# The Smart Health Data Deluge

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- **Characteristics of pervasive/smart health systems:**
  - We are capable of sensing immense amounts of data
  - Decisions will not be based on currently sensed data, but also historical data, models, …
  - Closing the loop can mean different things: continuous control vs. intervention
  - Controllers can be devices, humans, or both
  - *How do we close the loop when we are lost in data?*

- **Barriers to turning data into decisions**
  - The obvious: how do manage data with limited resources?
    - Limited processing, networking, storage, energy, … resources
  - Where to make the control decision?
    - Multi-stage control?
    - Quick decision: pre-processing, fusion, filtering, etc., directly on device (“triage model”)
    - Accurate decision: in-depth analysis on remote server; integration of historical data, models, etc.
    - Plus processing anywhere in between (e.g., fusing multiple sensor streams)
    - “Imprecise computation”: make preliminary decisions, confirm/revise afterwards (consequences?)

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- Predicting the control needs?
  - Can we take advantage of all that data to learn about user & environment?
  - “Shadow system” continuously simulating control scenarios?
  - Predict control needs & context: perform "pattern matching” instead of in-depth analysis?

- **Other considerations**
  - Controller = human. How can we guarantee stability?
  - What are acceptable trade-offs? Timeliness, accuracy, security?
  - Centralized control of many devices/subjects (prioritization?)
  - How to assess/measure “success” or “quality” of control loop itself?
    - Control both the plant AND the feedback loop?
      - Deciding on sensor needs
      - Changing sensor configurations
      - Take user input/feedback into consideration