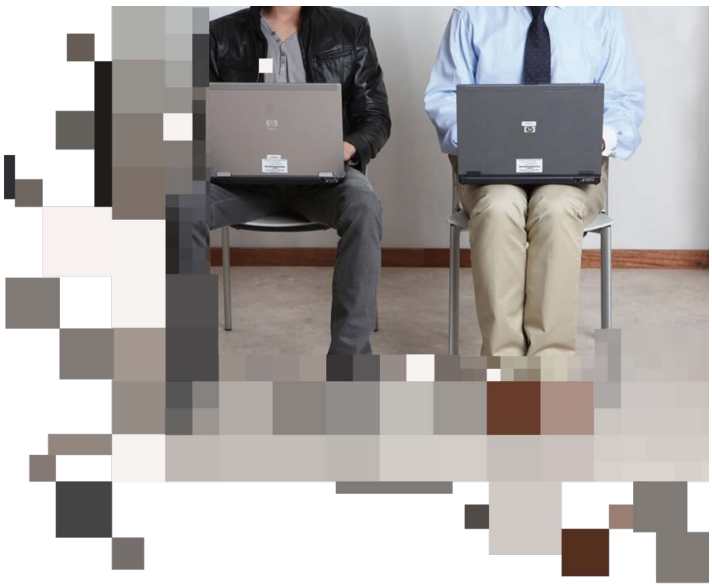

A Process Deviation Analysis Framework

Benoît Depaire

Former Research

- Former research
  - Van der Aalst, de Medeiros (2005)
  - Bezerra, Wainer (2007, 2008)
  - Bezerra, Wainer, Van der Aalst (2009)
  - Jalali, Baraani (2010)
  - Rozinat, van der Aalst (2008)
  - Adriansyah, Sidorova, van Dongen (2011)
  - Adriansyah, van Dongen, Van der Aalst (2011)

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Are all Deviations Alike?

- Some Deviations are OK, some are NOT
  - Exceptions
  - Anomalies
- Exceptions
  - Explicit vs Implicit
- Anomalies
  - Errors vs Fraud

Typical Managerial Questions

1. Where does the process deviate?
   - Which cases?
   - Which locations in the proces?
2. How does the process deviate?
   - What is going "wrong"?

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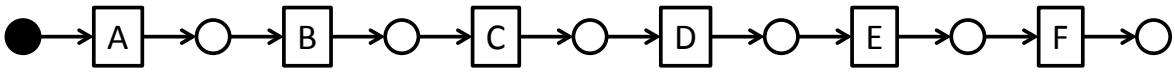

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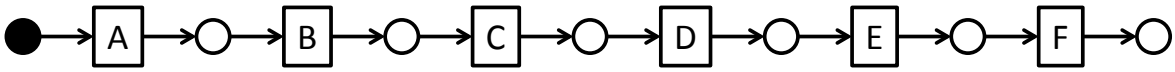

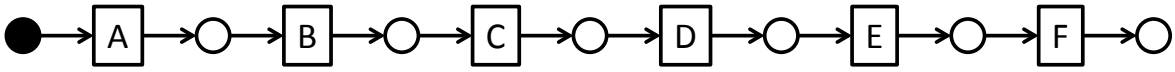

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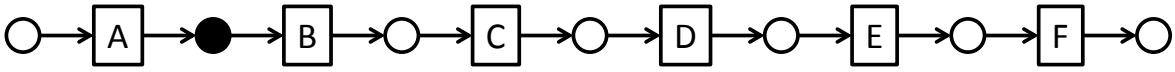

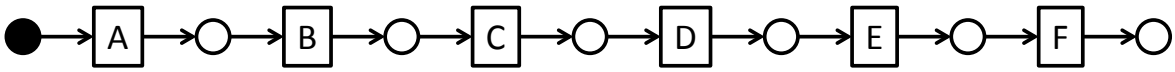

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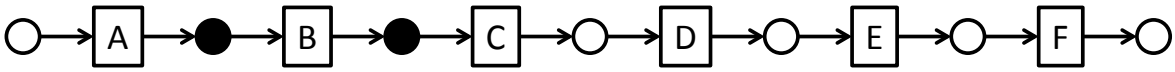

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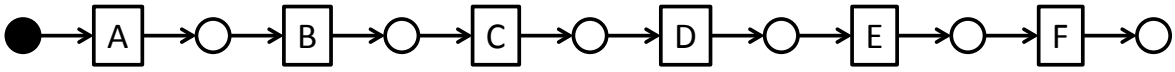

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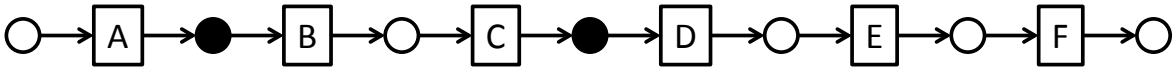

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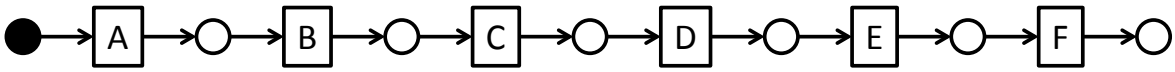

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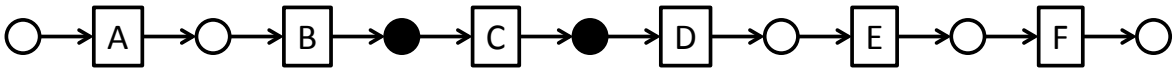

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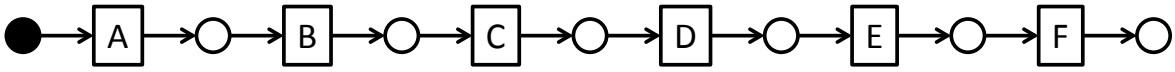

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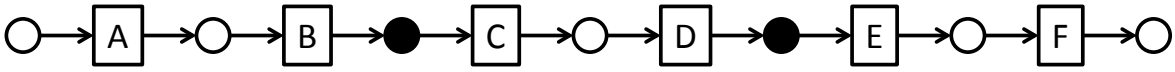

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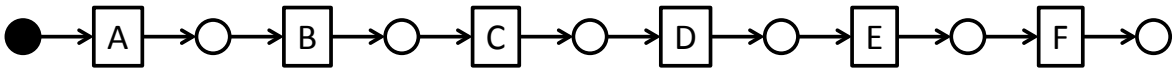

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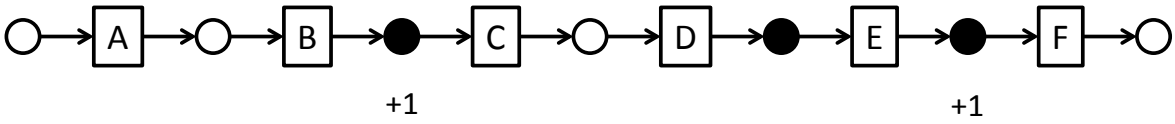

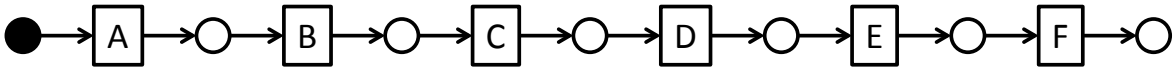

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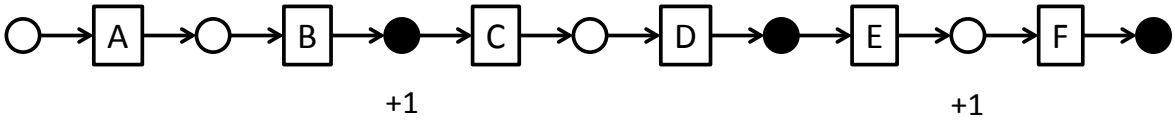

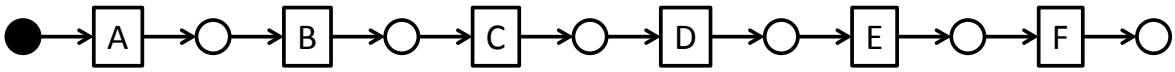

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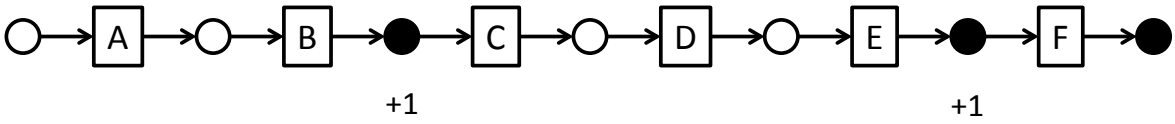

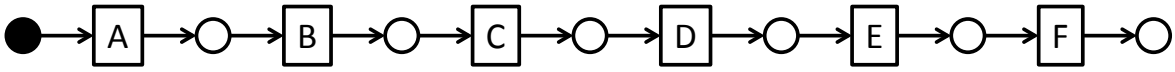

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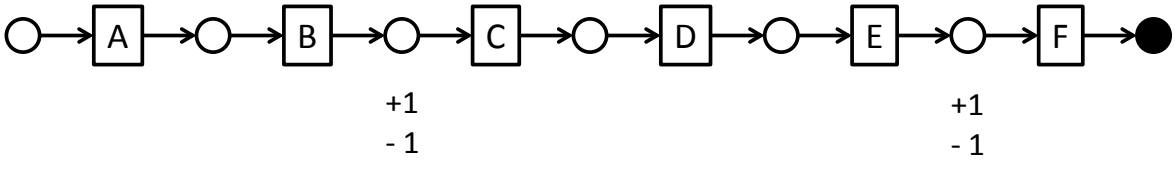

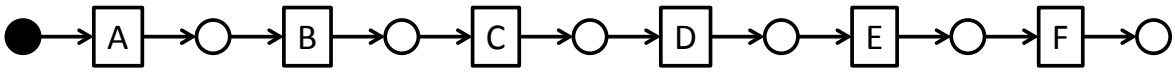

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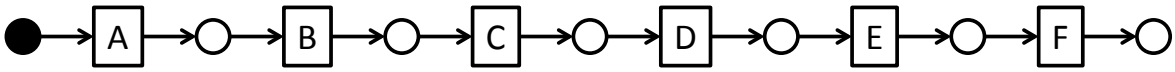

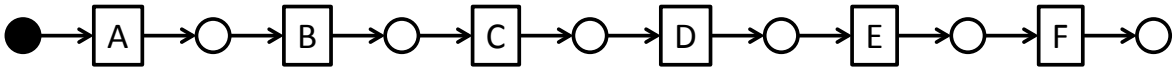

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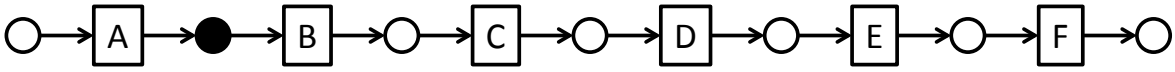

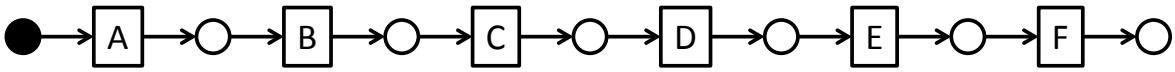

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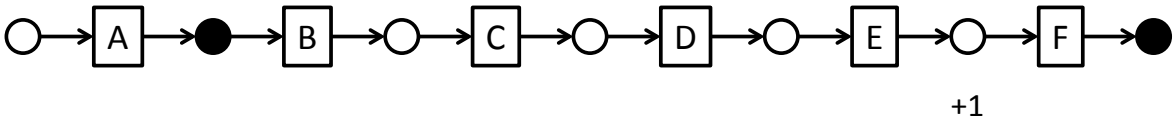

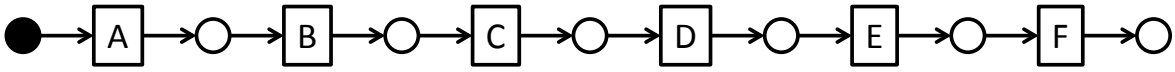

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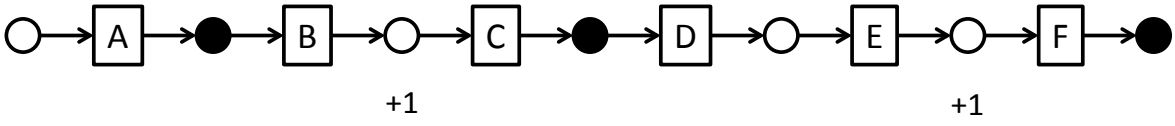

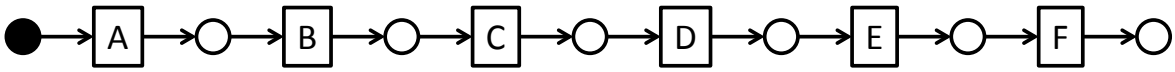

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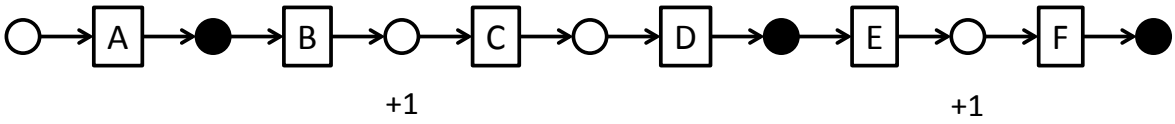

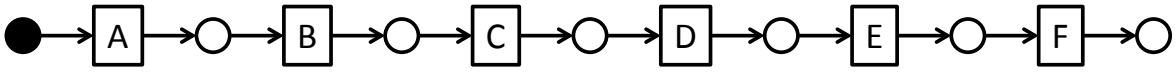

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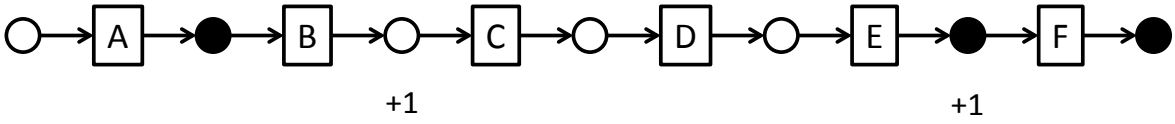

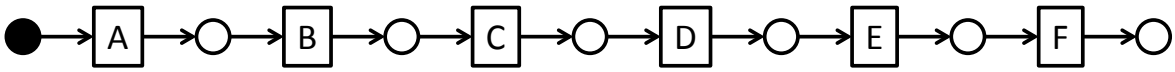

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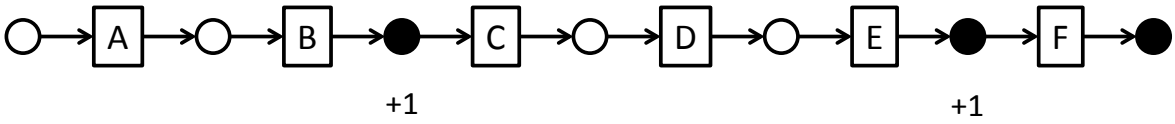

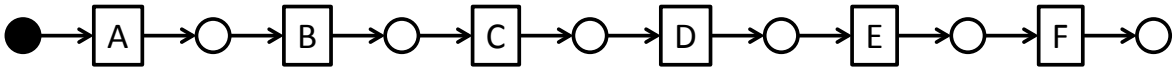

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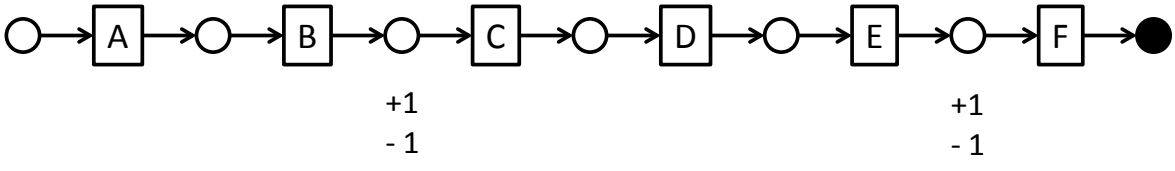

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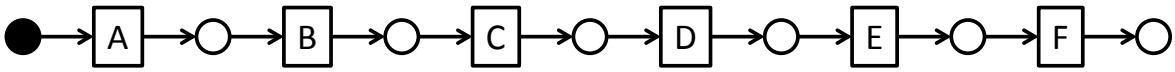

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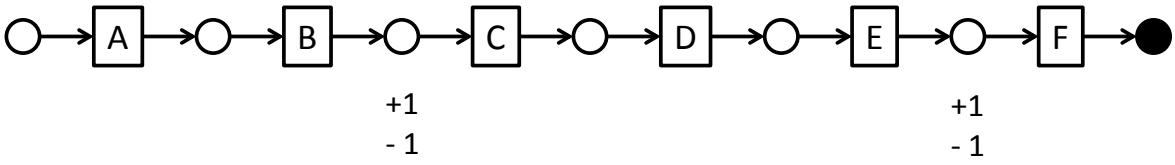

Typical Managerial Questions

1. Where does the process deviate?
   - Which cases?
   - Which locations in the proces?
2. How does the process deviate?
   - What is going "wrong"?
3. What type of deviations do we have?
   - Exceptions vs Anomalies?
   - Ex ante or ex post?
4. What are the implications?

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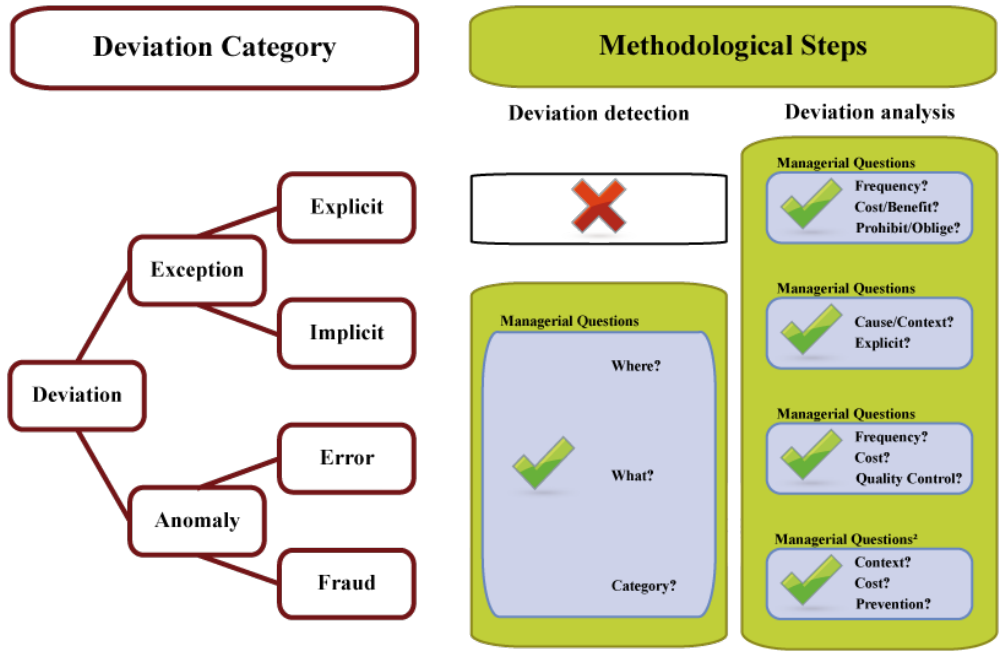
A Process Deviation Analysis Framework



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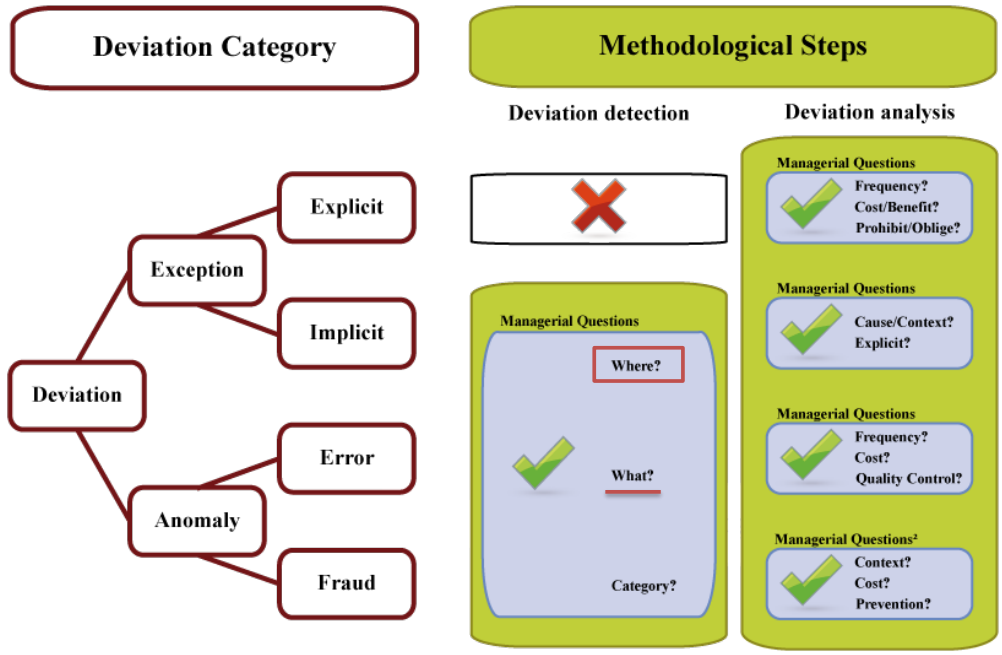
  - Bezerra, Wainer, Van der Aalst (200
  - Jalali, Baraani (2010)

Which cases deviate?

- Rozinat, van der Aalst (2008) — Conformance Measure
- Adriansyah, Sidorova, van Dongen (2011)
- Adriansyah, van Dongen, Van der Aalst (2011)

Skipped and Inserted Activities

A Process Deviation Analysis Framework



Deviation Detection

- High level vs Low level
  - Insert, Skip (low level)
  - Postponed activities, Swapped Activities, Repeated activities, … (high level)
- Trace vs Model
  - t: trace (sequence of executed events)
  - M: model (directed graph, XOR, AND)
  - p: Execution Paths of model M (sequence)

Deviation Detection

- General Structure
  1. Find the appropriate execution path
     - Use (known / unknown) decision rules
     - Minimize a cost function
  2. Detect the low level deviations in each trace
     - Skipped activities
     - Inserted activities
  3. Combine low level deviations into high level deviations

There have been deviations!