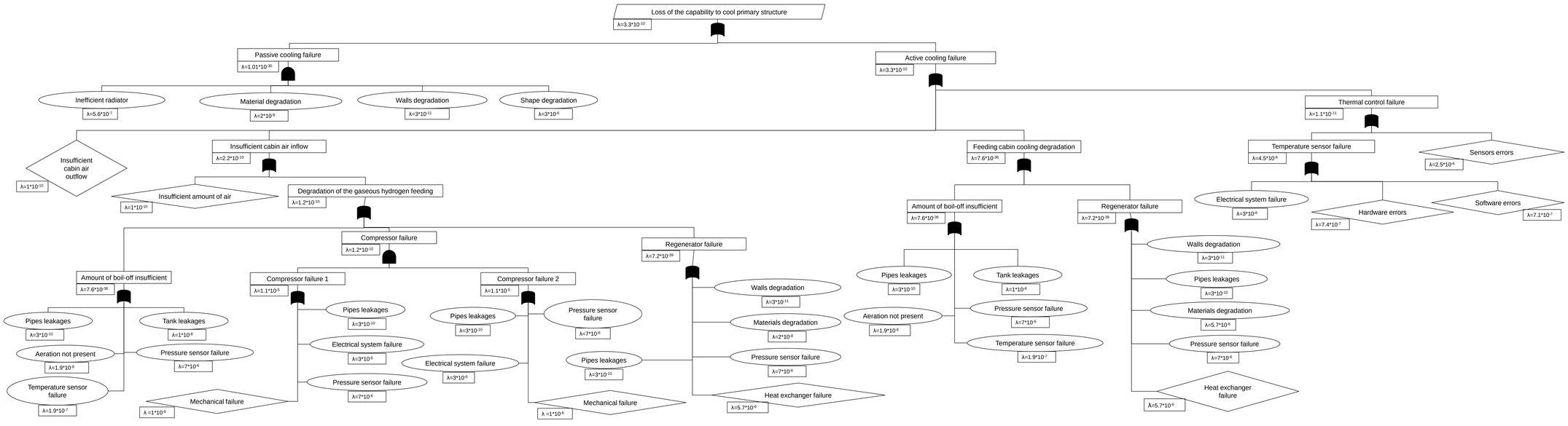
FTA (devices): Loss of the capability to cool the engines (Bottom-up approach)



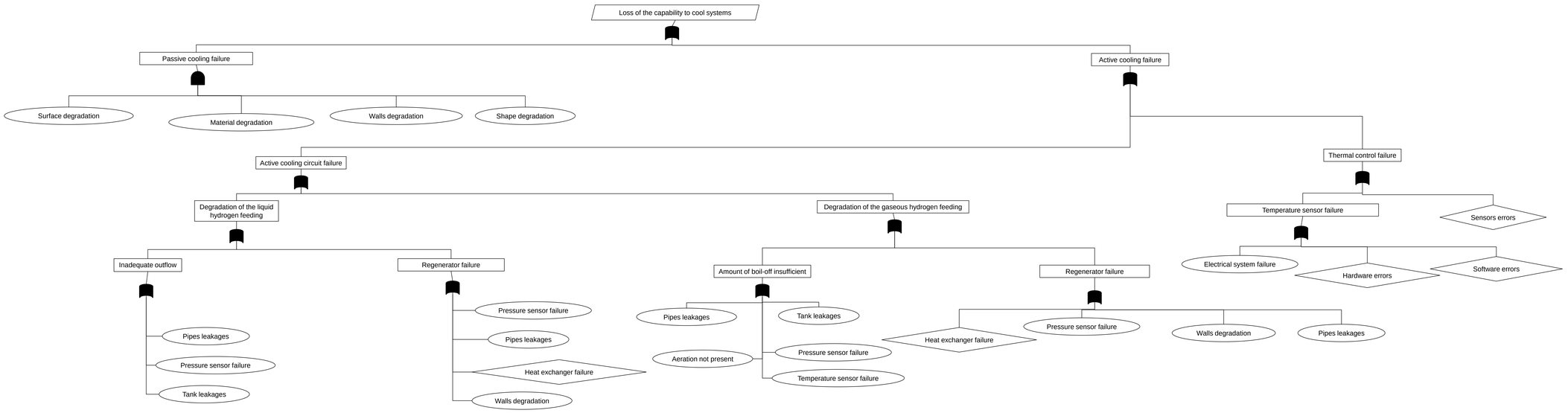
FTA (devices): Loss of the capability to cool the primary structure



FTA (devices): Loss of the capability to cool the primary structure (Bottom-up approach)



FTA (devices): Loss of the capability to cool the systems



FTA (devices): Loss of the capability to cool the systems (Bottom-up approach)