Data Abstractions: † = not configurable in EM | [possible extensions]

aggregate item [portfolio] **[S*]**
- **(aggregate items** [groups of spaces])
  - **individual item** [space] **[S]**
    - (**partial item** [space submeter])
      - **links**
        - [point 1]
        - [point 2]
        - …
        - [point n]
      - **categorical attributes**
        - [primary use]
        - [space type]
        - [use_type]†
        - [weather station ID]
        - [TMY (Typical Meteorological Year) data source]
        - [floor space unit]
        - [custom descriptor tag(s)]
        - ~~[end-use(s)]~~
      - **spatial attributes**
        - [address (location)]
        - [city]†
        - [province]†
        - [latitude]†
        - [longitude]†
        - [time zone]†
      - **static quantitative attributes**
        - [# occupants]
          - [# occupants subdivided by descriptor tag]
        - [year constructed (space age)]
        - [floor space]
          - [floor space subdivided by descriptor tag]
        - [# weekly operating hours]†
        - [base temperature]† **(?)**
      - **cyclical temporal categorical attribute**
        - [operating hours (e.g. open–closed, day–evening–night)]
          - [operating hours by descriptor tag]

item [point] **[P]**
- **temporal quantitative attribute**
  - [point value]
- **categorical attributes**
  - [resource] (e.g. *electricity, steam*)
  - [quantity] (e.g. *energy, mass, avg. power*)
  - [type] (e.g. *monitored, conversion, baseline*)
  - [unit] (e.g. *kW, kWh, GJ, lb, lb/h*)
  - [direction] (consumption vs. generation)
- **static quantitative attributes**
  - [update frequency]
- **links**
  - [space i]
  - [datalogger j]
  - [connector k]

item [space-point dyad] **[S-P]**
- **static quantitative attributes**
  - [cost conversion ratio]
  - [energy conversion ratio]
  - [Green House Gas conversion ratio]
  - [normal range ±%]
    - [coarse-grained normal range ±%]
    - [fine-grained normal range ±%]

weather [W]
- **temporal quantitative attribute**
  - [OAT: outside air temperature]
  - [relative humidity]
  - [wind speed]
  - [precipitation]
  - …
- **temporal categorical attribute**
  - [wind direction]

temporal intervals [T]
- [annual]
  - [semi-annual]
    - [quarter / season]
      - [month]
        - [week]
          - [day]
            - [operating hours]
              - [hour]
              - [1/4 hour]

derived attributes [D1] [items **[P]** + temporal interval **[T]**]
- **quantitative attribute**: average, sum, distribution, range, SD
  - [consumption]
  - [cost]
  - [average demand]
  - [peak demand]
  - [absolute savings / waste: point value 1 – point value 2]
  - [relative savings / waste: point value 1 / point value 2]
  - [cumulative savings]
- **temporal quantitative attribute**
  - [schedule: derivative of demand]

see Excel charts

derived attributes [D2] [item **[S]** + weather **[W]** + **[T]**]
- **quantitative attribute**
  - [HDD: base temperature – OAT]
  - [CDD: OAT – base temperature]

derived attributes [D3]
[item **[S+ P]** + derived attributes **[D1,D2]** + temporal interval **[T]**]
- **quantitative attribute**
  - [attribute [**D1**] per area]
    (e.g. energy intensity: consumption normalized by square footage)
  - [average baseload]
  - [attribute [**D1**] normalized by HDDs, CDDs]
  - [attribute [**D1**] normalized by # occupants]
  - [attribute [**D1**] normalized by # operating hours]
  - [attribute [**D1**] faceted by schedule interval]
  - ~~[end-use disaggregation]~~

out of scope for now

derived attributes [D4] [multiple items **[S + P]** + **[D1, D2, D3]**]
- **ordinal attribute**
  - ranking
- **quantitative attribute**
  - [contribution to aggregate derived attribute]

derived attributes [D5] [**[S + P]** + ranking **[D4]** + N t. intervals **[T]**]
- **quantitative attribute**
  - [change in ranking]