Data Preparation

The key to successful data science

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SDS 2016
September 16, 2016
Winterthur, Switzerland


Rolls-Royce


Royal Bank of Scotland

US Elections

The Age of Data Science?

The Reality of Data Science

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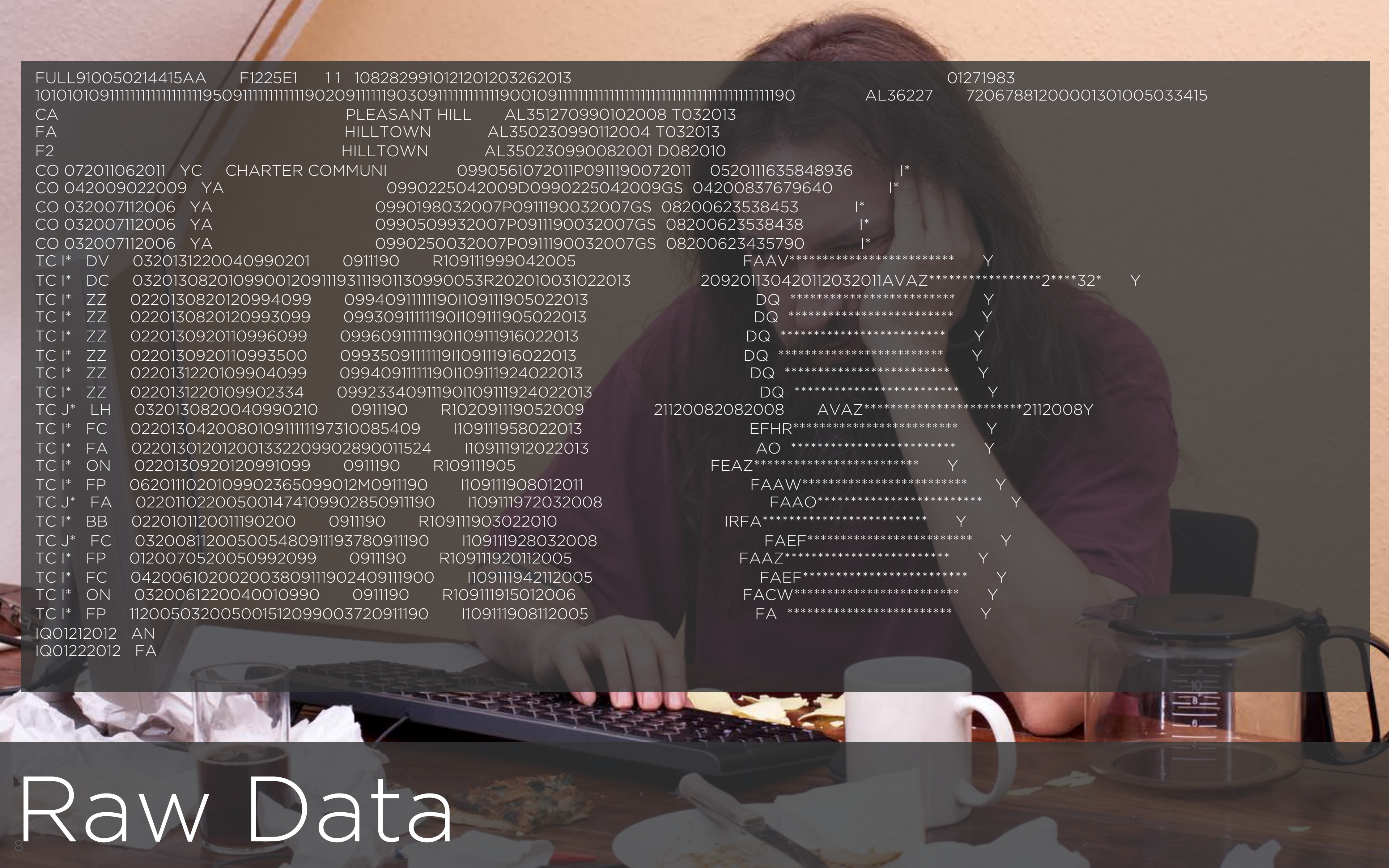

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Raw Data

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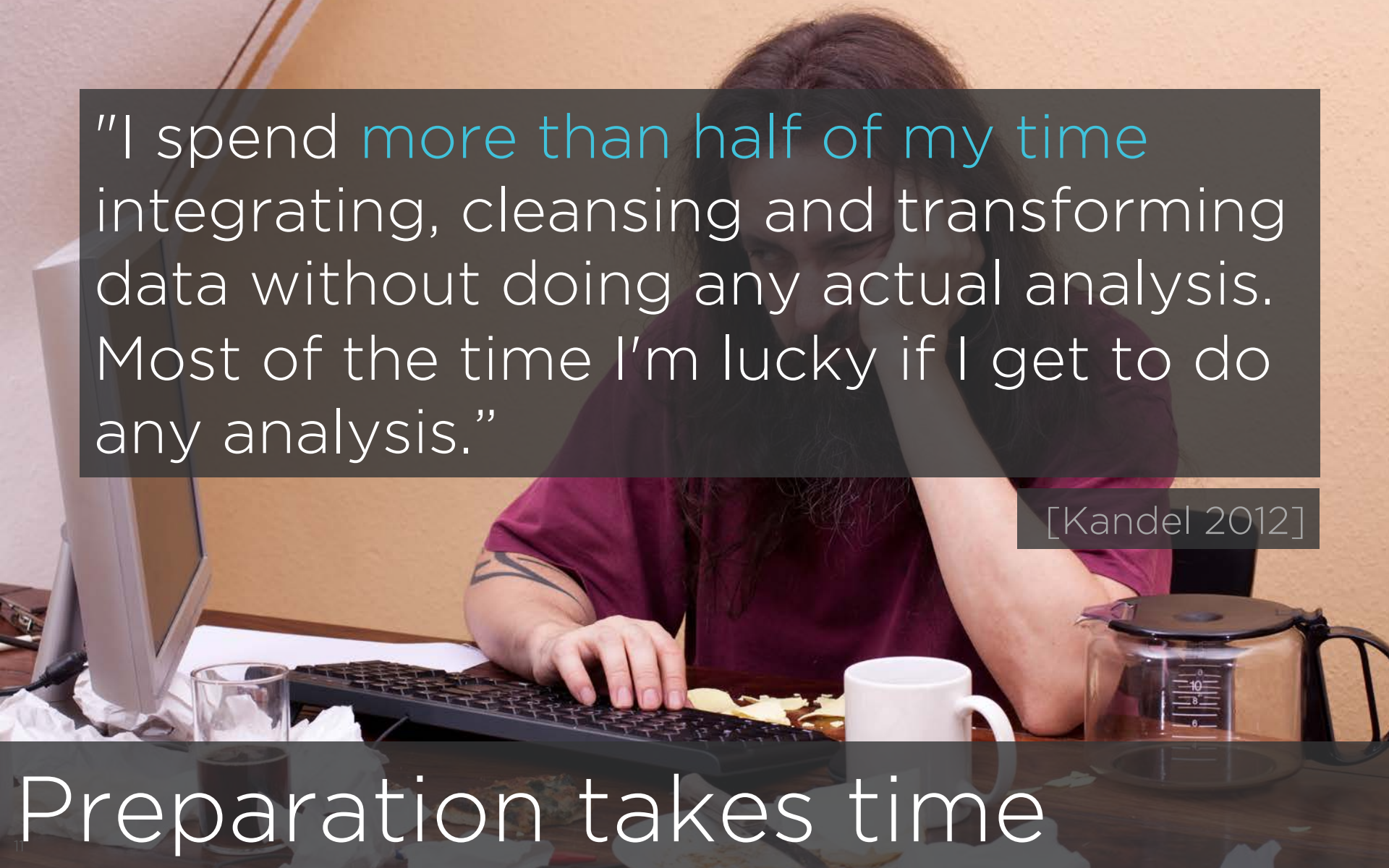
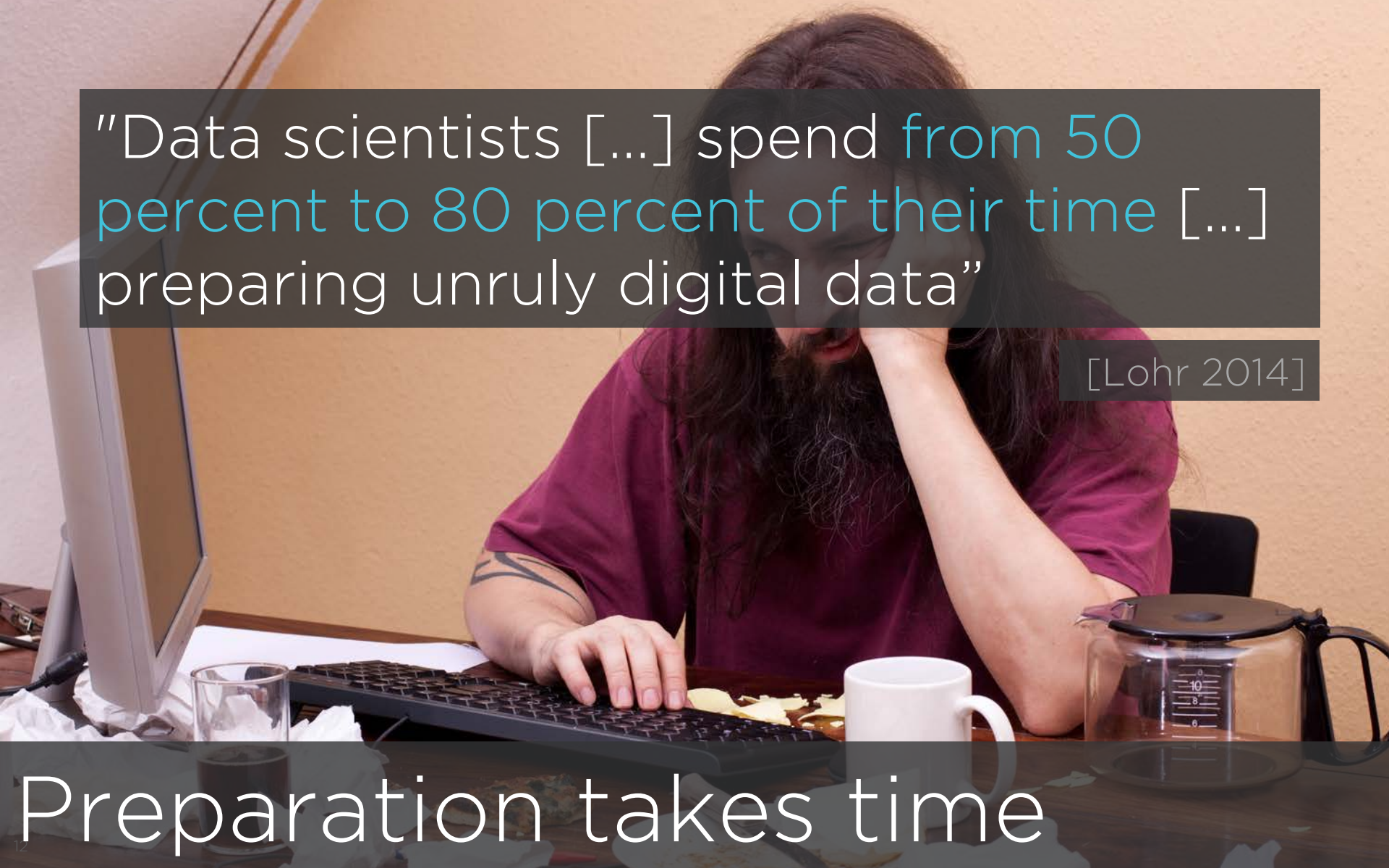
Raw Data

Preparation takes time


"I spend more than half of my time integrating, cleansing and transforming data without doing any actual analysis. Most of the time I'm lucky if I get to do any analysis."
[Kandel 2012]
Preparation takes time



"Data scientists [...] spend from 50 percent to 80 percent of their time [...] preparing unruly digital data"

[Lohr 2014]

Preparation takes time

Data is wasted

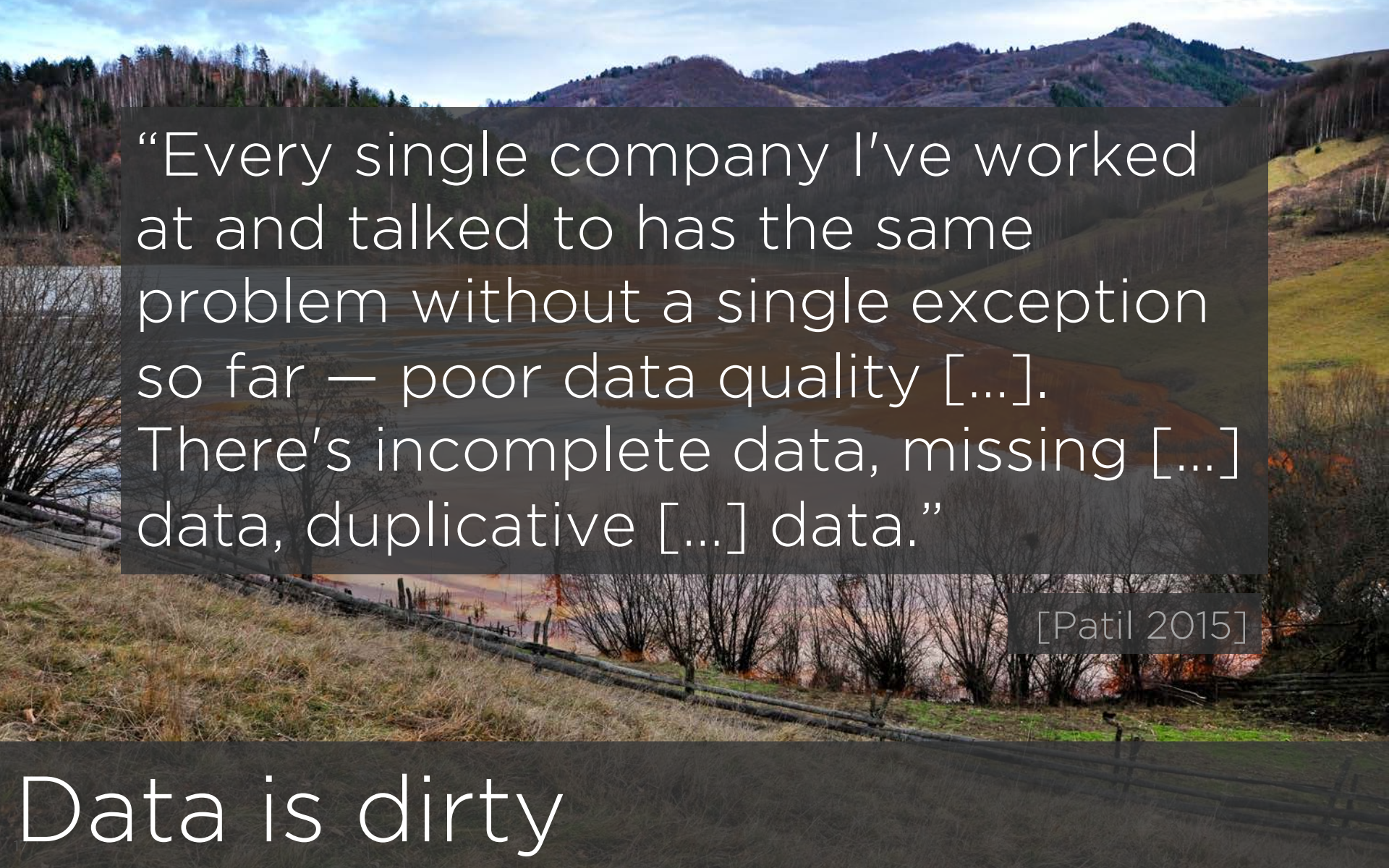
Data is wasted

"On average, organizations only use 28% of their semi-structured and 31% of their unstructured data."

[Forrester 2015]

Data is wasted

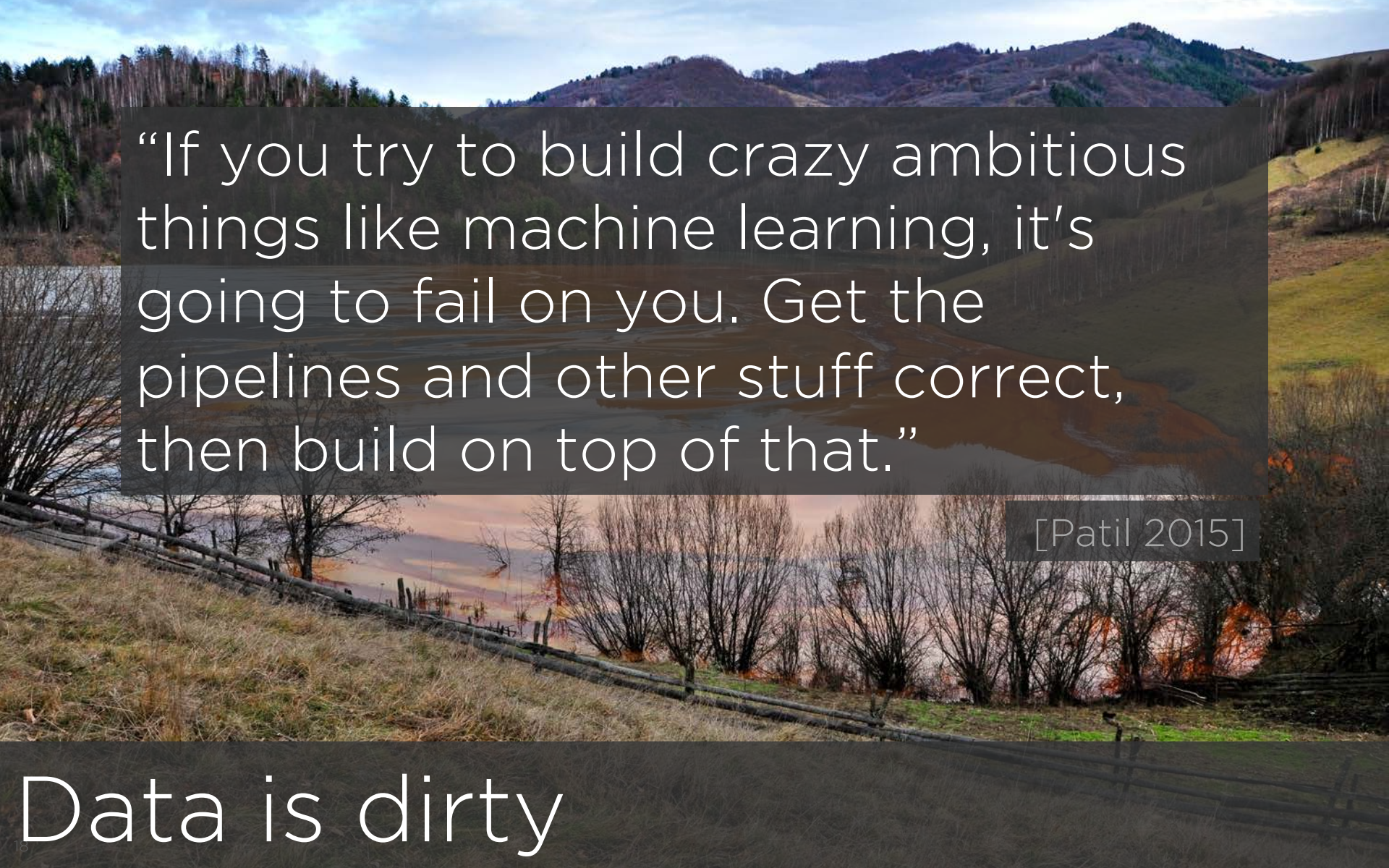
Data is dirty



"Every single company I've worked at and talked to has the same problem without a single exception so far — poor data quality [...]. There's incomplete data, missing [...] data, duplicative [...] data."

[Patil 2015]

Data is dirty



Data is dirty


• 50-80% of time spent on preparation
• only <= ~40% of data is being used
• poor data quality affects outcomes
The Reality of Data Science

Data Preparation Activities

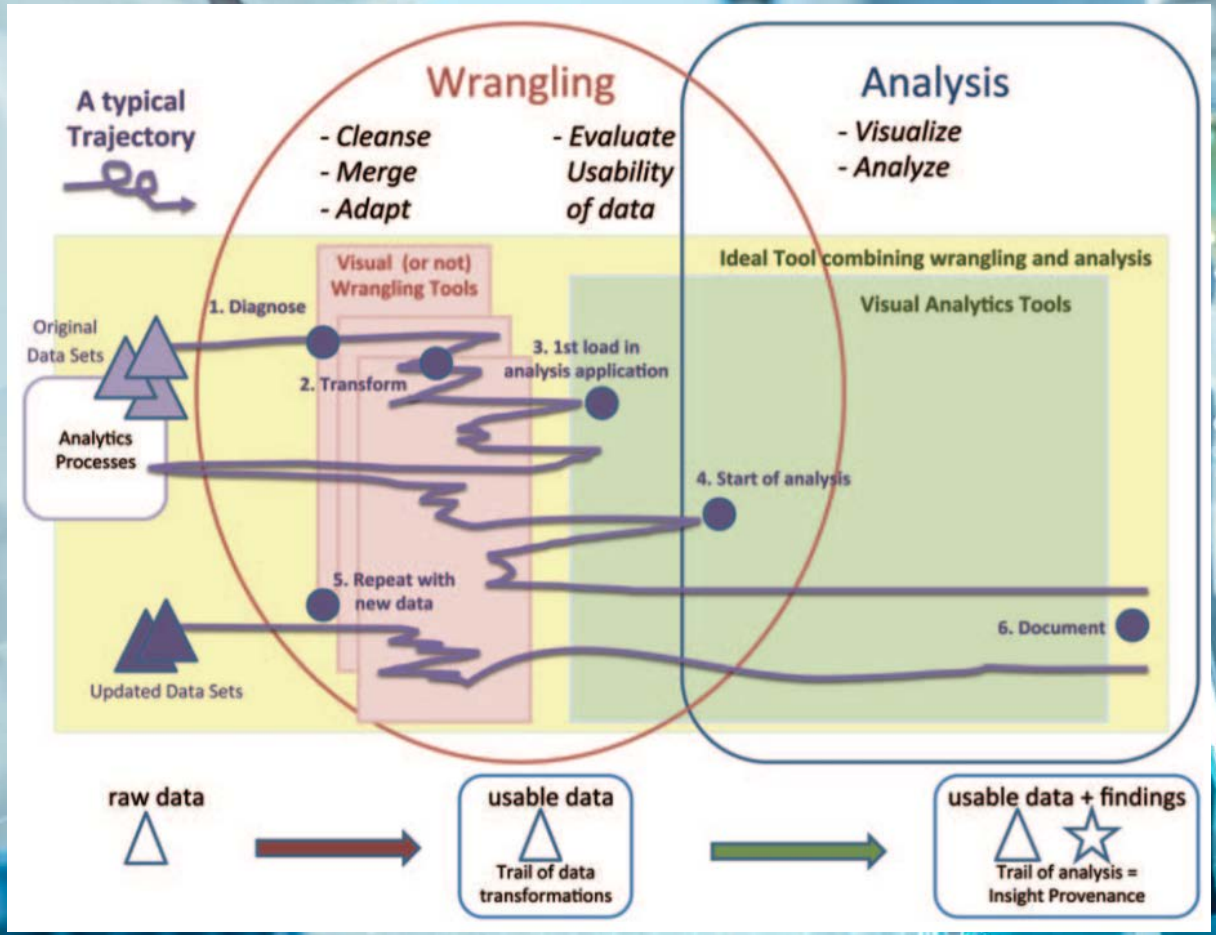
Discovery

Structuring

Cleaning

Enriching

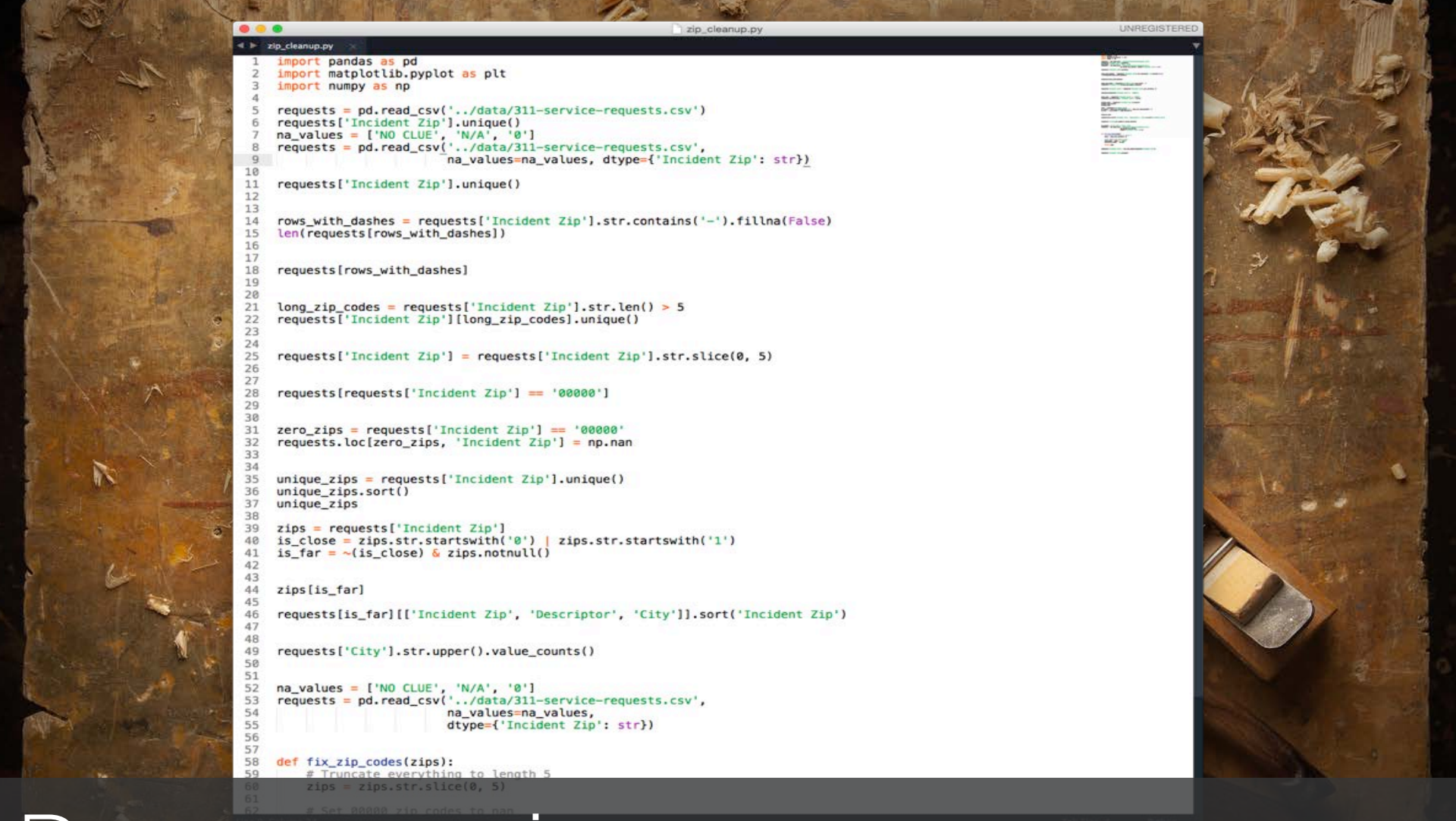
Validating



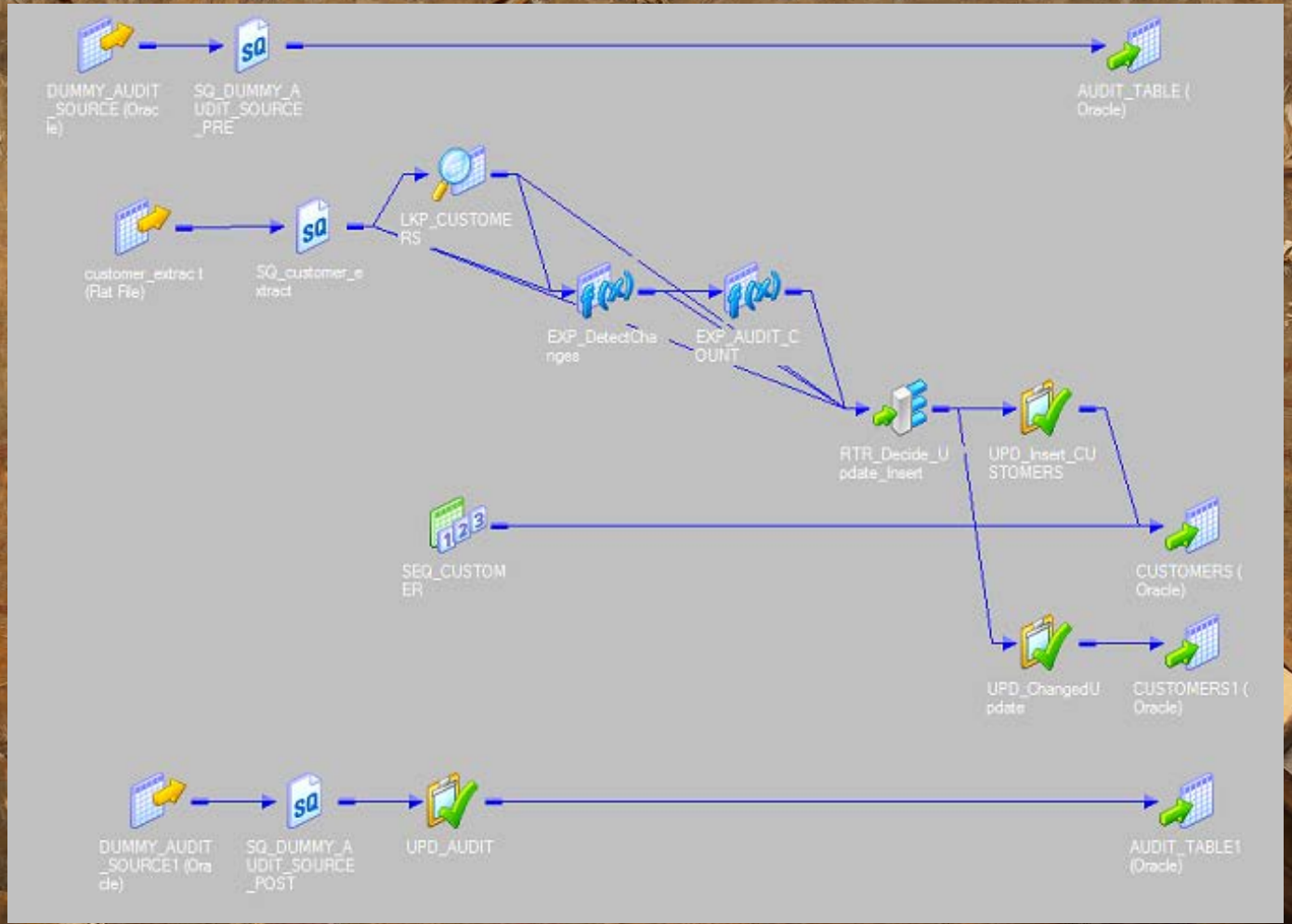
[Kandel et al 2011]

Data Preparation Process

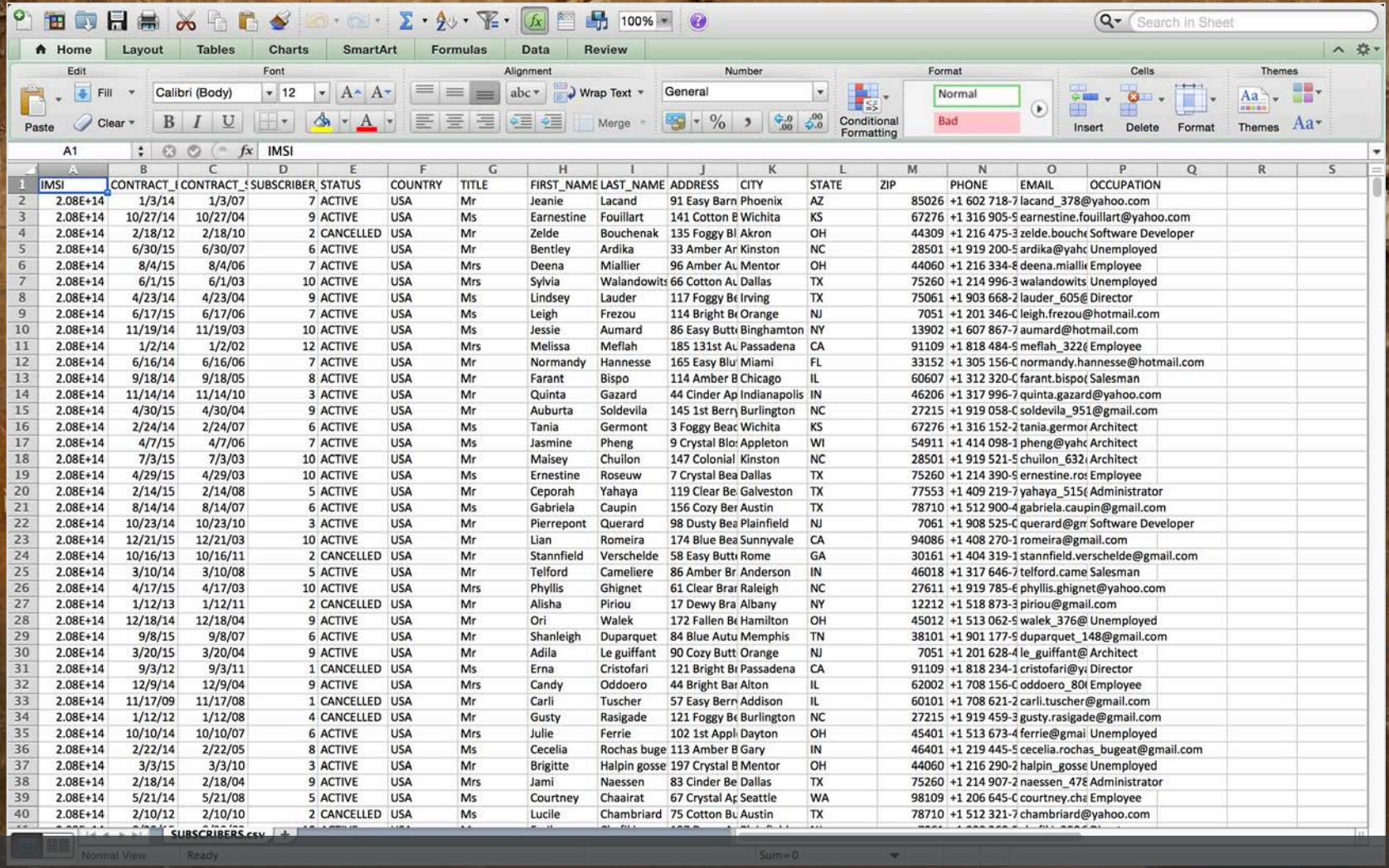
Data Preparation User Interfaces



Programming



Technical Workflow Mapping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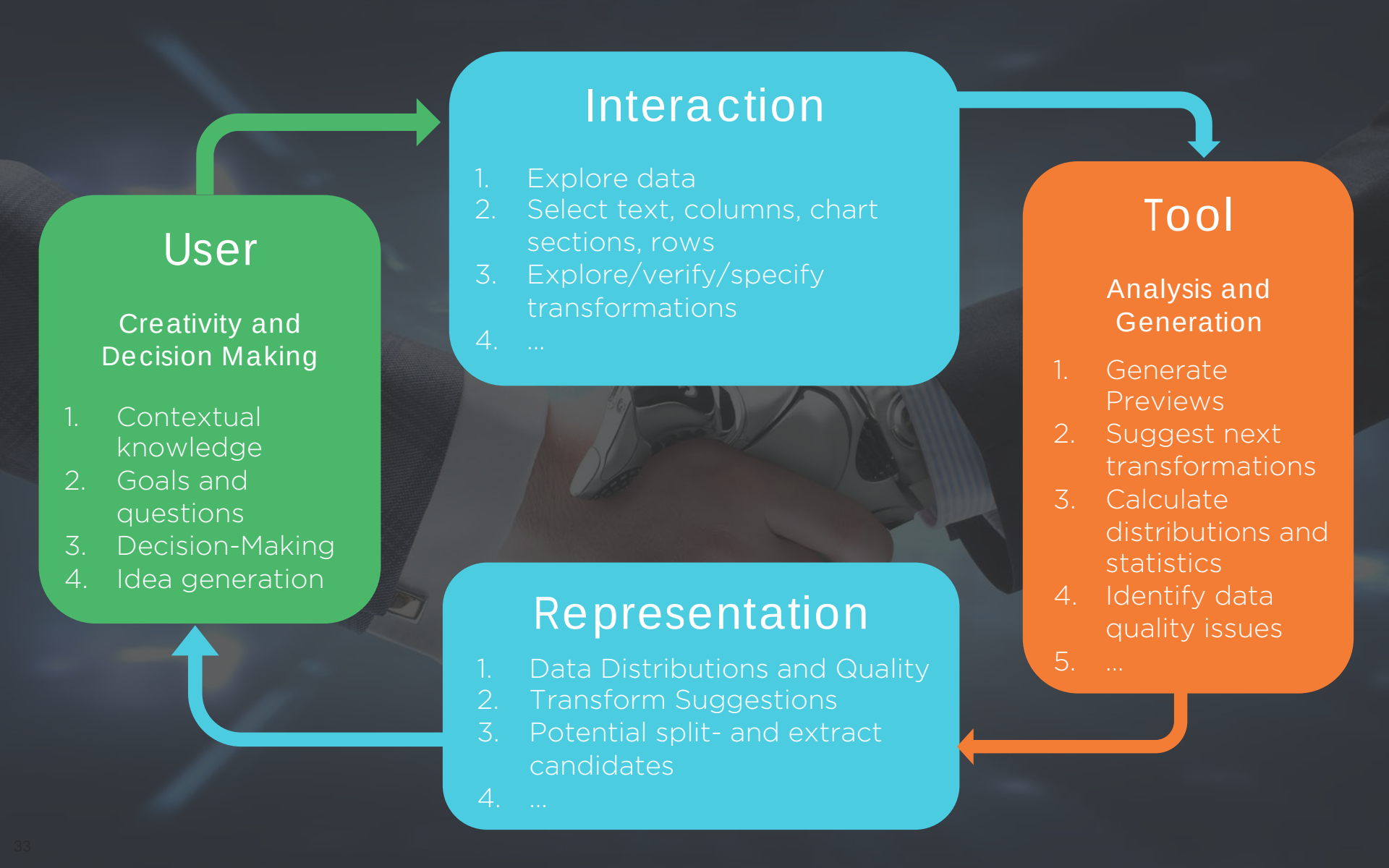
We need to rethink our UIs

We need to rethink our UIs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2. Goals and questions
3. Decision-Making
4. Idea generation
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2. Select text, columns, chart sections, rows
3. Explore/verify/specify transformations
4. ...
Tool
Analysis and Generation
1. Generate Previews
2. Suggest next transformations
3. Calculate distributions and statistics
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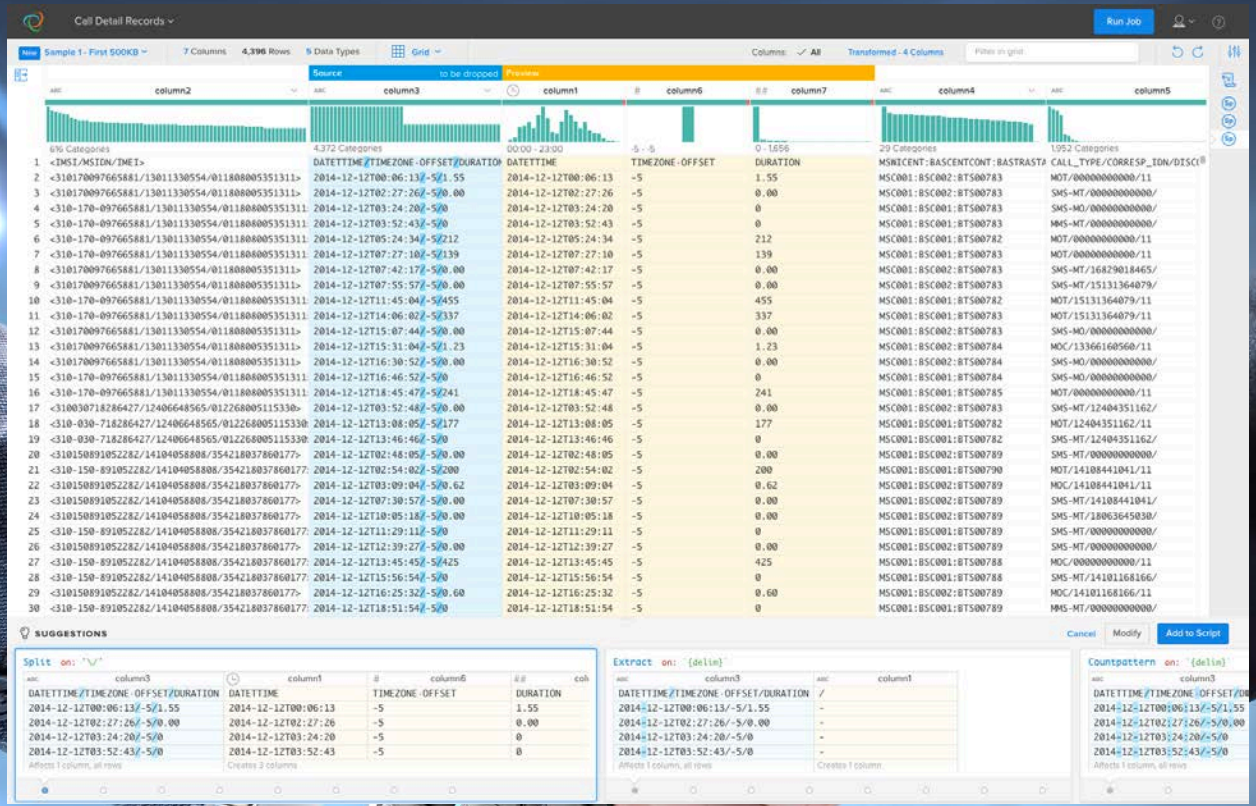
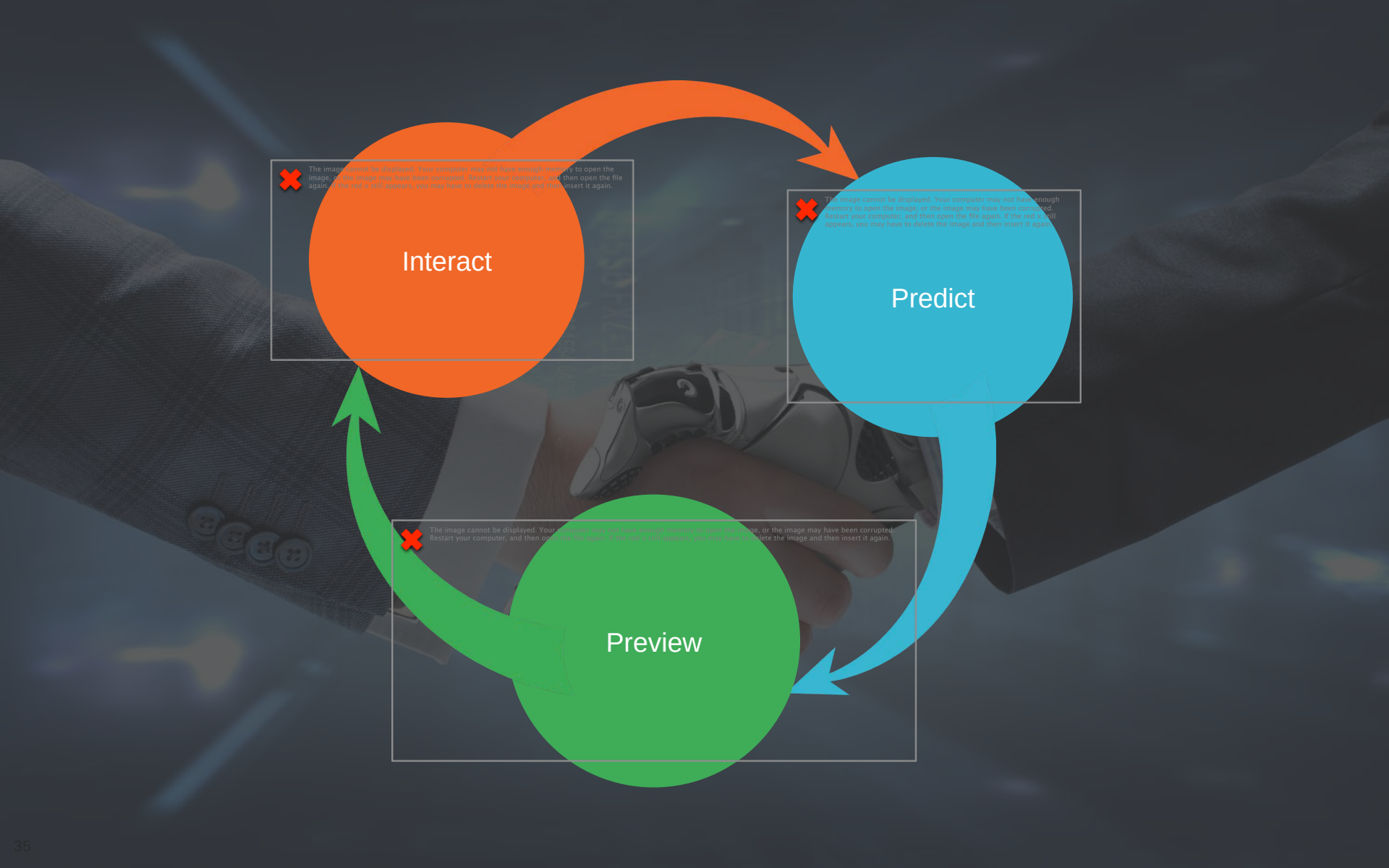
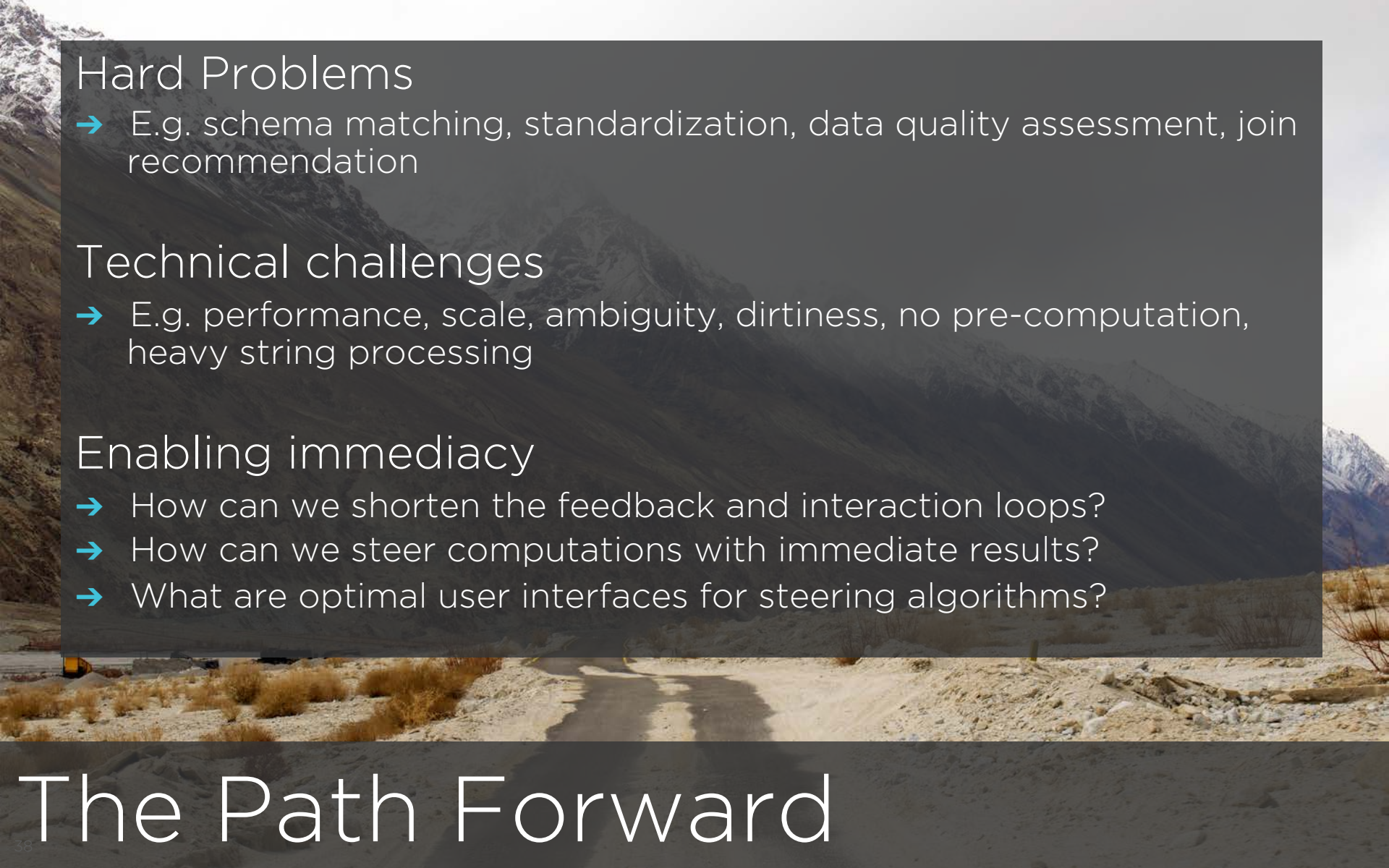


User Interaction Drives Smart Suggestions


Interact
Predict
Preview

Demo:
Insider Fraud Detection

The Path Forward



The Path Forward

Hard Problems

- E.g. schema matching, standardization, data quality assessment, join recommendation

Technical challenges

- E.g. performance, scale, ambiguity, dirtiness, no pre-computation, heavy string processing

Enabling immediacy

- How can we shorten the feedback and interaction loops?
- How can we steer computations with immediate results?
- What are optimal user interfaces for steering algorithms?

- data preparation is an essential part of data science and can take up to 80% of the time
- productivity and data quality are the central challenges
- human needs to in the loop: design for strengths of human and machine; design for immediacy

Summary

Data Preparation

The key to successful data science

Thanks!

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