YouCentric

Persistence Strategies in FHIR

Andy Stechishin &
Lorraine Constable

Persistence in FHIR

Where do put my stuff?

How do I get my stuff back?

How do I find my stuff?

DIKW

Data: symbols

Information: data that are processed to be useful; provides answers to "who", "what", "where", and "when" questions

Knowledge: application of data and information; answers "how" questions

Understanding: appreciation of "why"

Wisdom: evaluated understanding.

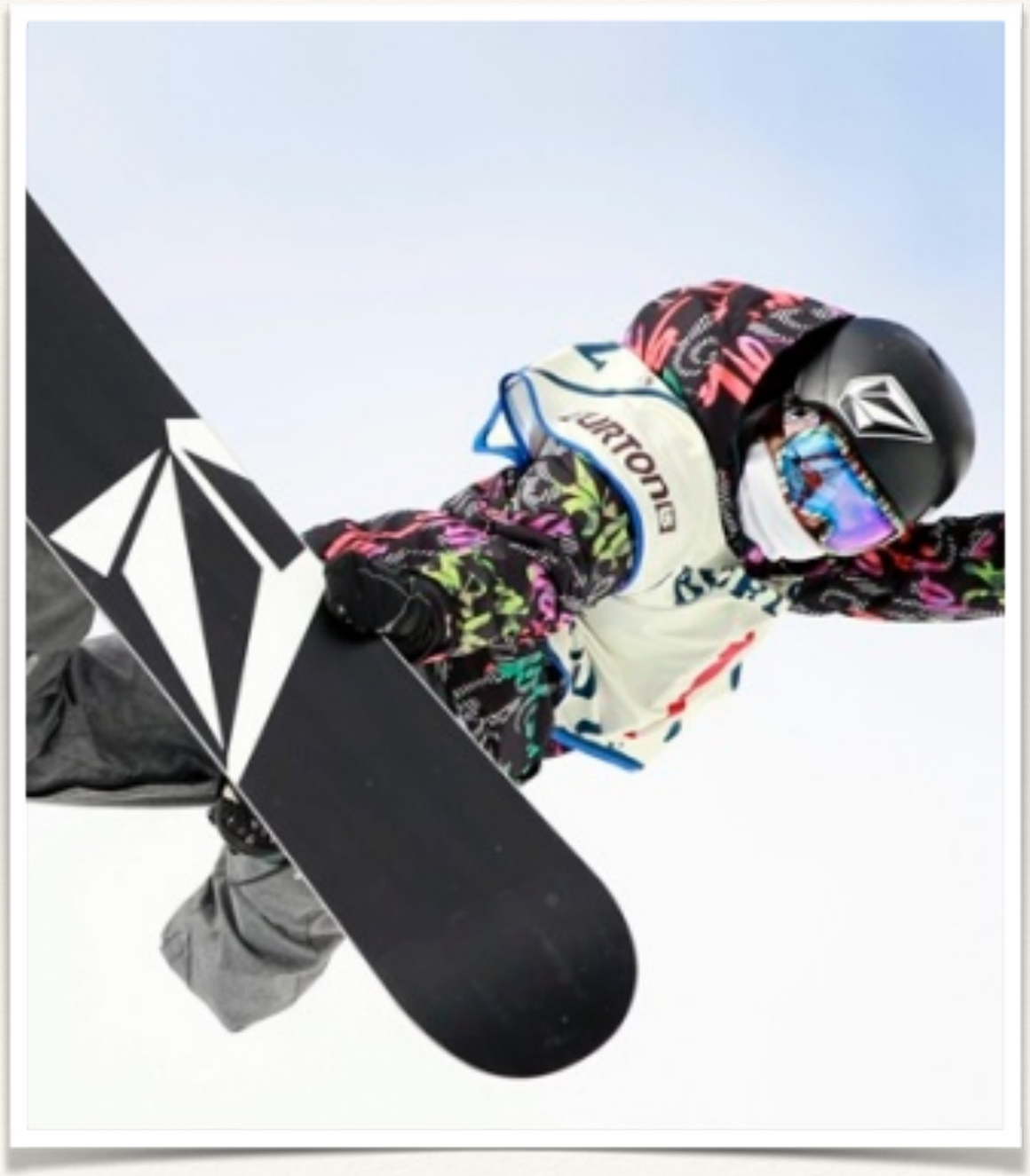
–Russell Ackoff

Persistence in FHIR

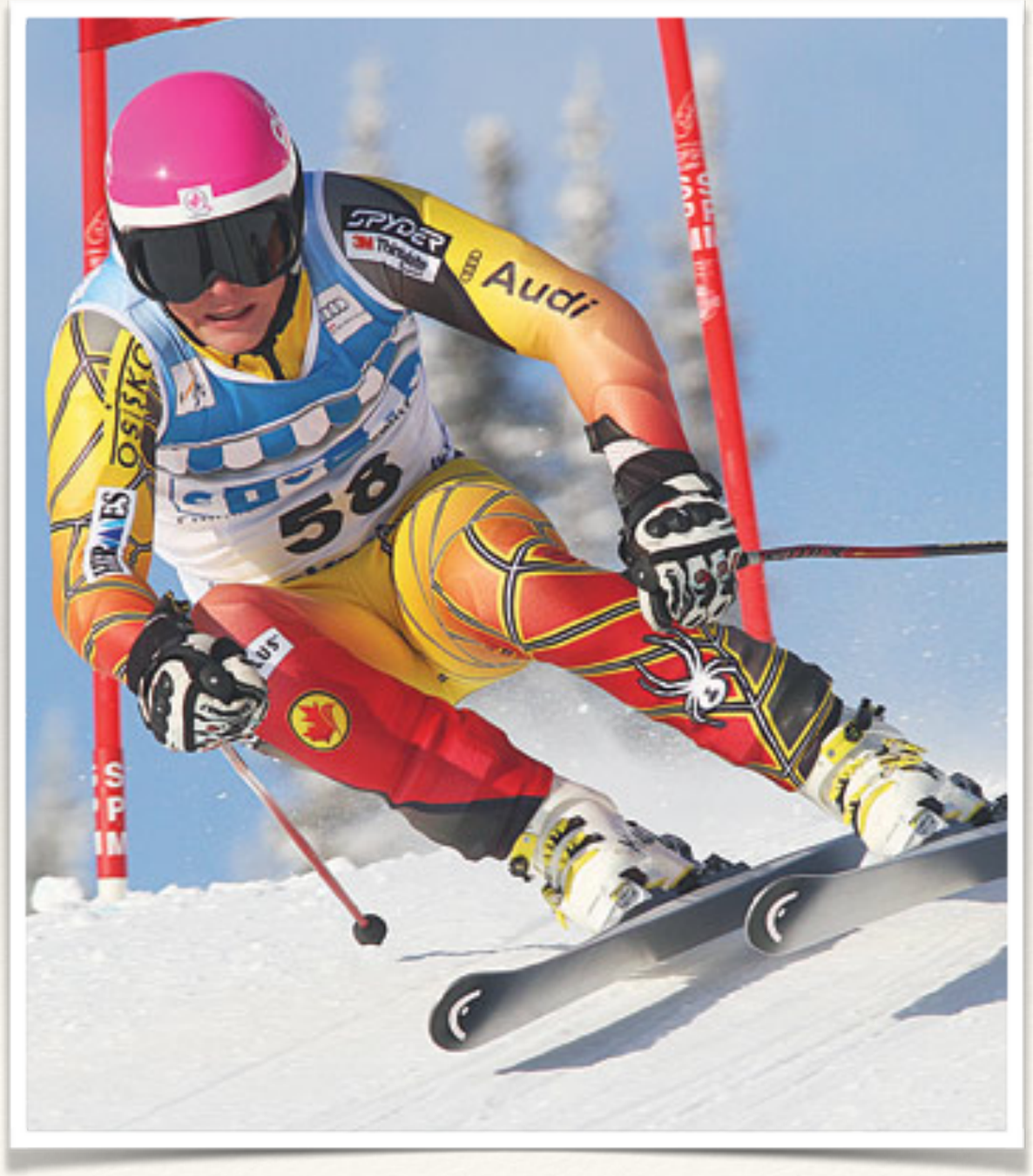
- Focus is three main approaches
- Compare and Contrast
- Extensions!
- Not an exhaustive list

Persistence in FHIR
No SQL

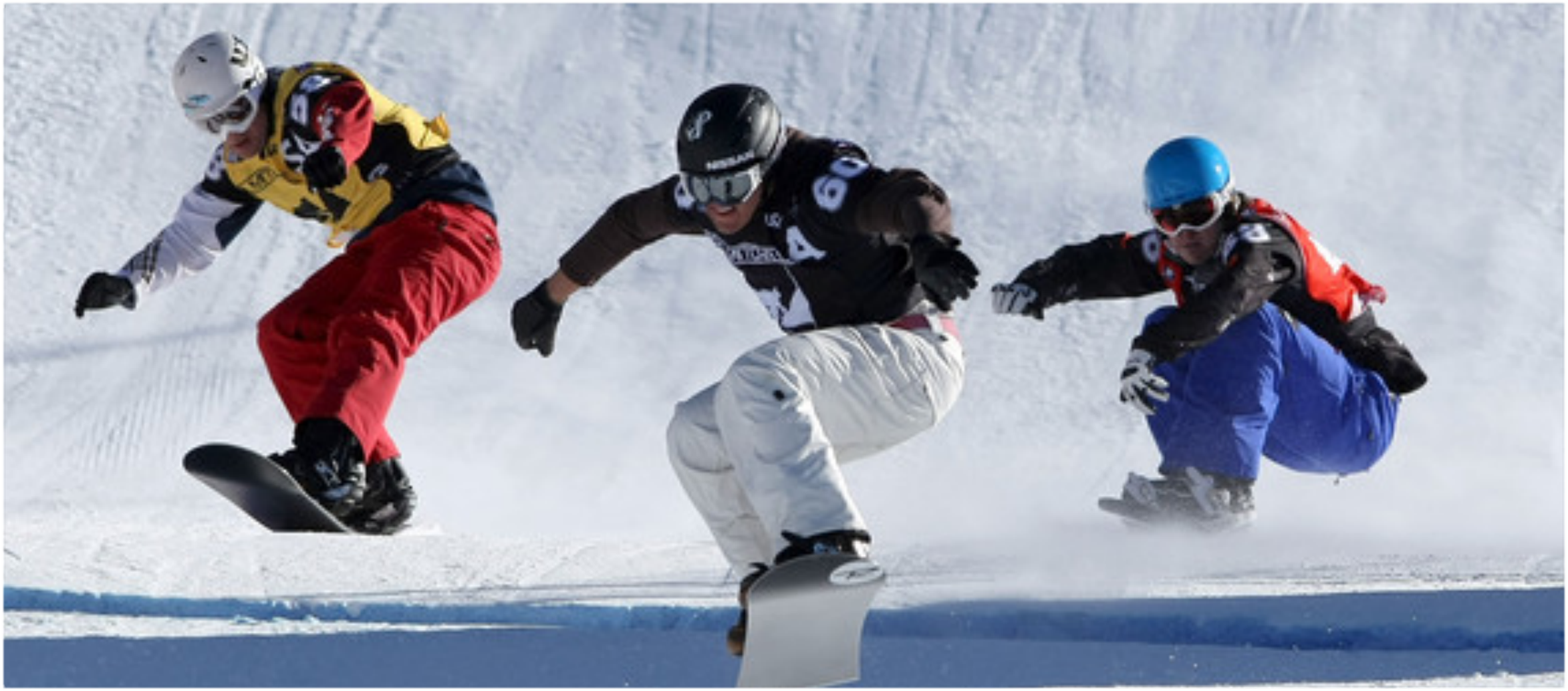
- The new Cool Kid on the Block
- MongoDB one popular example
- JSON syntax of many NoSQL databases appears attractive



Persistence in FHIR
Name-Value Pairs



- Use a Relational Database and do a ORM exercise
- Tradition SQL pattern for indeterminate data structures
- Tried and tested, advantages and pitfalls well known



Persistence in FHIR

Relational Hybrid Approach

- Use Relational DBs
- Store the Extra Stuff using Extended Types
- PostgreSQL HStore or JSON Column

Persistence in FHIR - NoSQL

- Many implementations to choose from
- Seems to align well with FHIR (particularly when using JSON)
- Resource serialization appears second nature (little or no coding)
- Common tool in the web developer's kit

Persistence in FHIR - NoSQL

- Non-standard query language = grumpy DBA's
- Not suited for analysis
- Does not have the same pedigree as the Relational contenders
- Fluid structure also makes it difficult to enforce local business rules (who needs integrity when you web-scale?)

Persistence in FHIR - NVP

- Traditional approach to variable data structures in a fixed-format DB
- Very easy / very efficient to query for only the presence of an extended attribute
- Future-proof against any new extension

Persistence in FHIR - NPV

- Queries on extended attributes can be extremely difficult
- This approach requires an unstitching/restitching of the data structures, data reconstitution is an involved, onerous process
- A large amount of up-front analysis to correctly set the extension/fixed column boundary

Persistence in FHIR - Hybrid

- Rapid query capability, structured data
- Ability to preserve original extended structures, some query capabilities into those extensions
- Mix and Match

Persistence in FHIR - Hybrid

- Requires careful analysis and design - determining where to draw the line between fixed and extended attributes can be difficult

- Querying into the hybrid areas falls out of the SQL standard - the mechanisms are no less proprietary than NoSQL

- In-flight redesign is cumbersome and difficult - all databases evolve

Persistence in FHIR - NoSQL

- Best Fits:
  - Resource Brokering applications
  - Store and Forward (Transient Datastores)
  - Snapshotting

Persistence in FHIR - NVP

- Best Fits:
  - In-Depth data analysis
  - Flexibility and Growth
  - Pulling the original resource back out is low priority

Persistence in FHIR - Hybrid

- Best Fits:
  - When a mix of Analysis with transactional Get/Put
  - When a large mix of resources from multiple sources need correlation
  - When the application needs to harvest key elements but wishes to retain the resource in a reproducible form