



COVID-19 Robot surveillance weekly report 13/05/2021

Report and analysis by: HPSC COVID-19 Robot team

Contents

Project summary	2
Background	2
Aim	2
Results	2
Report on key performance indicators for COVID-19 data processing	3
1. Robot activity: SP1, SP2, SP3	3
2. Timeliness of COVID-19 data processing: Laboratory / CIDR	4
3. Resources for COVID-19 data processing: human/ robot (SP2)	5
4. Robot activity SP1: COVID-19 laboratory records	6
5. Robot SP1: business/ data exceptions	Error! Bookmark not defined.
6. Robot activity SP2: CIDR COVID-19 event creation	7
7. Robot team SP2: business/ data exceptions	Error! Bookmark not defined.
8. Robot team activity SP3: event-matching for enhanced surveillance processing	8
9. Robot activity SP3: enhanced surveillance data, processing of PPAs, collected by the CTC ..	9
10. Robot SP3: business/ data exceptions	Error! Bookmark not defined.
11. COVID-19 Enhanced surveillance PPA processing of third pandemic wave (SP3)	Error! Bookmark not defined.
Appendix 1: COVID-19 data processing activity schedule	10
1. Robot operational schedule	10
2. Surveillance data processing actions/ responsibilities/ dependencies	10
Appendix 2: Acknowledgements	11
Appendix 3: HPSC Robot Team structure and contact information	11
Appendix 3: Further information	11

Project summary

Background

HSE-HPSC developed a COVID-19 surveillance robot to align COVID-19 data across HSE information systems on behalf of regional HSE-Public Health departments (DPHs). The DPHs use CIDR to process laboratory or clinical notifications, apply case definitions and input enhanced surveillance information from contact-tracing centres. On average, it takes 26 minutes per case.

Aim

The robot was rapidly developed to navigate the national infectious disease reporting system (CIDR), replicate human behaviour and automate three manual sub-processes (SP) to deliver timely data for epidemiological reporting by the Health Protection Surveillance Centre (HPSC) to the National Public Health Emergency Team (NPHE);

1. **SP1**
Laboratory records: process COVID-19 laboratory notifications on CIDR by either linking to a current patient on the system or by creating a new patient.
2. **SP2**
Infectious disease notifications: create a COVID-19 notification on CIDR, termed a 'CIDR event', by applying current case definitions.
3. **SP3**
Contact-tracing surveillance data: update the COVID-19 notification with data collected by the contact tracing centres via the Covid Care Tracker (CTC) i.e. information on symptoms, pre-existing clinical conditions and exposures of interest requiring immediate public health investigation to contain/limit the spread of COVID-19 (travel, mass gatherings etc.).

Results

1. **Successful integration:**
The robot aligned COVID-19 surveillance data across HSE information systems.
2. **Successful time-saving result:**
The robot operates quicker than a human, 3.3 minutes per case compared to 26 minutes. Therefore, based on a case-load of 100 daily cases, the robot saves 38 hours per day (400 cases, saves 151 hours).
3. **The ability to operate outside of core hours:**
The robot currently operates for 22 hours per day to maximise its benefit. This reduces overtime and out of hours work by the regional scientists, resulting in overtime cost-savings for the HSE.
4. **Successful degree of automation:**
The robot processed greater than 80% of cases just like a human. The remaining 20% are flagged by the robot for human processing as per the agreed robot business rules. The Public Health teams review and investigate these cases on a daily basis (Appendix 1).
5. **Sustainable change in surveillance system:**
SP1 and SP2 can both be extended to other infectious diseases being notified on CIDR, proving a worthwhile investment in national infectious disease surveillance. The SP3 process is specific to COVID-19 as the collection of enhanced surveillance by contact tracing centres, is a pandemic response and a departure from normal CIDR business process for collecting disease-specific information.

Report on key performance indicators for COVID-19 data processing

1. Robot activity: SP1, SP2, SP3

Transactions account for records the robot has processed; laboratory records (SP1), infectious disease notifications (SP2) and enhanced surveillance data collected via the contact tracing centres' positive patient assessments (SP3) (activity displayed in graph below).

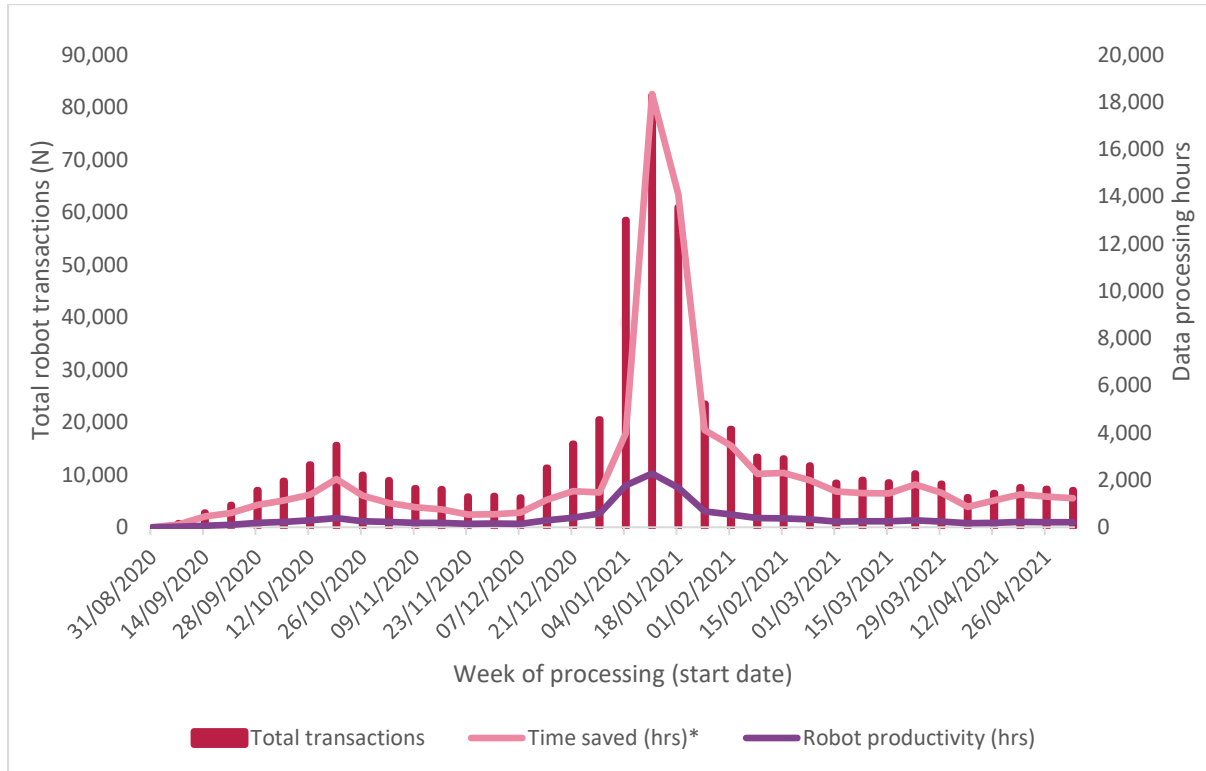


Figure 1: Weekly robot activity of COVID-19 data processing; total transactions, robot productivity (hrs) and time saved (hrs) for public health teams

*Time saved (hrs): Calculated by comparing the average robot processing time compared to human processing time of successful transactions. Average human processing time calculated during robot development, average robot processing time continuously updated.

Data source: Deloitte RPA weekly output files analysed 13 May 2021 (robot activity up to week ending 09 May 2021)

2. Timeliness of COVID-19 data processing: Laboratory / CIDR

This graph displays the data by time comparing when the laboratory authorised the test result, to when the infectious disease notification/event was created on CIDR.

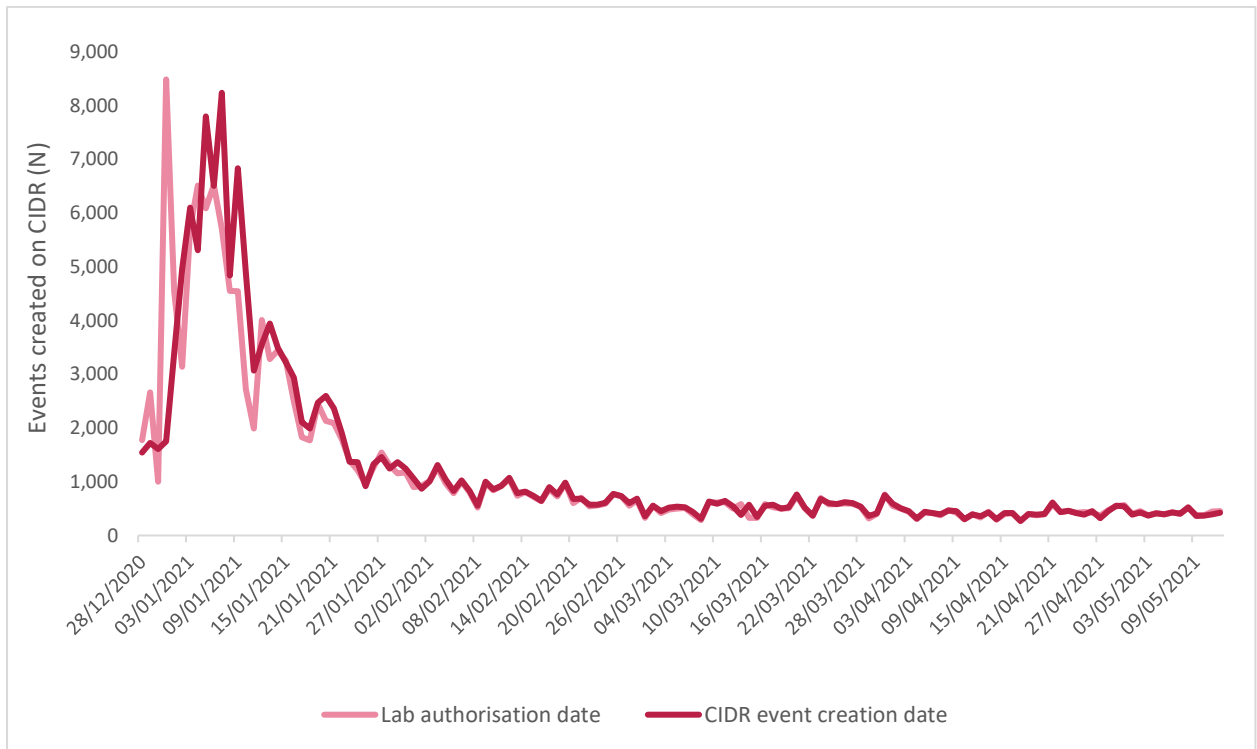


Figure 2: Timeliness of daily COVID-19 data processing; laboratory authorisation date compared to CIDR event creation date

Data source: CIDR report extracted 13 May 2021 at 13:30

3. Resources for COVID-19 data processing: human/ robot (SP2)

This graph displays the daily case data by whether the infectious disease notification/ CIDR event was created by a human working in a regional Public Health department or by the national COVID-19 robot, and the percentage of notifications/ events created by the robot in total (SP2).

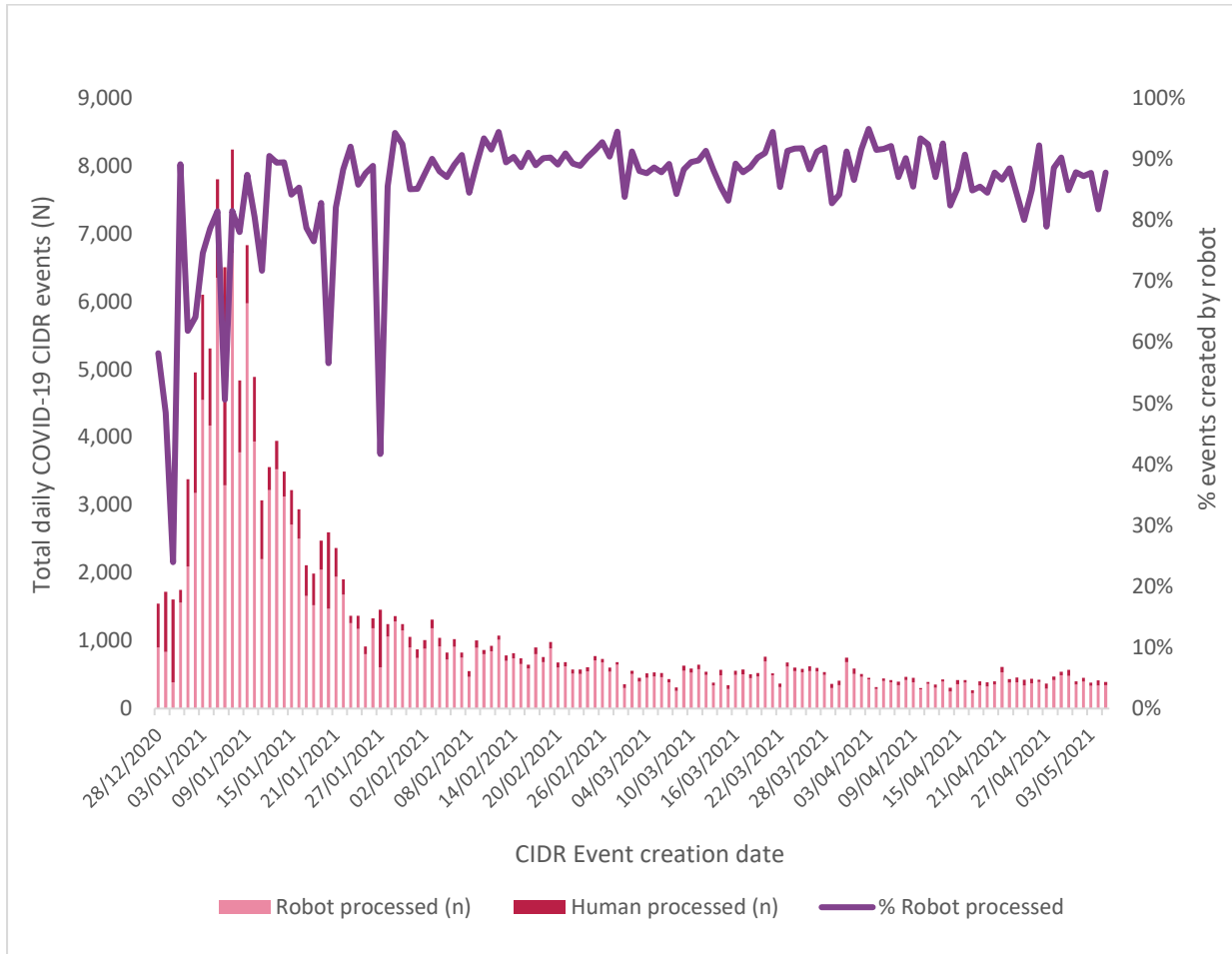


Figure 3: COVID-19 data processing; CIDR event creation processing by robot compared to human and proportion of total events created by the robot

Data source: CIDR report extracted 06 May 2021 at 13:30
 Data source: Deloitte RPA weekly output files analysed 06 May 2021

4. Robot activity SP1: COVID-19 laboratory records

COVID-19 laboratory records are processed on CIDR by either linking the record to an existing patient on the CIDR system or by creating a new patient (activity displayed in graph below). Exceptions are records that are flagged for human investigation by public health based on the nationally agreed business rules for the COVID-19 robot. Exceptions are flagged mainly due to data quality or case definitions and are applied to strengthen the quality of COVID-19 data on CIDR.

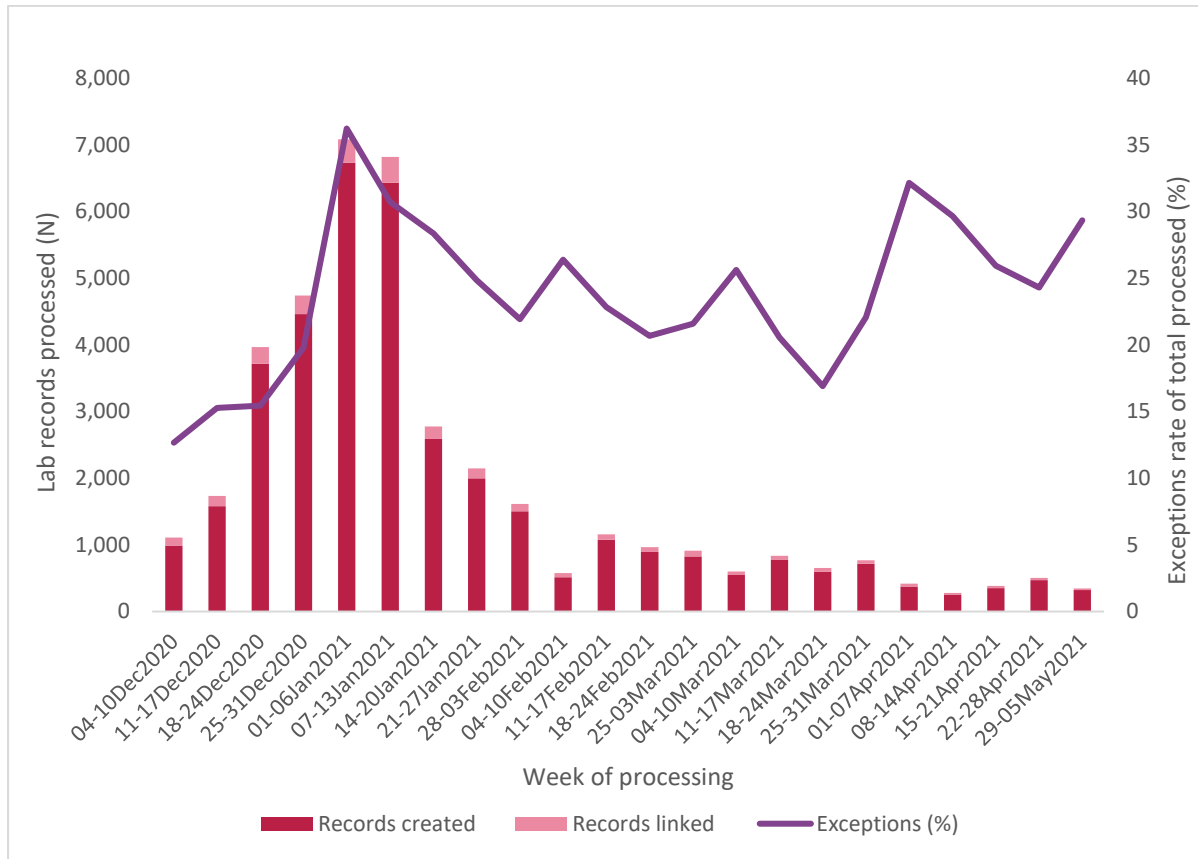


Figure 4: COVID-19 robot data processing SP1; Laboratory records by week and proportion of exceptions for public health investigation

Data source: Deloitte RPA weekly output files analysed 06 May 2021

5. Robot activity SP2: CIDR COVID-19 event creation

COVID-19 infectious disease notifications are created on CIDR by applying current case definitions and are termed a 'CIDR event' (activity displayed in graph below). Exceptions are records that are flagged for human investigation by public health based on the nationally agreed business rules for the COVID-19 robot. Exceptions are flagged mainly due to data quality or case definitions and are applied to strengthen the quality of COVID-19 data on CIDR.

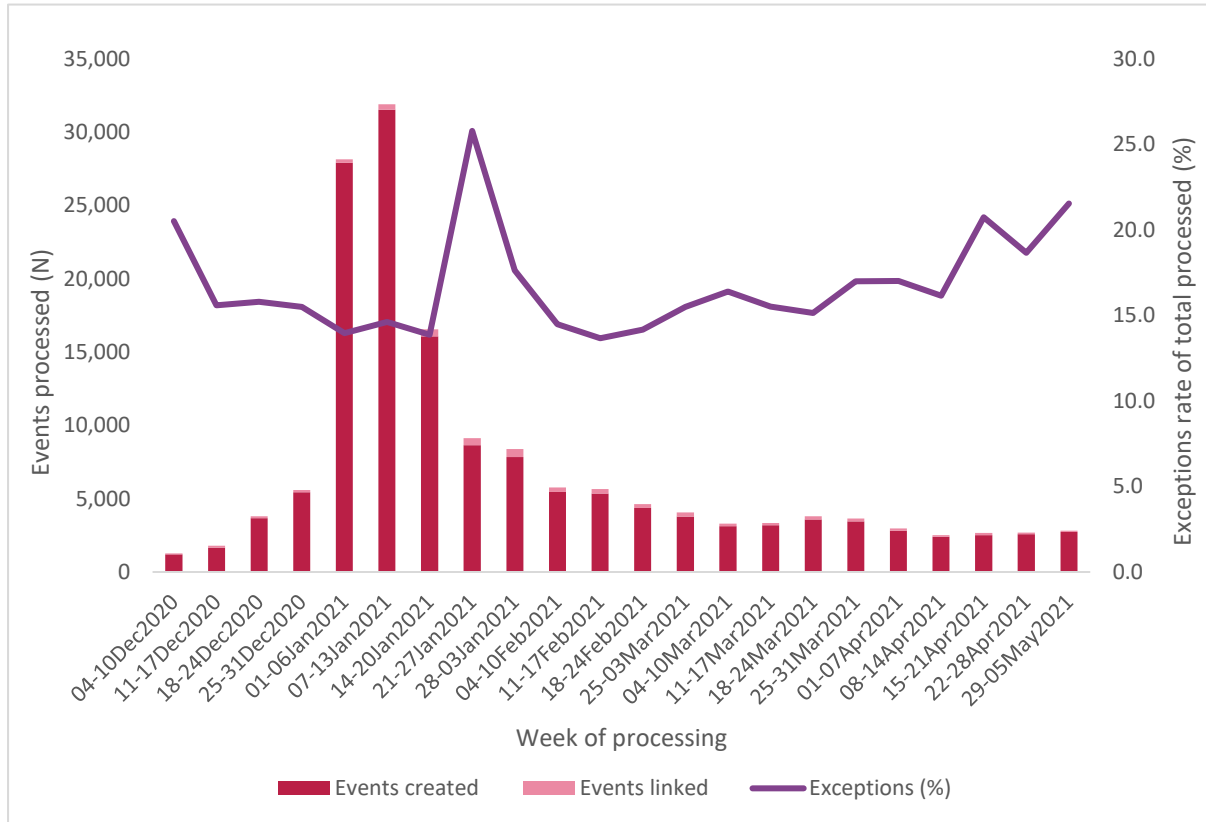


Figure 5: COVID-19 robot data processing SP2; CIDR event creation by week and proportion of exceptions for public health investigation

Data source: Deloitte RPA weekly output files analysed 06 May 2021

6. Robot team activity SP3: event-matching for enhanced surveillance processing

To transfer the data collected by the contact tracing centres on the Covid Care Tracker (CTC) to CIDR, the robot team match the CTC’s Positive Patient Assessments (PPAs) to the CIDR notification/events by patient name and date of birth.

Event matching is a four-step process; deduplication of PPA records, formula matching, manual matching, re-attempt formula matching. This results in two outcomes;

- a. Matched PPAs are prepared for robot processing in an SP3 input file (approx. 96% of PPAs).
- b. Unmatched PPAs are prepared for human investigation by Public Health, as per the agreed business rules. Unmatched PPAs are due to data quality of name/DOB or processing delays (approx. 4% of PPAs).

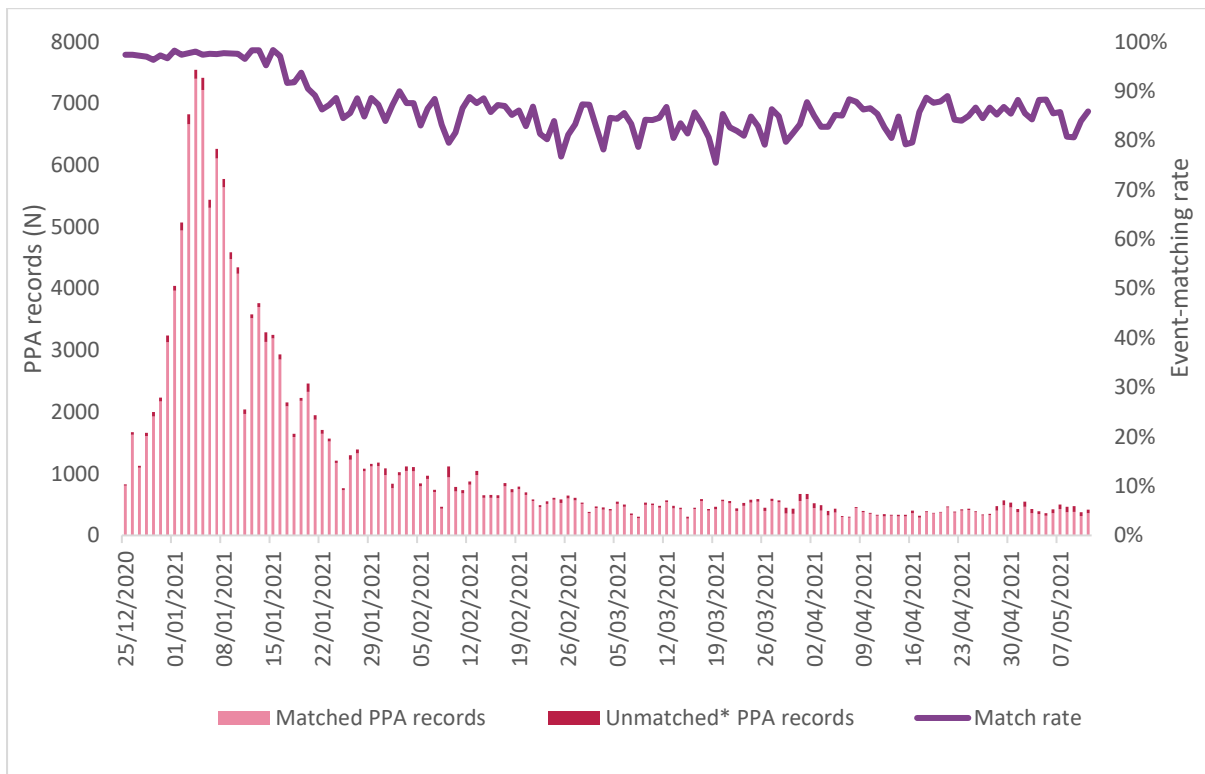


Figure 6: COVID-19 data processing SP3 file preparation; Event-matching of PPA records for SP3 robot processing; daily match figures and proportion of records matched

*Unmatched PPA records are re-attempted, therefore the match rate is provisional and will change over time.

Data source: 7-day CIDR COVID-19 event report extracted daily at 09:30 and 13:30

Data source: CTC extract received daily via email at approx. 20:15

7. Robot activity SP3: enhanced surveillance data, processing of PPAs, collected by the CTC

The matched PPAs are processed by the robot in SP3, updating COVID-19 events with enhanced surveillance information from the contact tracing centers on the Covid Care Tracker system (CTC). Exceptions are records that are flagged for human investigation by public health based on the nationally agreed business rules for the COVID-19 robot. Exceptions are flagged mainly due to data quality or case definitions and are applied to strengthen the quality of COVID-19 data on CIDR.

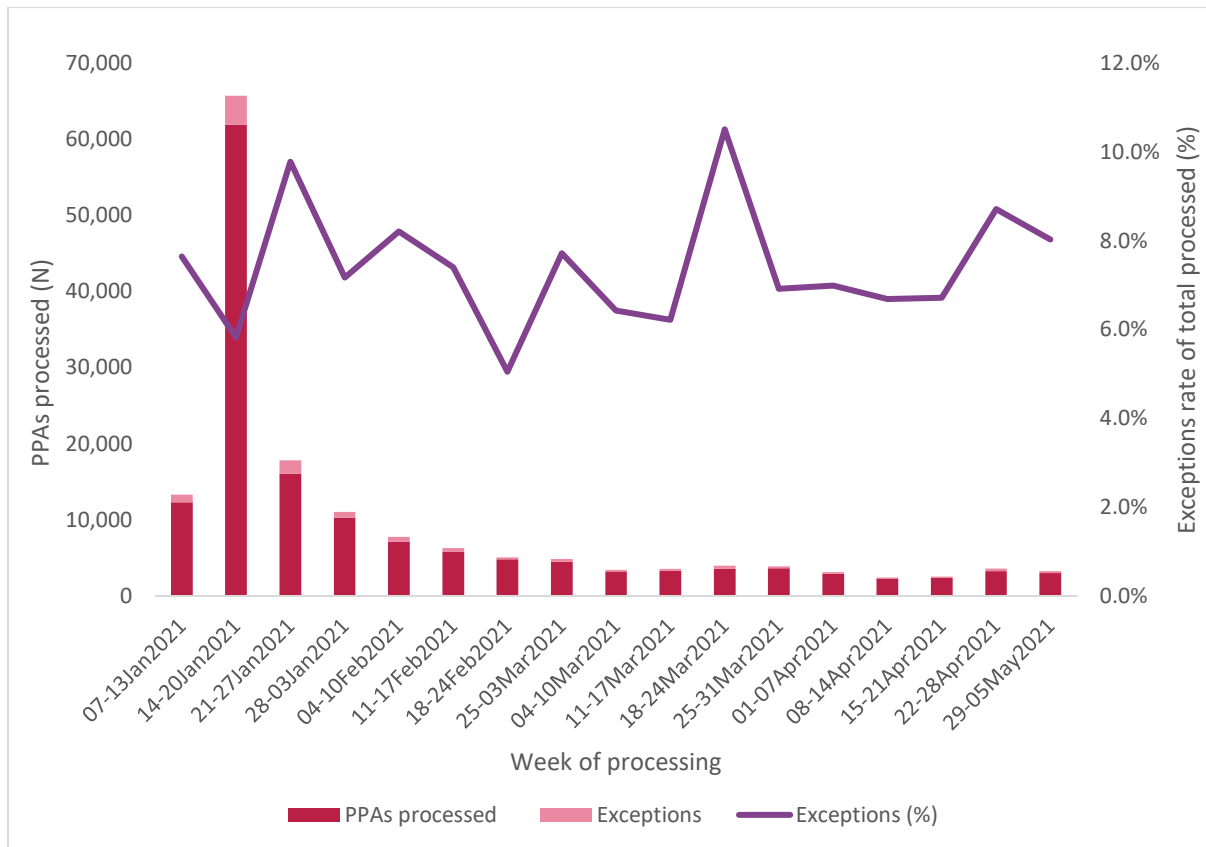
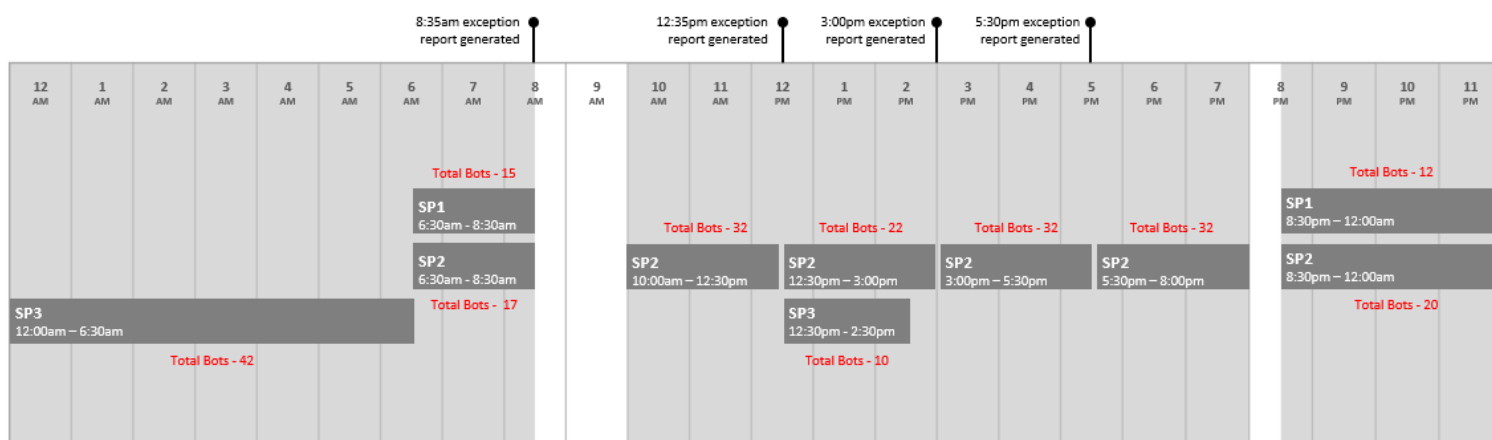


Figure 7: COVID-19 robot data processing SP3; Enhanced surveillance by week and proportion of exceptions for public health investigation

Data source: Deloitte RPA weekly output files analysed 06 May 2021

Appendix 1: COVID-19 data processing activity schedule

1. Robot operational schedule



2. Surveillance data processing actions/ responsibilities/ dependencies

Sub-process	Action	Frequency	Responsibility
1	Manually process all business exceptions flagged on the robot output file.	Daily @ 8:30am	Public Health
1	Review robot output file to verify all lab notifications completed by the robot were processed appropriately.	Daily @ 8:30am	Public Health
1	Continue processing lab notifications in Queue 1 throughout the day (as possible).	Daily from 8:30am to 8:00pm	Public Health
2	Manually process all business exceptions flagged on the robot output files.	Daily @ 8:30am, 12:30pm, 3:00pm and 5:30pm	Public Health
2	Review robot output files to verify all events created/linked by the robot were processed appropriately. This includes ensuring the correct CCA was assigned.	Daily @ 8:30am, 12:30pm, 3:00pm and 5:30pm	Public Health
3	Run the 7-day CIDR report for event matching.	Daily @ 07:30am and 1:30pm	HPSC
3	Complete event matching process and prepare the sub-process 3 input file before the scheduled runs.	Daily @ 12:30pm and 12:00am	HPSC
3	Manually process all business and application exceptions flagged on the robot output files.	Daily @ 8:30am and 3:00pm	Public Health
3	Review unmatched PPA's on a weekly basis and process/investigate these call records as appropriate.	Weekly	Public Health

Appendix 2: Acknowledgements

The project is led by Julie Arnott and Niamh Sneyd (HSE-HPSC) on behalf of the scientists in the HSE-Departments of Public Health, in consultation with and supported by Deloitte, HSE-Health Business Services and the HSE-Office of the Chief Information Officer.

Appendix 3: HPSC Robot Team structure and contact information

Project owner: John Cuddihy, Director of HPSC

Programme manager: Niamh Sneyd, HPSC IT Business Manager

Project manager, business process lead and stakeholder manager: Julie Arnott, HPSC Epidemiologist

Business support: Debasish Hajra and Allen Sinna

Project support: Maura Russell and Ciara Cross

Robot support helpdesk: Robot Support robotsupport@hpsc.ie

Appendix 3: Further information

Further information is outlined on the [HPSC website](#).