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Compliance and Coercion a CSYS300 class project rev 2

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Compliance and Coercion
Problem Statement

- An analyst is reviewing information on the nuclear fuel cycle in a nation to assess compliance with the non-proliferation treaty
- The analyst has multiple types of information available
  - On-site inspections
  - On-site monitoring equipment
  - Open source information
  - Third party information
  - Operator-provided information
- How does the analyst's confidence in their assessment evolve with time?

Compliance and Coercion
Choice of analysis approach

- For this problem selected a systems dynamics view
- Stocks
  - Main – analyst confidence in their assessment
  - Auxiliary
    - Analyst confidence in knowledge of the system
    - Analyst cumulative assessment of data
    - Information resources
- Inputs
  - High reliability, expensive information
  - Medium reliability, moderately expensive information
  - Low reliability, inexpensive information
- Decision functions
  - Analyst assessment of data as it comes in
  - Analyst reassessment of previous data as knowledge increases
- The feedback loop is the analyst request for more or less information from different types of sources constrained by the availability of resources to obtain that information

Compliance and coercion
Analyst confidence in knowledge of system

- The analyst has a very limited view into the nuclear fuel cycle of the country of interest
- As the analyst gets more information, their confidence that they understand the details of that cycle will increase
- The increase in confidence from increased information will be different for different types of information

Compliance and coercion
Initial and Cumulative Data Assessment and Reassessment

- As each data stream comes in, the analyst will assign a value to that data of either
  - Red – indicative of noncompliance
  - Yellow – possibly indicative of noncompliance
  - Green – indicative of compliance
- Based on data and knowledge of the system, the analyst will maintain a cumulative assessment with subjective probabilities of Red, Yellow, or Green
- The individual data assessments and cumulative assessment will be periodically reevaluated based on new data and the analyst's increasing knowledge of the system

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Analyst confidence in assessment

- The analyst's confidence in their assessment of compliance will depend on their assessment of their knowledge of the system
- The analyst's confidence in their assessment of compliance will depend on their cumulative assessment of the data in light of their knowledge of the system

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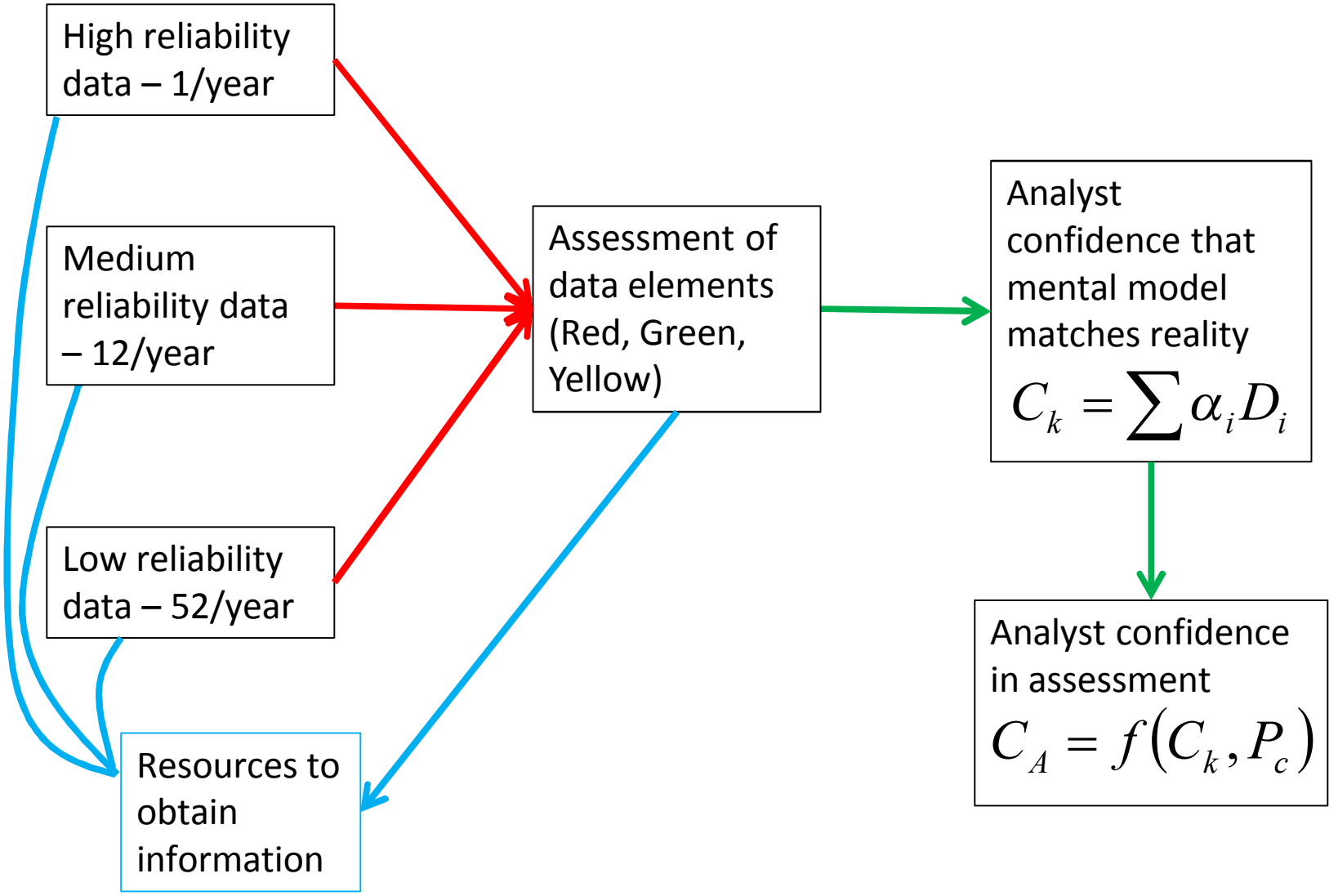
Notional Block diagram



Compliance and coercion
Feedback loop

- Notionally there is some kind of feedback loop through which the analyst, within resource constraints, can obtain more high reliability data

Compliance and coercion
Time dependence

- Time dependence is introduced through noisy data streams of high, medium, and low reliability data
  - These should include an appropriate stochastic distribution of false positives and negatives, differing for the type of data
  - These data come in at explicitly different rates
- Data reassessment is also performed periodically