DEMAND-CONTROLLED VENTILATION DCV

- Limitations and definitions

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LIMITATIONS AND DEFINITIONS

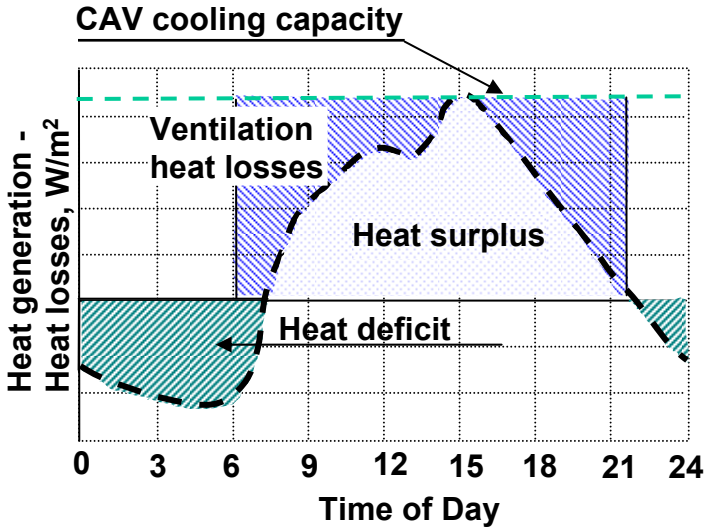
- Alternative definitions are of course possible
- Our starting point is the V in HVAC
- Ventilation (ASHRAE): “Process of supplying or removing air by natural or mechanical means to or from a space”
- Control-on-demand *ventilation rate*

  → DCV
- Control-on-demand air enthalpy or air composition

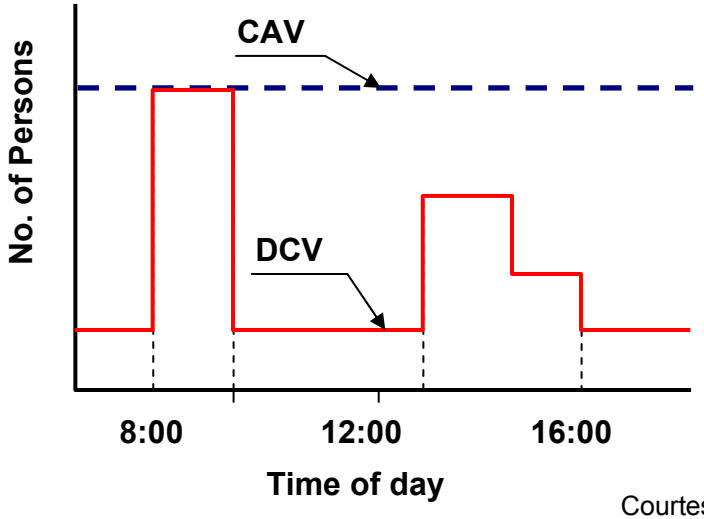
  → DCAC

PRINCIPLE APPLICATIONS OF DCV

- **DCV for thermal comfort control** (removal of heat)



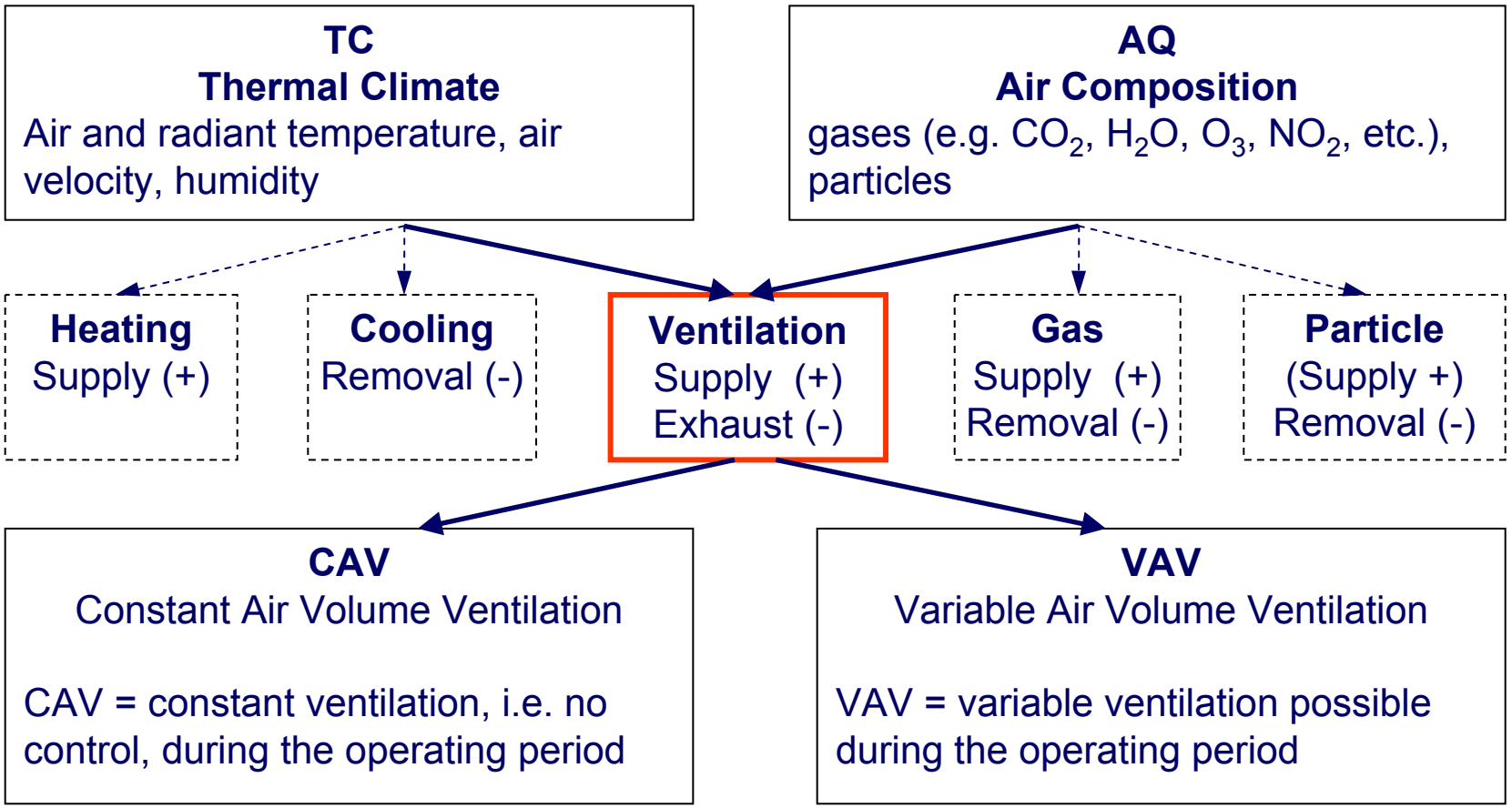
- **DCV for indoor air quality control** (removal of pollutants)



Courtesy of M-L Maripuu

HVAC SYSTEMS

Demand: Specification of thermal climate, air composition (to meet a desired perceived air quality) or some other demand factor (e.g. safety requirements)



VENTILATION

CAV

- **Constant Air Volume Ventilation** (1 or 2 steps, e.g. on/off, max/min)
- CAV = constant ventilation, i.e. no control, during the operating period

Examples of CAV:

- manual operation (e.g. on/off)
- time control (e.g. day/night)
- supply-air temperature control (temperature COD)
- outdoor-air/recirculation-air control (enthalpy COD)

VAV

- **Variable Air Volume Ventilation** (> 2 steps or continuous variation)
- VAV = variable ventilation possible during the operating period

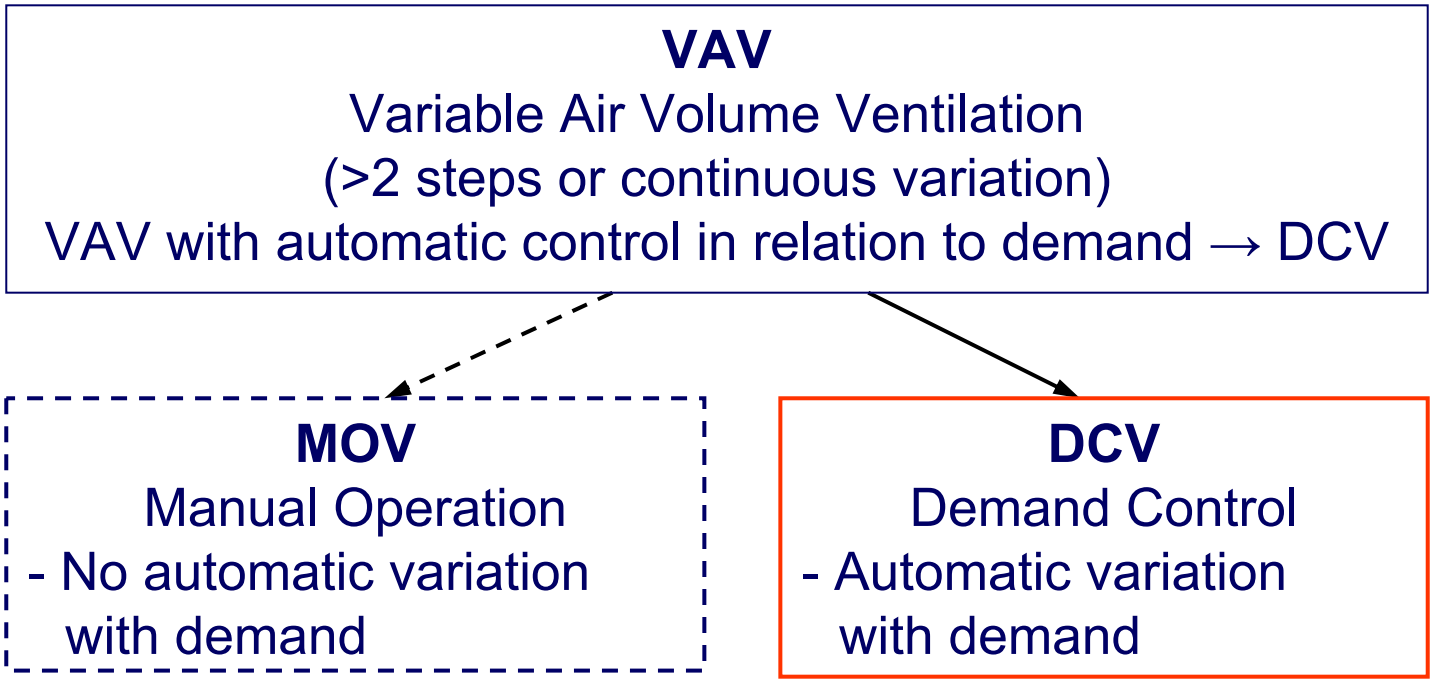
Examples of VAV:

- Manual Operation (MOV)
- Open-loop Control (OCV)
- Closed-loop Control (CCV)

VAV with automatic control-on-demand → DCV

VAV AND DCV

- **DCV is a subgroup of VAV**
- VAV with automatic control-on-demand → DCV



DEMAND CONTROLLED VENTILATION

- **Specify the demand:** Thermal climate, air composition, safety etc.
- **Specify the control:** Must be related to the demand parameter by measurement or by prediction.

DCV system solutions

OCV

Open-loop Control

Feed-forward signal from *sensors,*
e.g. in the outdoor air,
or by *prediction*[1)]
- temperature (e.g. room),
- humidity,
- CO_2 or other gas sensors,
- particle concentration,
- occupancy .....

CCV

Closed-loop Control

Feedback signal from sensors
e.g. in the room air
- temperature,
- humidity,
- CO_2 or other gas sensors,
- particle concentration,
- occupancy

.....

1) Prediction may be by weather forecast, past occupancy records etc.