Identification and definition of attributes to evaluate international event-based surveillance using Epidemic Intelligence from Open Sources (EIOS) at the Robert Koch Institute, Germany

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EIOS for international event-based surveillance

The Public Health Intelligence (PHI) team at the Robert Koch Institute (RKI) conducts event-based surveillance (EBS) focusing on media scanning to detect, verify, assess and communicate international events that may pose a threat to public health in Germany and/or the German population (PH events).

The EIOS system is increasingly used worldwide to conduct EBS with publicly available information.

The PHI team at RKI joined the EIOS community of practice in 2017. In 2023 new working procedures were introduced to consolidate the use of EIOS for routine international EBS, motivating an evaluation.

We aimed to (1) define an evaluation framework and (2) identify, operationalise and prioritise evaluation attributes in order to conduct the evaluation of international EBS using EIOS at RKI.

Evaluation timeline (January-November 2023)
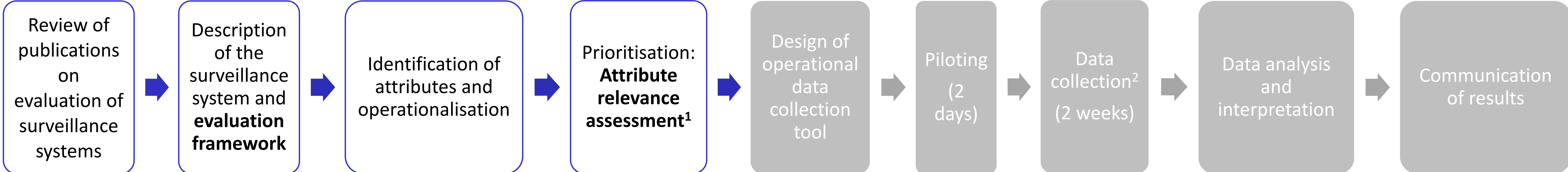
[1] **Attribute relevance assessment:** 5 current and 2 former PHI officers with experience of using EIOS for international EBS at the RKI were sent a structured questionnaire containing definitions, indicators and data collection methods for each attribute. They were asked to rate each attribute from 1 (not relevant) to 5 (very relevant) based on its relevance to the objectives of the surveillance system.

Evaluation framework and attribute relevance prioritisation

**Figure 1.** Framework for the evaluation of international EBS using EIOS at RKI
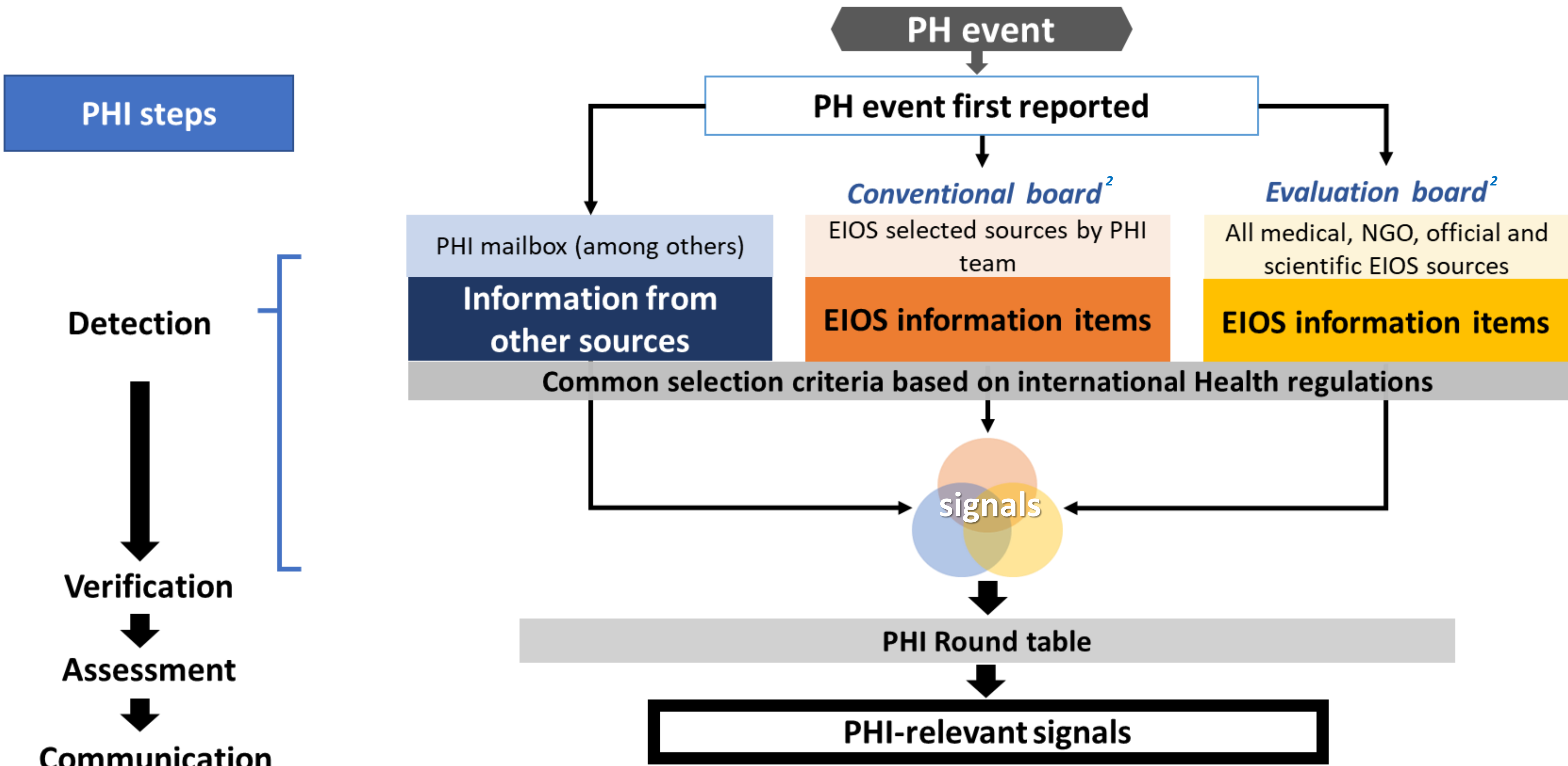
[2] **Note:** during the 2 weeks of the data collection period, a PHI officer and an evaluator with experience in international EBS using EIOS will perform the detection of signals. The PHI officer will use the conventional board routinely used by the PHI team, which contains selected sources, and the evaluator will use the evaluation board, which contains a broader range of sources within EIOS.

The PHI officer will also monitor the PHI mailbox (among others) which contains additional sources.

All signals detected by the PHI officer and/or the evaluator will be brought to the daily PHI roundtable, where the PHI team will assess and select the PHI-relevant signals to be communicated in the daily report.

Figure 2. Relevance assessment of 12 attributes for the evaluation of international EBS using EIOS at RKI by the PHI team (N=7)
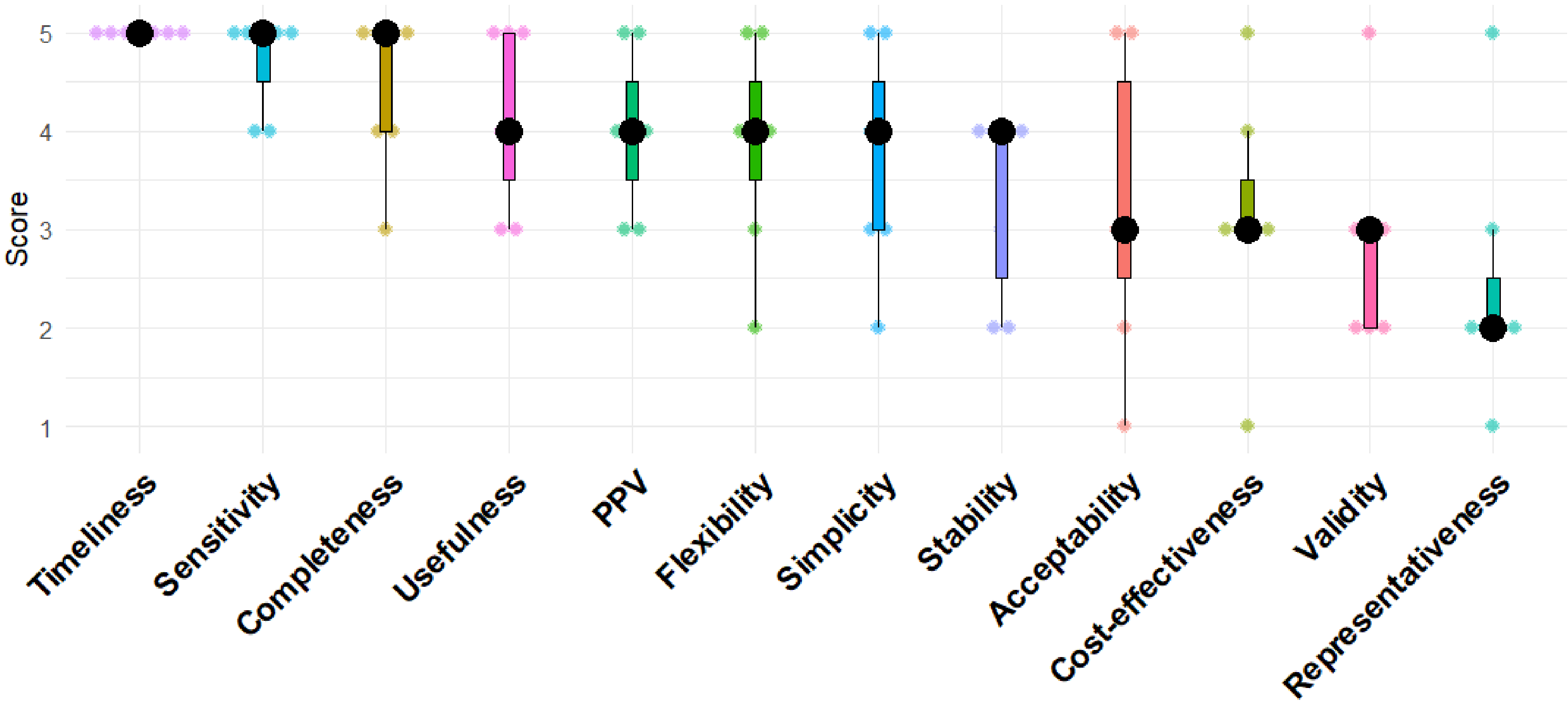
Note: The coloured dots represent each member's rating and the black dots the median for each attribute. The boxes extremes show the interquartile range, while the lines extending from the boxes indicate the range of data excluding outliers. **PPV:** positive predictive value.

Table 1. Overview of the three most relevant attributes for the evaluation of international EBS using EIOS at RKI based on PHI team assessment

	Definition	Indicator(s)	Data source
Timeliness	Ability of international EBS using EIOS to detect PH events at a time point that allows appropriate public health action	e.g. days between a PH event is first reported and it is first communicated as a PHI-relevant signal	Operational data collection tool
Sensitivity	Capacity of international EBS using EIOS to detect PHI-relevant signals	PHI-relevant signals coming from EIOS / PHI-relevant signals (overall and by board)	Operational data collection tool
Completeness	Extent to which EIOS contains all necessary sources to perform international EBS	EIOS sources in EIOS board / relevant sources needed for international EBS at RKI	Operational data collection tool and EIOS source check

Conclusions

1. Surveillance system attributes have to be adapted to be used for EBS and to the specific surveillance system characteristics.

2. Timeliness was the most relevant attribute for the evaluation of EBS using EIOS at RKI according to the PHI team, followed by sensitivity and completeness.

3. Data collection methods and tools have to be designed according to the prioritised evaluation attributes and defined indicators.

Recommendations

We recommend (1) further development of methods for EBS evaluation and inclusion in surveillance system evaluation guidelines and (2) the reporting of attribute selection methods and definition as an essential part of the evaluation of surveillance systems.

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