In [ ]:

```
package ComponentRequirements {
    import BatteryPowerCalculation::*;
    import HAPMassCalculation::*;
    import EstimatedPowerCalculation ::*;
    requirement <'CR'> HAPComponentRequirements {
        requirement <'CR1'> PayloadSubsystem {
            requirement <'CR1.1'> ImagingSystem {
                doc /* Shall integrate high-resolution optical camera providing
                400 sq.km scanning area with long-range visibility
                 and environmental change recording capability,
                it will change multiple images into composite mosaics  */
                //satisfies SR1.1, SR1.2
            }
            requirement <'CR1.2'> Radarsystem {
                doc /* Shall deliver high-precision change detection with 0.5m resolution,
                detecting natural diasters ,environmentalchanges */
                //satisfies SR1.3, SR1.5
            }
            requirement <'CR1.3'> Spectrometersystem {
                doc /* Shall provide real-time hyperspectral processing
                (400-2500nm) with 5nm resolution,
                analyzing atmospheric air quality parameters*/
                //satisfies SR1.6
            }
           requirement <'CR1.4'> Sensor {
                doc /* Shall include  multispectral sensor
                for environmental monitoring and tracking  */
                //satisfies SR1.1, SR1.2, SR1.5
            }
      }
        requirement <'CR2'> StructuralSubsystem {
            //Verifieing using Verification cases
            requirement <'CR2.1'> AirframeStructure {
                doc /* Shall use carbon fiber sandwich structure with:
                     - Total mass ≤130kg (including mounts)
                     - Wingspan ≤27m
                     - Length ≤11m  */

                 attribute totalWeight=totalMass;
```

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            constraint MassRequirement {
                totalWeight <= 130[kg]
                 }
            //satisfies SR2.1, SR2.7, SR2.8, /// verification case
        }
        requirement <'CR2.2'> StratosphericThermalManagement {
            doc /* shall operate reliably in an ambient temperature
            range between -60°C and +60°C */
            //satisfies SR2.4
        }
    requirement <'CR2.3'> PowerSubsystem {
    //Verified using Analzsis Cases
        requirement <'CR2.3.1'> SolarEnergy {
            attribute SolarEnergy =40800;  // Wh
            doc /* shall provide power using solar energy per day approximately 40,800Wh */
            //satisfies SR2.2, SR2.1// used in power Analysis
                //A HAP with 10 m² solar panels at 25% efficiency generates:
                //Solar Power=1360W/m²×10m²×0.25=3400W (3.4 kW)
                //Solar energy per day = Solar Power × Sunlight Hours
                //Solar energy per day= 3400W * 12 = 40,800wh
               //(e.g., 12 hours daylight at 3.4 kW → 40.8 kWh)
        }
     requirement <'CR2.3.2'> BatterySystem {
         doc /*shall provide power using battery the estimated battery power
         capacity is approximately 50kWh */
                 attribute powerBattery= capacity;
                //satisfies SR2.3,Package BatteryPowerCalculation// battery capacity is 1800
         // capacity of battery = watt * hours = 4166w*12hr=49,992wh
         // a lithium battery capacity is 50kWh
        }

       doc /* shall have an estimated power for HAP system that is
       solar energy per day * battery capacity that is approximately 90,792Wh */
            attribute EstimatedPower = estimatedPower;

    }
    requirement <'CR2.4'> PropulsionSubsystem {
        requirement <'CR2.4.1'> AltitudeControlSystem {
            doc /* Shall maintain an altitude at 20km within the stratosphere.*/
            //satisfies SR2.5
        }
```

```
            }

        }

    }

}
```