Potentials of collaboration:

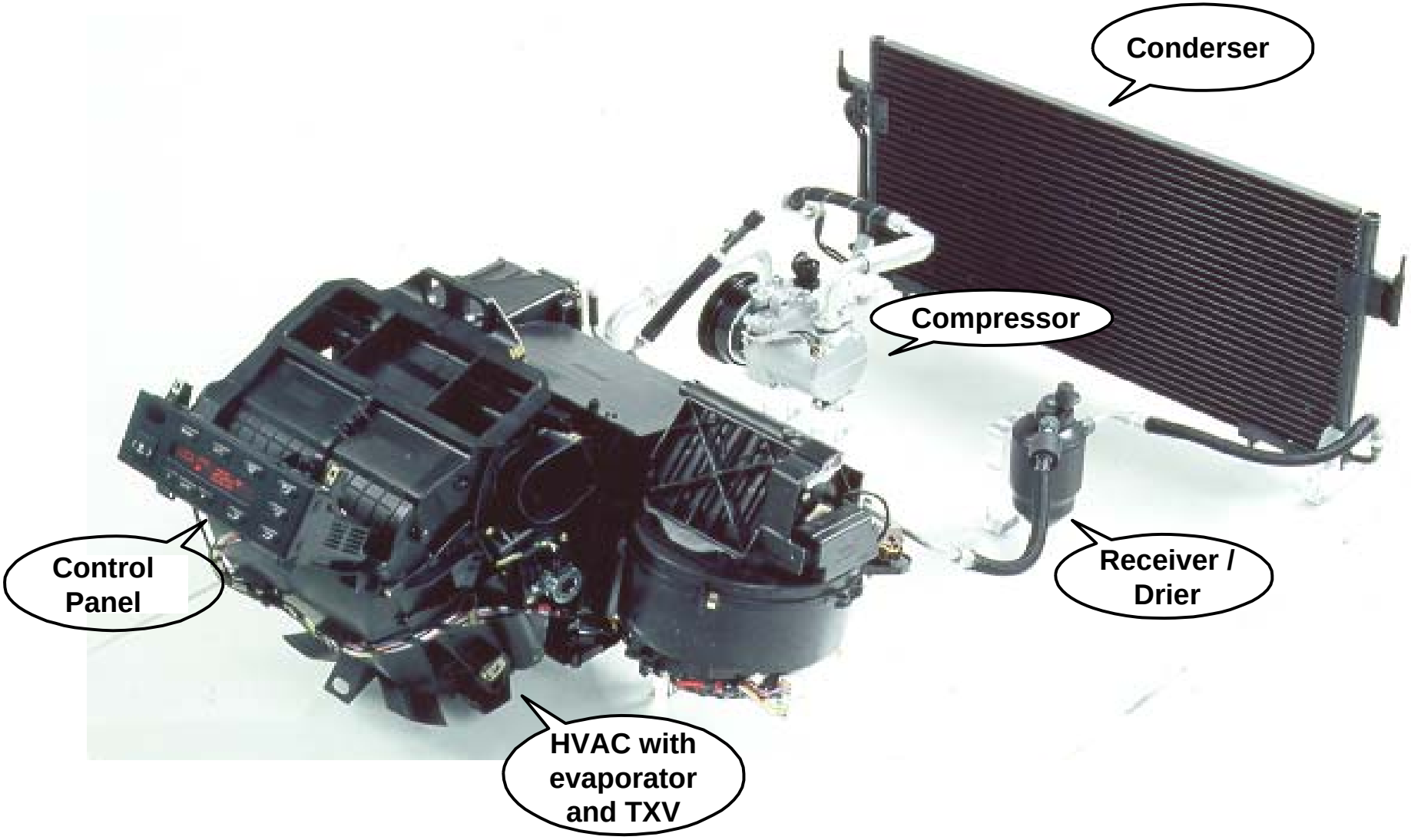
Aerospace – Railway - Automotive

Discussion Mark Sondermann,

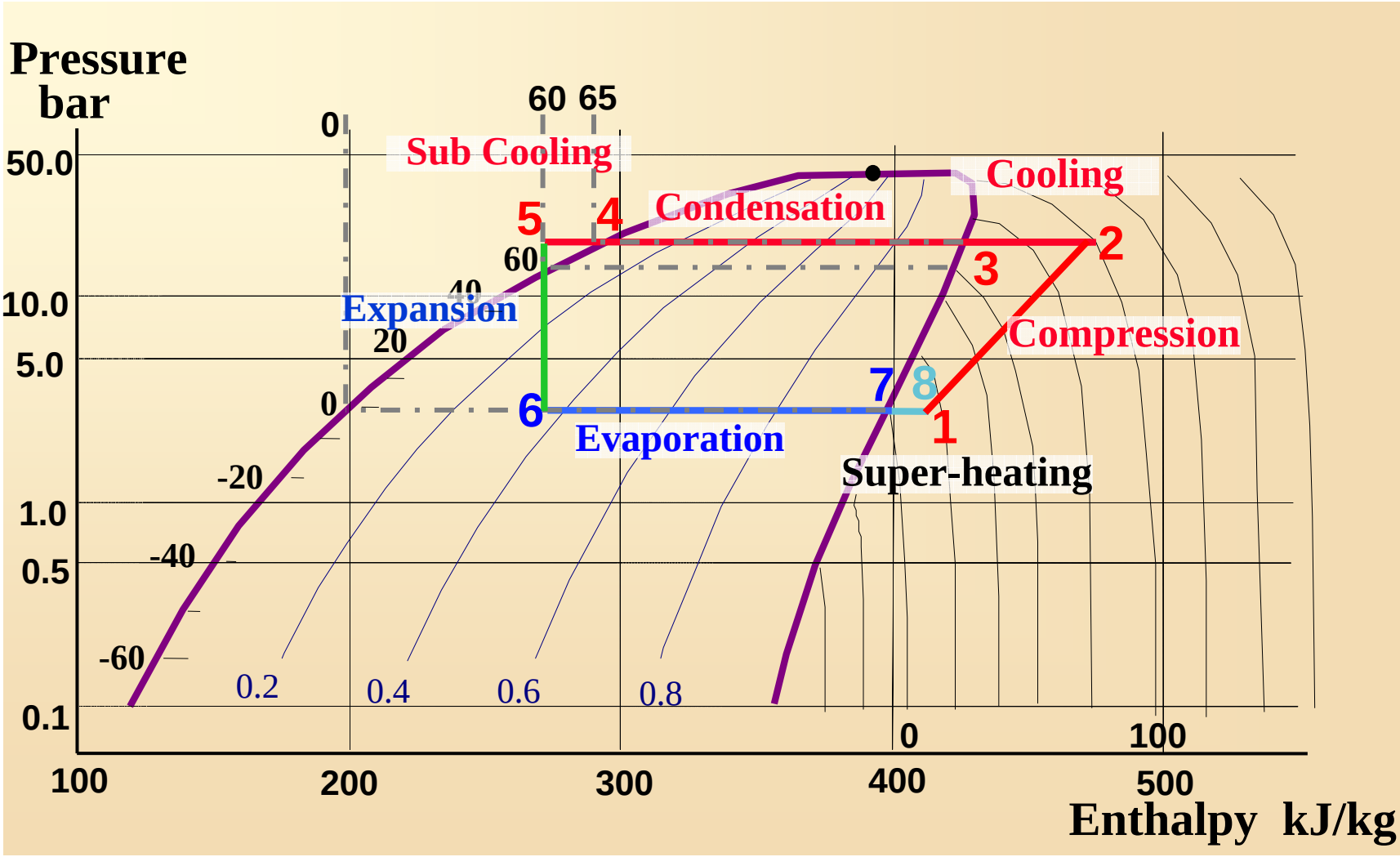
Fa. Valeo 16.4.2012

valeo added™

System Components

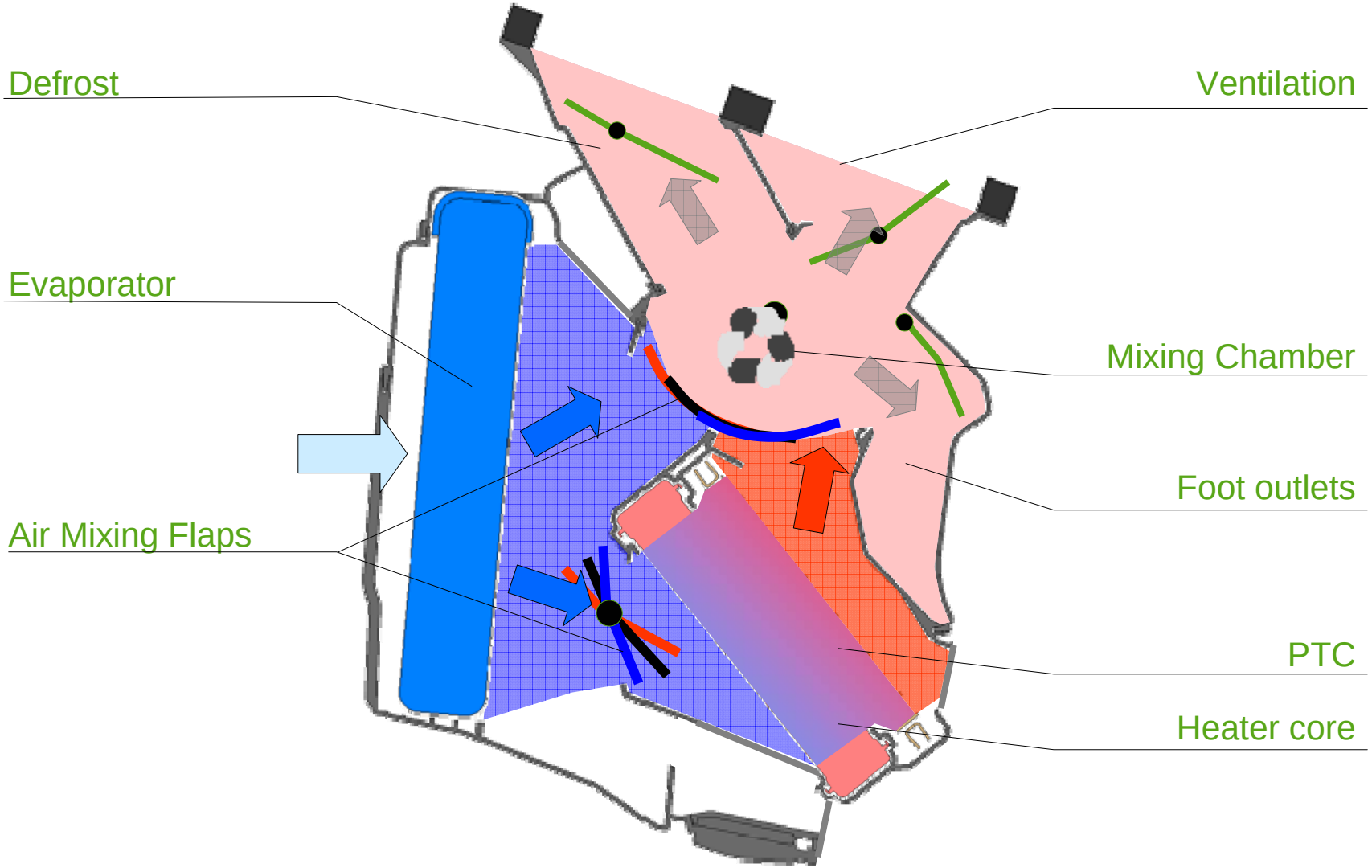


Physical Working Principle in log ph - Diagram



Architecture HVAC Module

Cooling – Heating – Temperature adjustment



Development Drivers in Automotive Applications

Architectures

Dust / Water / Sand / Salt / Gases

Platform-solutions

Package restrictions

Legislations

New refrigerants

Efficiency / fuel consumption

ELV vehicle (2000/53/EG)

F-Gas Regulation (2006/40/EG)

New power trains

Heating power deficit

PTC /Heat Pumps

Engine-Stopp

E-compressor / Coolant storage

Battery cooling

Hydrogen in cooling loops

Comfort

Multi-zone

Temperature- / air distribution

Performance

Wellness

Fragrance/ Vitamin/Ions

Parking heating / A/C

Mapping
Core targets in product development

Personal view – to be discussed

Category	Automotive	Railway	Aviation
Priorities	1. Comfort 2. Performance 3. Cost 4. Efficiency 5. Weight 6. Durability	1. Durability 2. Efficiency 3. Cost 4. Weight 5. Performance 6. Comfort	1. Weight 2. Durability 3. Efficiency 4. Cost 5. Performance 6. Comfort

Mapping
Development Environment

Personal view – to be discussed

Category	Automotive	Railway	Aviation
Cabin	~ 1,5 qm	~ 25 – 350qm	~ 200 - 400qm
Individual Controls	Ja	Nein	Nein
High Dynamic performance requirements	Ja	Nein	Ja
Operating time	5000h	estimated 50.000h	estimated 50.000h
Production volume / a	100.000 - 2.000.000	estimated 50-100	estimated 50-100

Automotive technology, naturally