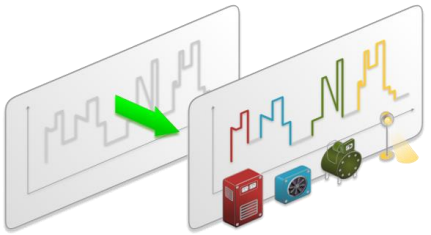
Blind Identification via Lifting

* In many CPS applications, observations arise from **unknown dynamics** driven by **unknown inputs**.
* *Example*: Energy disaggregation
  * **Observed:** Aggregate energy consumption.
  * **Unknown:** Device dynamics, and device usage patterns.

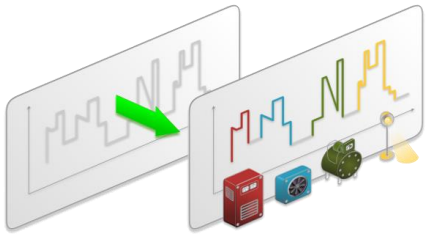


* *Example*: Occupancy estimation
  * **Observed:** Door sensor measurements.
  * **Unknown:** Heat dynamics of the building, and number of occupants.

FORCES
FOUNDATIONS OF RESILIENT CYBER-PHYSICAL SYSTEMS

Blind Identification via Lifting

* Simultaneously recovering both the inputs and the dynamics from the observations is **ill-posed**. (This is the **blind identification** problem.)
* Motivated by our CPS problems, we assume our inputs lie in some **known subspace**.



* We can phrase the blind identification problem as a **constrained rank minimization** problem.
* Under some conditions, a convex relaxation can recover the **optimal solution** to the non-convex problem.
* These conditions can tell us **how many measurements are needed**!