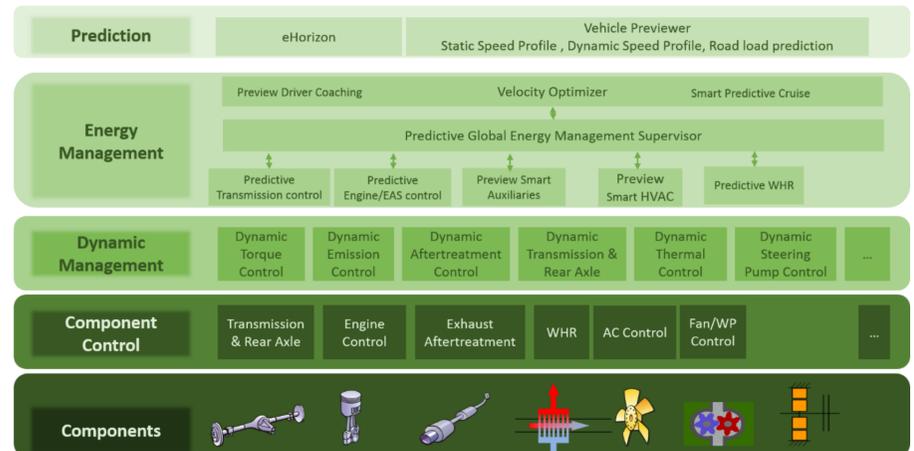


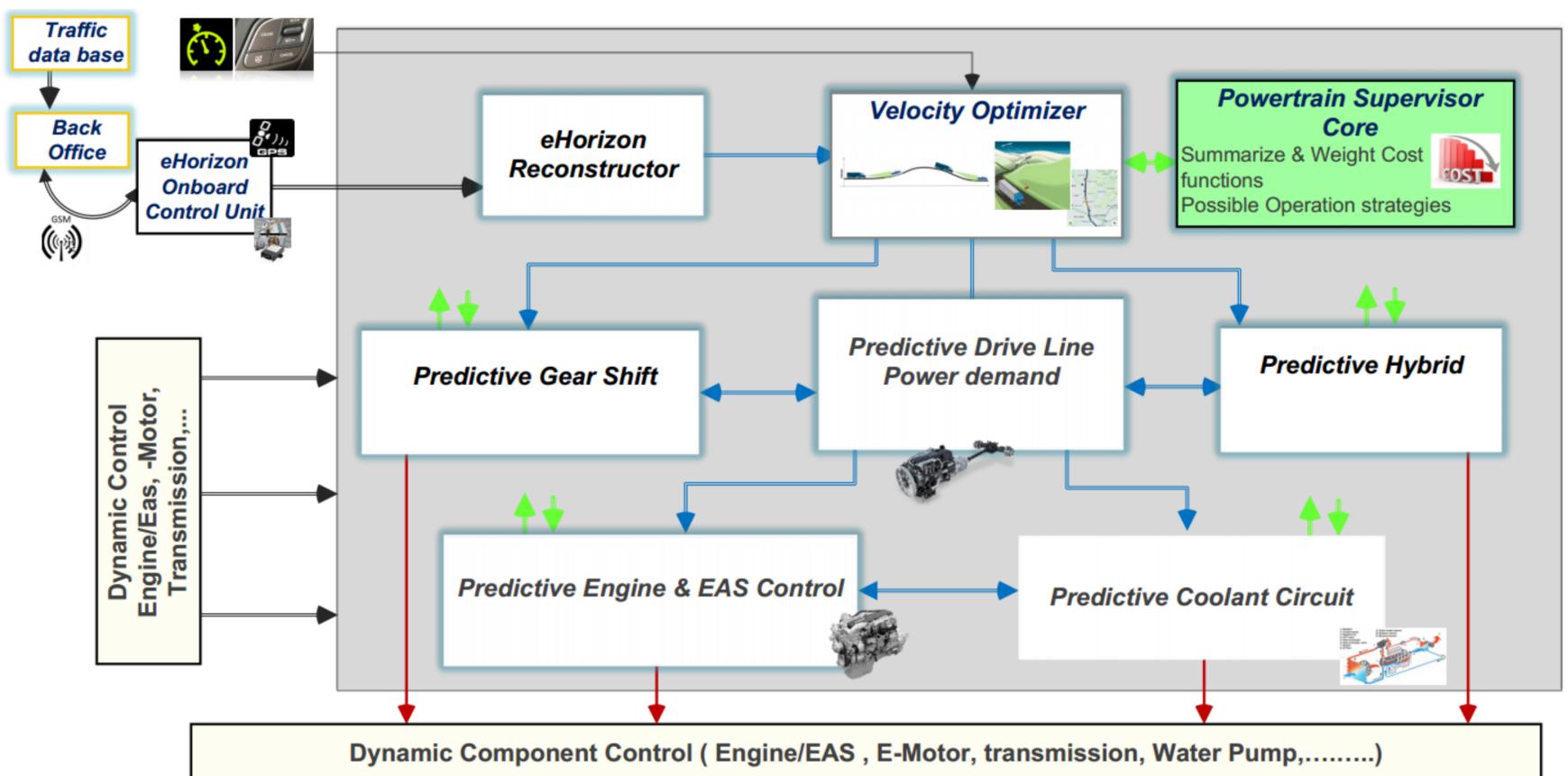
Predictive Global Powertrain and Vehicle Supervisor

Challenges and solutions: Fuel economy is a key aspect to **reduce operating costs and improve efficiency of freight traffic**, thus increasing truck competitiveness. The efficient coordination of the different energy sources and sinks – **global energy manager**, further enhanced by comprehensive environmental information – **predictive control** – will significantly improve trucks' energy efficiency.



IMPERIUM's contributions: At the vehicle velocity optimization level, it is possible, that velocity change requests are made. These velocity change requests can come from other optimizers, which use the velocity profile as basis, (e.g. in a thermal optimization loop a higher velocity could be more convenient) or from adaptive cruise control, for example if another slower vehicle is detected by the radar. The information exchange and coordination is handled by the Powertrain Controller. The velocity change request needs to be combined with an efficiency factor or cost. The velocity optimizer can now estimate what following the velocity change request would cost in terms of fuel consumption, and it can update its velocity profile based on this value as well as on the priority. The task of the energy management supervisor controller (EM-SC) is to suggest a driving strategy, as well as a control strategy for whole powertrain and with its components like combustion engine, electric motor, battery, transmission or auxiliaries. The driving strategy is to a significant extent derived from information of the road ahead and from information about other traffic participants. The main objective of developed driving strategy is reduction of fuel consumption and emissions by simultaneously ensuring reasonable journey time and driver acceptance criteria.

Impact / what's next: At the end of the IMPERIUM project, a TRL 7 (system prototype demonstration in operational environment) was achieved. The fuel consumption benefit achieved with the strategy can increase the benefit of non predictive Eco-Roll functionalities.



The research leading to these results has received funding from the European Union's Seventh Framework Programme (FP7/2007-2013) under grant agreement n° 608988