

## ATTACHMENT 2



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30 December 2019

Ms Catherine Myers  
 Chief Executive Officer  
 Victorian Commission for Gambling and Liquor Regulation  
 Level 3, 12 Shelley Street  
**RICHMOND VIC 3121**

**By Email**

Dear Ms Myers

**Sixth Review of the Casino Operator and Licence (Sixth Review) - Recommendations 7 and 8**

I refer to Recommendation 7 and 8 of the Sixth Review and our response dated 2 July 2018.

Recommendation 7 provides:

*The VCGLR further recommends that Crown Melbourne use observable signs in conjunction with other harm minimisation measures such as data analytics to identify customers at risk of being harmed from gambling.*

Recommendation 8 provides:

*The VCGLR recommends that Crown Melbourne proceed with development and implementation of comprehensive data analytics tools for all patrons, to proactively identify for intervention patrons at risk of harm from gambling. These tools would utilise both historical data (with parameters developed from the second player model), and real-time monitoring of play periods. Crown Melbourne should look to models in other jurisdictions, and consult with external data analytics experts, with a view to implementing world-class, proactive approaches with real-time (or near-real time) operational effectiveness. In particular—*

- (a) for carded play (that is, player activity which can be systematically tracked), Crown Melbourne will have in operation a comprehensive real-time player data analytics tool by 1 January 2020, and*

*(b) for uncarded play (that is, all other player activity), Crown Melbourne will, by 1 January 2019, commence a comprehensive study of all the practical options for a real time player data analytics tool, with a view to reporting in detail (including legal, technical and methodological issues) to the VCGLR by 1 January 2020 and the tool being in operation by 1 July 2022.*

## Executive Summary

In response to Recommendations 7 and 8, Crown Melbourne Limited (**Crown**) has undertaken significant work, including:

- The development of a data analytics tool for carded players (**members**), the 'Crown Model', to proactively identify opportunities for interventions with members who may be at risk of harm from their gambling. The Crown Model:
  - Utilises historical data, applying a complex algorithm, which has been refined during extensive trialing conducted over a 12 month period;
  - Appears, based on our trials, to be a more suitable tool for Crown when compared to other tools currently in use/available. Based on research undertaken, there is currently no third party technology available which meets Crown's requirements; and
  - Has been endorsed by expert Professor Alexander Blaszczyński, in terms of the work performed to date, recognising that more time and data are now needed to progress the tool further.

The Crown Model is continuing to be operated in the same manner as during the trial, and is under continued review for refinement opportunities by both the Responsible Gaming Team and the Customer Analytics Team. It is proposed that Crown will also continue to have ongoing reviews carried out on the Crown Model by external experts.

- The development of a new real-time play period monitoring tool, which provides greater accuracy in reporting, allowing intervention at 12, 20 and 24 hours of continuous play. This tool is currently in full use at Crown, in concert with observable signs.

Therefore, in relation to the monitoring of carded play, Crown now has in operation a real time play periods tool in combination with a comprehensive player data analytics tool, which it is committed to developing and monitoring, to ensure it keeps or leads pace with alternate products in the market.

Please also note that specifically with respect to Recommendation 7, Crown has continued to use observable signs as a key element to its responsible gaming framework, together with the enhancement of its Play Period monitoring tool and the Crown Model.

With respect to the monitoring of uncarded play, despite extensive research, Crown has not yet identified any tools which are currently available (and importantly, proven) to effectively monitor uncarded play in Crown's environment, with a view to intervene with patrons who may be at risk of harm from their gambling. However, there are two pieces of technology which are currently under development, which Crown will continue to monitor closely. These are:

- Anonymous Player Awareness System (APAS); and
- Focal Research's EGM uncarded monitoring tool.

Based on the above summary, which is articulated further below, we are of the respectful view that Recommendations 7 and 8 have been addressed to the extent possible. Notwithstanding that a tool for monitoring uncarded play has not yet been identified; and that the Crown Model will continue to be refined over a period of time; the information contained within this submission confirms the commitment that Crown has in developing and implementing tools of this nature.

### Crown Model

The Crown Model is Crown's data analytics predictive data-modelling tool, developed by Crown's in-house specialist resources. In developing the tool, Crown had the benefit of engaging with officers of the Victorian Commission for Gambling and Liquor Regulation (VCGLR) in order to obtain their feedback, for which we are grateful. Relevant background and detail regarding the Crown Model's development is outlined below.

To seek expert review and benchmark the Crown Model, as well as identify whether there was a more effective product in the market, Crown undertook research to identify a predictive data analytics tool, which is operating in a land based casino across both table games and gaming machines.

The outcome of this research was that there is currently no entirely suitable product which satisfies Crown's following requirements for a model:

- a) Utilises predictive data analytics;
- b) Applies to a land based environment;
- c) Incorporates both Gaming Machine and Table Games play; and
- d) Discloses its algorithm for peer assessment and independent efficacy testing.

Regardless, Crown was able to use information collated from this research to assess it against the Crown Model, to ensure we were implementing a suitable, proactive and industry leading product. Some examples of the models Crown reviewed include:

- The rule-based criteria Automated Risk Monitoring System (ARMS), in use at SkyCity Adelaide. However, it did not fit the criteria of providing data analytics or predictive modelling and its use for Crown's purposes were therefore discounted.
- The 'Playscan' product, a responsible gaming tool developed and implemented by Svenska Spel, a state-owned company operating in the regulated gambling market in Sweden. Playscan, as described in its publicly available information, incorporates a '*probabilistic risk prediction model ... [and] analyses player data to detect signs of problematic gambling*', as well as limit setting and personalised player feedback (web based). It is mainly in use on Video Lottery Terminals in Sweden and Norway, as well as other gaming products and in France. However, there was no peer reviewed research available to confirm efficacy and Crown was unable to obtain any substantive independent indication of the usefulness of the tool.
- Focal Research, which has conducted research and developed a data analytics tool for land based carded play on Electronic Gaming Machines (EGMs) in Australasia.

### ***Consultation with External Data Analytics Experts***

Crown has carefully considered the research and Focal ALERT™ product, as the only entity to our knowledge conducting both research and developing tools for land based EGMs in Australasia. A number of presentations and discussions in relation to Focal's research and product offering took place throughout 2018 and 2019. This included a presentation of Focal ALERT™ to the Crown Resorts Limited Responsible Gaming Board Committee on 15 November 2018. These presentations and discussions with Focal Research were of great value to Crown, as Focal Research's use of data analytics in this area could be drawn upon when developing the Crown Model.

Although Focal Research's product, 'Focal ALERT™' is used for land based operator data analytics, it does not yet incorporate land based table games player data analytics.

We understand a report on the outcomes of a trial of a particular version of the product was issued in late December. We will review and consider the outcomes of this trial, and continue to monitor any progress in relation to the incorporation of table games play and assess its relevance to Crown.

We also note, for information purposes only, an earlier version of Focal ALERT™ was used by two provincial Canadian casinos, Casino Regina and Casino Moosejaw, Saskatchewan, Canada. Focal Research built and maintained the algorithms as part of the casinos' Responsible Gaming Programs iCare from the iView system. The algorithm was in place for nine years from 2005 but was discontinued in 2014.

In addition to the above, whilst there are a number of entities offering on-line gambling based player data analytics, none have converted to a land based product, and research has been silent on the potential cross over.

Crown will continue to monitor products in this area as they develop, with a view to benchmarking and improving the Crown Model as relevant, to ensure it is an industry leader in its class. In continuing the development of the Crown Model, Crown will continue to deploy the resources of the internal Customer Analytics Team, who are Crown's data analytics experts. The Customer Analytics Team are intimately familiar with the nature of Crown's business and members, and the data which is available for analysis.

### ***Development of the Crown Model***

In our respectful view, the development of the Crown Model, which includes both gaming machine and table games play, in the absence of a suitable market solution, was the most appropriate and effective action to take to address Recommendations 7 and 8, and most importantly, positively support our responsible gaming commitment (in conjunction with observable signs).

With helpful commentary provided by the VCGLR and the Victorian Responsible Gambling Foundation (VRGF) in terms of the baseline data, that is, largely the tracked play behaviours of members who subsequently self excluded, Crown proceeded with the development of the Crown Model.

Please find attached in **Attachment A** an outline of the development process of the Crown Model (as previously provided to the VCGLR), which included the analysis of 18 months of historical gaming data on 560 self excluded members to identify potential variables, which could be used in predictive modelling. Two-hundred variables were analysed, of which 50 were used to build the first models.

Once built, the models were subject to a validation process involving 559 self excluded members, and reached the stage where a live trial was required.

Consequently, a comprehensive trial was undertaken over a 12 month period from 25 June 2018 to 30 June 2019, in order to test and refine the effectiveness of the Crown Model. The details of the trial are articulated in **Attachment B**. Key aspects of the trial included the following:

- 9 tranches of 100 members each (ie 900 members in total) were provided to Responsible Gaming for review and action. Of these members:
  - Responsible Gaming attempted to either interact with, or observe, the members when they next returned to the casino (132 did not return, based on loyalty card usage). There were 602 members interacted with/observed, and 15 self exclusions were entered into as a result of this process. The remaining 166 members were unable to be interacted with (due to, for example, having left the casino when the RGA attended, were in a group and a private conversation was not possible etc.).
  - After interaction with Responsible Gaming, there were 258 subsequent interactions involving Responsible Gaming, relating to 76 members. These interactions were in response to play period monitoring, observable signs, welfare checks, Withdrawal of Licences, additional self exclusions, etc.
- 10 members, who had previously been interacted with, were randomly selected to complete a survey 7-8 months after their interaction, to collate qualitative data on what impact had been made. Of these 10, 3 members advised of a change in behaviour and 9 members indicated that the interaction was useful.

As has been the experience of the Focal ALERT™ product, the process and development of such a tool requires a great deal of time and agility and Crown is committed to the continued development of its tool that will assist (alongside observable signs, being a key component of our responsible gaming framework) in gambling harm minimisation.

To ensure the Crown Model was developed with the assistance of an expert, Crown consulted with Professor Alexander Blaszczynski, who was asked to review the Crown Model and comment on its merit. Upon review of the first quarter of Crown Model trial results, Professor Blaszczynski noted in May 2019 as follows:

*"In summary, [Crown's] Player Data Trial shows very promising preliminary results that the predictive algorithm can identify a subset of members exhibiting problems as evidenced by repeated contact with RGLOs (Responsible Gaming Liaison Officers), and that RGLO interactions between identified members is effective in moderating gambling behaviours as assessed by changes in visits, hours and ADT (Average Daily Theoretical) as compared to the control group. As a live trial over time, the predictive algorithm can be refined as more data and information is incorporated in the statistical model."*

Following review of the Crown Model Trial Report presented in **Attachment B**, Professor Blaszczynski made the following additional observations:

*"I have reviewed the Crown Model Trial Report and concur with the views expressed that the development of a predictive model is dependent on the development of a large database with refinements resulting in further iterations of the Model. The Model has positive potentials...[it] represents an additional tool to assist in the identification of behavioural indicators of problem gambling."*

The trial outcomes and Professor Blaszczynski's observations, albeit initial at this stage, have provided Crown with strong support that the Crown Model could be used as an additional tool to identify members who may benefit from intervention by Responsible Gaming, particularly when used in conjunction with observable signs. However, the Crown Model requires additional refinement and any machine learning product such as the Crown Model requires sufficient volumes of data and time to realise the success of the algorithm via validation and the impact an interaction may have.

Crown intends to continue to refine and develop the Crown Model guided by new literature as it becomes available, and in consultation with external experts in the field, the Customer Analytics Team and the Responsible Gaming Department. Crown will continue to run the Crown Model with periodic reports being analysed by the Responsible Gaming and Customer Analytics teams. Crown also proposes to carry out a detailed review of the Crown Model after a further 12 months of operation which will provide additional analysis and commentary on a broader data set and learnings over that extended period.

### **Play Periods Monitoring**

Crown's real time monitoring, 'Play Periods', is a program that identifies continuous ratings without appropriate breaks during a 24 hour period. Members, using their loyalty cards and identified via Play Periods, are approached where possible by Responsible Gaming Advisors (RGAs) or Gaming Staff and reminded to take regular breaks. This program has been in place at Crown for a number of years, and was reviewed and significantly enhanced in 2018/2019.

### ***Technology***

Historically (prior to 2018), the method of identifying Play Periods was through SYCO (the loyalty program data collection system), in the form of automatically generated reports every four hours. These reports identified members who had over 12-hours of cumulative gaming activity but failed to take into account time on-site (e.g. the report would not capture a member with 11-hours of cumulative gaming activity over (for example) a 20-hour period).

In June 2018, following a review to identify more accurate technology to improve the functionality of Play Period monitoring, a program called 'Splunk' was identified as a viable option for reporting real-time Play Periods. *Splunk is a software product that captures, indexes and correlates real time data in searchable form, from which graphs, reports, alerts, dashboards and visualisations can be generated.*<sup>1</sup>

After initial discussions regarding the Splunk product and a period of analysis, verification and testing was conducted. A trial dashboard was then developed as a method of identifying members who had been on-site for more than 12-hours without a substantial break, based on their loyalty card use. Operationally, the trial dashboard was cross-referenced against SYCO reports, to test against the SYCO Report baseline and identify any discrepancies.

The trial was valuable in identifying the most appropriate parameters to provide meaningful real time data outputs, which could assist the Responsible Gaming Team in appropriately identifying

<sup>1</sup> Obtained from Splunk website, accessed 23 November 2019. [www.splunk.com/](http://www.splunk.com/)

members who had played for extended time-periods. Harm minimisation interactions were then able to follow (where possible).<sup>2</sup>

These harm minimisation interactions were purposed to inform members of their play behaviours for that period, discuss whether they have had sufficient breaks and whether they require any assistance from the Responsible Gaming Team.

In December 2018, Crown implemented the Responsible Gaming Splunk Dashboard v1.0 as the primary method for real-time monitoring of Play Periods and the existing 4-hourly automatic SYCO reports ceased.

By mid-2019, mobile Splunk alerts were implemented by Crown's IT Department, through the development of 'Webex Teams', which provided notifications to RGAs' phones, from the Splunk Dashboard. Following the success of the mobile Webex Teams notifications, the technology was further rolled out to gaming teams in late 2019.

A timeline of improvements made to Play Period reporting is shown in the below table:

Play Period Timeline	Commencement Date
Play Periods (time on device) commenced development using SYCO	July 2013
Splunk Dashboard Trial (time on site)	September 2018
Enhancement of Play Periods policy	December 2018
RSG Splunk Dashboard v1.0	December 2018
Webex Teams <sup>3</sup> Play Period alerts generated to PC and mobile telephones	April 2019
RSG Splunk Dashboard v2.0	August 2019
Webex Teams introduced to gaming staff to assist in monitoring Play Periods	October 2019

### ***Interaction Policy and Process***

The above mentioned improvement in technology has meant that the policy to intervene with a member has evolved, such that the more accurate Play Period reporting will result in a member being approached in the lead up to 12 hours on site (where the member's longest continuous break from gaming has been less than two hours). Previously, the manner in which the reports were generated meant that a member in this situation would be reported on and approached at 16 hours on site. This policy change occurred in December 2018.

<sup>2</sup> Limitations to approaching members included where they had left the area before staff approached, where they were in a group and couldn't be drawn out without causing embarrassment etc.

<sup>3</sup> Webex Teams TM is an online collaborative tool that brings together messaging, file sharing *et al* to produce results faster, from the Cisco website accessed 17 November 2019 [www.cisco.com](http://www.cisco.com)

Specifically, the policy is applied as follows:

- The real time monitoring Play Periods program captures and alerts the Responsible Gaming Team based on various parameters, for example:
  - A member in the lead up to the 12-hour mark (where the member's longest continuous break was less than two hours);
  - A member in the lead up to the 14-hour mark (where the member's longest continuous break was less than three hours); etc.
- The Responsible Gaming Team then seek to undertake interactions with relevant members (either personally or through gaming staff).
- Further alerts are received and acted upon at a minimum at the 12 and 20 hour marks.
- Interactions post 20 hours, are conducted by the Responsible Gaming Team.
- Beyond 24 hours, members are asked to leave for a 24 hour period.

When developing the harm minimisation interactions, whilst cognisant of the positive outcomes that were to be expected from the enhanced real time tool, Crown took into account that some members:

- See interactions as interfering with 'their style of play';
- Actively avoid contact regarding Play Periods, i.e. not using cards at all or periodically only; and
- View RGAs as policing rather than supporting/educating.

Accordingly, careful consideration was given regarding the nature of the interaction to ensure that we had sufficient focus on the quality and timing of each intervention, which is crucial in terms of having meaning for the individual and their approach to their gaming behaviour. An intervention that occurs too early may be regarded as irrelevant by the member and there would be a loss of opportunity and impact in discussing Responsible Gaming issues. Any intervention needs to be purposeful, based on educating the member and alerting them to the potential problems associated with continued play. Knowledge and play history of members is significant, and where possible making use of this prior to any contact contributes to a meaningful, significant and targeted intervention with each member. All interactions are entered into the Responsible Gaming Register.

#### **Uncarded Play Monitoring**

As described in Crown's letter to the VCGLR, dated 24 December 2018, where Crown *'advise[d] that it has commenced its study on exploring options available to it and will be assessing and analyzing the research and expert evidence available which supports a data analytics tool on uncarded play that may enhance Crown's responsible gaming framework.'*, Crown has undertaken this study, the results of which are provided at **Attachment C**.



In summary, to date Crown has been unable to locate an existing practical option for a real time uncarded player data analytics tool which is suitable for Crown's environment. However:

- A recent article<sup>4</sup> noted that the UK Betting and Gaming Council will introduce Artificial Intelligence technology called the Anonymous Player Awareness System (**APAS**). Although APAS again is only being applied to Gaming Machines, Crown will monitor its progress to determine if we can draw any learnings from it.
- Crown is aware that Focal Research is currently focusing on the development of a system that can identify gamblers of interest that are playing uncarded on an Electronic Gaming Machine. To date, no further information is available, however, Crown will continue conversations with the Focal Research team.

Crown will continue to monitor new developments and look for solutions in the market, as well as liaise with its IT Department regarding bespoke options.

### Conclusion

In our respectful view, Crown has undertaken significant work in order to address Recommendations 7 and 8. For ease of reference, the table below presents Crown's response to each element of the Recommendations.

Recommendation – Key Aspects	Crown's Response
<p><b>Recommendation 7</b></p> <ul style="list-style-type: none"> <li>➤ Use observable signs in conjunction with other harm minimisation measures such as data analytics</li> </ul>	<p>Crown has continued to employ observable signs as part of its everyday responsible gaming practices.</p> <p>The Crown Model has been developed and refined over a 12 month comprehensive trial.</p> <p>The Crown Model is currently being used in the same manner as during the trial, in conjunction with observable signs.</p>
<p><b>Recommendation 8</b></p> <ol style="list-style-type: none"> <li>1. Develop and implement comprehensive data analytics tools</li> <li>2. Use historical data and real time monitoring of play periods</li> <li>3. Research models in other jurisdictions</li> <li>4. Consult with external data analytics experts</li> </ol>	<ol style="list-style-type: none"> <li>1. The Crown Model and improved Play Periods monitoring tools have been developed and/or enhanced and implemented.</li> <li>2. Crown Model utilises historical data. Play Periods involves real time monitoring.</li> <li>3. Research has been conducted and has not identified any suitable products.</li> <li>4. Consulted with Focal Research, who are external data analytics experts, about how they were using data, which informed Crown's progress with the Crown Model.</li> </ol>

<sup>4</sup> <https://www.gamblinginsider.com/news/8186/analysis-kept-off-system-needed-trialing-before-legal-cut>

Recommendation – Key Aspects	Crown's Response
<p><b>Recommendation 8(a)</b></p> <p>Implement a real time player data analytics tool for carded play by 1 January 2020</p>	<p>Real time monitoring is currently conducted on member Play Periods, as described above. This complements the operation of the Crown Model which, given the need to run algorithms based on historical data in order to identify a member at risk, is not real time.</p>
<p><b>Recommendation 8(b)</b></p> <ol style="list-style-type: none"> <li>1. Commence a comprehensive study of all practical options for real time player data analytics tools for uncarded players by 1 January 2019.</li> <li>2. Report outcomes of the study by 1 January 2020.</li> <li>3. Implement tool(s) by 1 July 2022.</li> </ol>	<ol style="list-style-type: none"> <li>1. The study of options for real time play data analytics tools for uncarded players commenced by 1 January 2019, as outlined in Crown's letter to the VCGLR dated 24 December 2018.</li> <li>2. Outcomes to date are included in <b>Attachment C</b>. A suitable tool has not yet been identified. Crown will continue to monitor this.</li> <li>3. The implementation of tool(s) by 1 July 2022 will be dependent on the ability to source an appropriate and effective tool prior to this date.</li> </ol>

Please note that our response and the detail contained within it (including the attachments) (**Material**) contains confidential and commercially sensitive information. The Material is provided to the VCGLR in strict confidence for its sole and exclusive use in connection with Recommendation 7 and 8. It is the view of Crown that the Material provided is exempt from disclosure under the *Freedom of Information Act 1982 (Vic)* under various sections of that Act. As such the Material must not be placed on any file, register website or database that is (or possibly is) available to the public. Please also note that Crown does not consent to the Material being disclosed to any third party whatsoever – whether under the Freedom of Information Act or otherwise – and the Material is made available strictly on this basis, and on the basis that no disclosure of the Material or any part of it be made without either receiving prior written consent from Crown or giving adequate prior notice to Crown in order that it may object to such disclosure.

Please do not hesitate to contact me or Joshua Preston, if you have any queries.

Yours sincerely



Barry Felstead  
Chief Executive Officer – Australian Resorts

cc: Rowan Harris

Encl

## Attachment A | Crown Model



This document and all and any information contained in it (Material) contains confidential and commercially sensitive information. The Material is provided to the Victorian Commission for Gambling and Liquor Regulation in strict confidence for its sole and exclusive use in connection with the Crown Model (player data predictive model). It is the view of Crown Melbourne Limited and Crown Resorts Limited (collectively Crown) that the Material provided is exempt from disclosure under the *Freedom of Information Act 1982* (Vic) under various sections of that Act. As such the Material must not be placed on any file, register website or database that is (or possibly is) available to the public. Crown does not consent to the Material being disclosed to any third party whatsoever – whether under the Freedom of Information Act or otherwise – and the Material is made available strictly on this basis, and on the basis that no disclosure of the Material or any part of it be made without giving adequate prior notice to Crown in order that it may object to such disclosure.

### Introduction and methodology

The objective of the Crown Model is to build a predictive model that identifies patrons who exhibit potential problem gaming behaviour based on data obtained from patron historic gaming activity and some demographic information.

There were a total of ~1100 self-excluded patrons between July 2012 and December 2016, which were split evenly between model build and validation.

	Model Build Dataset	Model Validation Dataset
Number of self excluded patrons	560	559
Number of randomly selected patrons from database	5,000	5,000
Total number of Patrons	5,560	5,559

Two separate models were built (Table Games and Gaming Machines) due to the different nature of the two gaming products.

A combination of patron demographics and gaming behaviour (18 months up until the point of self-exclusion) were used, and over 200 variables were analysed, out of which the 50 best were chosen to build the models. The 50 are based on machine learning algorithms which are designed to identify the best features.



*Confidential and commercially sensitive*



## Model validation results

Model validation results show a capture between ~35% and ~52% of all self-exclusions dependent on model threshold, and also identify patrons who are potentially showing problem gaming behaviour, but did not self-exclude.

**Total TG self exclusions in validation set: 418 Patrons**

Model Threshold	60%	70%	80%
<b>Correctly</b> predicted to self exclude	219	200	175
% of self excluded patrons identified by model	52%	48%	42%
Self excluded patrons <b>not</b> captured by model	199	218	243
% of self excluded patrons <b>not</b> identified by model	48%	52%	58%
<b>Incorrectly</b> predicted to self exclude	27	20	10
% of patrons <b>wrongly</b> identified by model	11%	9%	5%

### **TG results at 70% model threshold:**

- Model is able to identify 48% of all self-exclusions (200 out of 418)
- In total the model identified 220 patrons, of which 20 patrons did not-self exclude, but potentially displayed problem gaming behaviour

**Total GM self exclusions in validation set: 141 Patrons**

Model Threshold	60%	70%	80%
<b>Correctly</b> predicted to self exclude	73	61	50
% of self excluded patrons identified by model	52%	43%	35%
Self excluded patrons <b>not</b> captured by model	68	80	91
% of self excluded patrons <b>not</b> identified by model	48%	57%	65%
<b>Incorrectly</b> predicted to self exclude	28	17	7
% of patrons <b>wrongly</b> identified by model	28%	22%	12%

### **GM results at 70% model threshold:**

- Model is able to identify 43% of all self-exclusions (61 out of 141)
- In total the model identified 78 patrons, of which 17 patrons did not-self exclude, but potentially displayed problem gaming behaviour

## Summary

In order to validate results, time would be required (as a prediction is made regarding a future event). It is important to note that **potential** problem gaming behaviour is identified, and not everyone identified would experience problem gaming.

Building this model has been technically difficult. With more time and additional information obtained from the model run on the current active patron database, further enhancements could be made in order to increase the accuracy of predictions.

As this would be a live model trial, for best outputs continued analysis and enhancements may be required to form a final view on accuracy, usefulness and reliability.

The Crown Model would be an additional tool in the very robust Crown Melbourne Responsible Gaming framework, where observable signs are viewed as an effective means of identifying potential problem gaming behaviours and staff are trained to refer patrons who display these signs or request assistance to Responsible Gaming Liaison Officers.

## Attachment B | Crown Model Trial



This document and all and any information contained in it and appended (**Material**) contains confidential and commercially sensitive information. The Material is provided to the Victorian Commission for Gambling and Liquor Regulation (**VCGLR**) in strict confidence for its sole and exclusive use in connection with its review of the Crown Model (player data predictive model). It is the view of Crown Melbourne Limited and Crown Resorts Limited (collectively **Crown**) that the Material provided is exempt from disclosure under the *Freedom of Information Act 1982* (Vic) and (Cth) and under various sections of those Acts. As such the Material must not be placed on any file, register website or database that is (or possibly is) available to the public. Crown does not consent to the Material being disclosed to any third party whatsoever – whether under the *Freedom of Information Act*[s] or otherwise – and the Material is made available strictly on this basis, and on the basis that no disclosure of the Material or any part of it be made without giving adequate prior notice to Crown in order that it may object to such disclosure.

### Background

The *Fifth Review of the Casino Operator and Licence, June 2013* by the VCGLR, recommended that Crown assess the use of player data in relation to intensity, duration and frequency of play as a tool to assist in identifying problem gamblers.<sup>1</sup> A trial was implemented, with the results provided to the VCGLR on 20 November 2015.

The VCGLR subsequently requested that Crown provide a presentation of the results, to the VCGLR Commissioners at the 28 April 2016 Commission meeting. At this meeting, the then Chair, Dr Bruce Cohen, provided comment that the use of loyalty program Member (**Member**) play data available for persons who subsequently self exclude, could provide the basis for predictive data modelling as a tool to assist in identifying potential problematic play in the general loyalty program Member population.

In correspondence dated 15 September 2016, the VCGLR confirmed the expectation that Crown would review the use of player data for persons who self exclude, to determine whether meaningful or common variables can be identified.

As such, Crown Melbourne's Customer Analytics Team commenced work on a predictive data modelling project entitled the 'Crown Model', using the data available from loyalty program Members in the lead up to self-exclusion. Details of this project have been discussed on several occasions with VCGLR representatives, including a VCGLR data subject matter expert, in late 2017 and early 2018.

Further, the VCGLR's *Sixth Review of the Casino Operator and Licence, June 2018* recommended:

#### Recommendation 7

*The VCGLR further recommends that Crown Melbourne use observable signs in conjunction with other harm minimisation measures such as data analytics to identify customers at risk of being harmed from gambling.*

#### Recommendation 8

*The VCGLR recommends that Crown Melbourne proceed with development and implementation of comprehensive data analytics tools for all patrons, to proactively identify for intervention patrons at*

<sup>1</sup> Fifth Review of the Casino Operator and Licence, Victorian Commission for Gambling and Liquor Regulation, June 2013, pg. 99



*risk of harm from gambling. These tools would utilise both historical data (with parameters developed from the second player model), and real-time monitoring of play periods. Crown Melbourne should look to models in other jurisdictions, and consult with external data analytics experts, with a view to implementing world-class, proactive approaches with real-time (or near-real time) operational effectiveness. In particular—*

- (a) for carded play (that is, player activity which can be systematically tracked), Crown Melbourne will have in operation a comprehensive real-time player data analytics tool by 1 January 2020,*
- (b) for uncarded play (that is, all other player activity), Crown Melbourne will, by 1 January 2019, commence a comprehensive study of all the practical options for a real time player data analytics tool, with a view to reporting in detail (including legal, technical and methodological issues) to the VCGLR by 1 January 2020 and the tool being in operation by 1 July 2022.*

### **Current Process**

Apart from the Crown Model Trial, Crown's current process when identifying potential problem gambling behaviours, is via the use of observable signs commonly associated with problem gambling behaviour. These observable signs have an evidence base in research.<sup>2</sup> Crown employees are instructed to refer customers who seek assistance and/or are displaying observable signs to a Responsible Gaming Advisor (RGA). The implementation of the Crown Model Trial is viewed and utilised as an additional tool for Responsible Gaming staff.

### **Collection of Player Data**

Crown operates a property wide loyalty program known as Crown Rewards. Members are able to earn points when playing gaming machines, table games (and their electronic versions), purchasing food and beverages, staying in the hotels and when purchasing goods and services from participating Crown Melbourne Complex (**Complex**) retailers. These points can be redeemed for goods, services and gaming play throughout the Complex.

Collection of Member gaming data activity relies on the Member using their card when gaming. As such, there are some limitations in the use of Member data from a research and analytical perspective. These limitations include:

- The Member using their card when gaming, and this may not be at all times (so an incomplete or skewed data set could be captured);
- Only the Member using their card (i.e. no card sharing);
- In terms of gaming play, the Member may also be gambling at other venues, so a complete assessment of their play behaviour is not possible; and
- Data accuracy limitations when collecting Member play data i.e. table games staff input etc.

<sup>2</sup> 'Validation study on in-venue problem gambler indicators', Thomas, A., Delfabbro, P. and Armstrong, A. (2014), Gambling Research Australia; 'Identifying Problem Gamblers in Gambling Venues', Delfabbro et al (2007) and 'Current Issues related to identifying the problem gambler in the gambling venue' various authors, Australian Gaming Council (2002).



### Objective of the Crown Model Trial

To determine, by way of a 12-month trial, if the Crown Model could be utilised as an additional tool to identify loyalty program Members who may benefit from a responsible gaming intervention.

### Timeline

Date	Who	Detail
11 June 2018	Responsible Gaming Team	Finalisation of operational documentation The Responsible Gaming Team received a briefing on the Crown Model Trial
14 June 2018	Crown Melbourne Responsible Gambling Management Committee	The Committee was briefed on the Crown Model Trial
18 June 2018	Customer Analytics Team	Provision of names for adding to paging (a <b>Tranche</b> )
25 June 2018	Responsible Gaming Team	Commencement of Crown Model Trial
July 2018 to July 2019	Customer Analytics Team and Responsible Gaming Team	Review following the completion of each Tranche

### Methodology and Process

The Customer Analytics Team developed Crown Model identifiers from a review of the data of the Members in the Crown Rewards database.

For the Crown Model Trial, local Members who had used their Crown Rewards card for gaming in the prior 30 days were provided as a 'Tranche' of 100 Members.

Upon receipt of the report, a Responsible Gaming Advisor (**RGA**) placed the Member identifiers on a pager that alerted the RGA team when the Member next used their Crown Rewards card in a gaming device.

When an RGA received an alert that a Member identified on the report had inserted their Member card into a gaming device, they made every reasonable effort to attend that location.

If the Member was not in a position to be approached in a discreet manner, the RGA notated and re-attempted an approach at another time (where possible).

If a Member was able to be approached discreetly, the RGA did so and engaged in conversation.

The RGA discussed the following with the Members:

- An outline of the RGA's role;
- Asked the Member whether they were aware of the Responsible Gaming Centre services and programs;



- Asked the Member whether they are comfortable with their level of play;
- Reminded the Member to take regular breaks; and
- Provided the Member with an RGC card if appropriate.

The interactions provided an opportunity for the RGA to deliver information about the services and programs of the Responsible Gaming Centre, consider whether there are any responsible gaming issues and take further appropriate action as required.

The interactions were recorded in the database, as well as a separate spreadsheet, which assisted in analysing the effectiveness of the trial and to also provide feedback to the Customer Analytics Team at the scheduled meetings, in order to refine the Crown Model.

### **Development of the Crown Model**

In summary, the objective of the Crown Model is to build a predictive model that identifies patrons who exhibit potential problem gaming behaviour based on data obtained from patron historic gaming activity and some demographic information.

From the Initial Model, a sample of randomly selected Members from a pool of ~200,000 from the Crown Rewards database (meeting the criteria of at least one Table Games or Gaming Machines rating in the last 18 months) was obtained.

After review of Initial Model build, following the first Tranche of the Crown Model Trial, further refinements were made such as:

- analysing up to the last 200 visits instead of relying on a static period of 18 months;
- implementation of a new modelling algorithm (Neural Networks);<sup>3</sup> and
- combining two separate (Table Games and Gaming Machines) models into one, to better capture any interplay between product.

### **Crown Model Trial Results**

The Crown Model Trial as refined, commenced on 25 June 2018 and ceased 30 June 2019,

Nine Tranches were provided by the Customer Analytics team during the Trial period.

Regular meetings with the Customer Analytics Team and Responsible Gaming were held, to review progress and develop refinements based on progress.

<sup>3</sup> Neural Networks is a modelling algorithm that aims to recognise patterns within a dataset. Over time, modelling has evolved from using simpler techniques (such as regression) to more complex algorithms such as Neural Networks or Gradient Boosting by leveraging advances in computing capacity. These algorithms can be more accurate and help identify patterns not captured by traditional modelling techniques.





Refinement continued throughout the trial period using gaming player data from persons who subsequently self excluded, as well as empirical observations garnered via conversations/interactions with Members.

On completion of the initial Tranche of Members observed/interacted with, it was found that further time was required between data collected from the observation/interaction, which was used to refine the Crown Model, and the next Tranche to be released. As such, the initial commitment to monthly meetings was reconsidered to be end of Tranche meeting, with nine Tranches completed in the Trial period.

Representatives from the Customer Analytics and Responsible Gaming Teams met post Tranche completion to discuss the Crown Model, provide feedback from staff about the Member interactions and be updated on any refinements. Information from the Customer Analytics Team is provided in **Appendix A**.

Post-Trial, Crown continued the observations/interactions, to gather the observational data, which may be useful for the next phase of Crown Model refinement.

RGA observations of the trial of the Crown Model suggested that:

- It empowers Responsible Gaming staff to take a proactive role in their duties;
- The interaction could assist Members to prevent any potential problems from escalating;
- Some Members displayed negative attitudes on being approached: defensive and suspicious of Responsible Gaming/Crown's motives;
- There were difficulties in engaging Members who play on tables or in a group, or who are higher tier Members; and
- Limitations from Members not using their own card or not using their card at all times.

It was decided to collect qualitative data from a sample of those Members who had been contacted by an RGA. The aim was to establish whether the interaction with the RGA had any impact, and if so to what effect.

RGAs were engaged to deliver a short questionnaire to be administered by way of unstructured interview, exploring whether the Member had changed their gaming behaviour; had reflected on the interaction; sought formal or informal assistance for problem gaming behaviour; and whether they had discussed the interaction with any other person.

Ten Members, who had previously been interacted with, were randomly selected and interacted with at periods between seven and eight-months post interaction.

Not all Members chose to answer all questions posed by the RGA.

Most recalled being approached by RG employees to talk about their gaming, with a modest number indicating the interaction having any effect on their gaming behaviour.

A more detailed report of the interactions is contained in **Appendix B**.



## Responsible Gaming Team Data Overview

25 June 2018 – 30 June 2019

The following describes an overview of the data collected by the Responsible Gaming Team when observing or interacting with Members who were identified via the Crown Model Trial. In terms of any previous contact recorded by the Responsible Gaming Department, histories were collected for the prior five years.

- 900 Members were provided to Responsible Gaming from the Customer Analytics team (9 Tranches each with 100 Members);
- Of these 900 Members, 149 collectively had a total of 1134 prior interactions with Responsible Gaming in the preceding five years. Of the 149, there were a minimum of six, and maximum of 28 Members with an average of 17 Members who had a prior interaction with Responsible Gaming across any of the nine Tranches;
- Of the prior interactions with Responsible Gaming from these 149 Members, the top five interactions were:
  - Play Periods - 55.8% - these are reminders of length of play or time on site;
  - Revocation Information – 7.3% - where the Member has inquired about revoking a self exclusion;
  - Welfare – 6.1% - commonly associated with observable signs or follow up when an employee or other customer has raised concerns;
  - Observable Signs – 3.4% - observable signs that were reported to or observed by RGAs;
  - Self Exclusion Information – 2.8% - where a Member has requested information about the Self Exclusion Program;
- Of note is that the bulk of the interactions related to 'Play Periods';
- Of the 900 Members, 526 were engaged and interacted with by Responsible Gaming and 76 Members were observed due to an interaction unable to take place;
- Most Members found the interaction positive, which is a testament to the skill of the RGAs, and also assists in increasing targeted harm minimisation interventions;
- 132 of the 900 Members had no recorded visitation before the Tranche concluded;
- 15 of the 900 Members have proceeded with a voluntary Self Exclusion as at 31 October 2019. Of the 15 Members, nine subsequently self excluded after an average of 155 days following an interaction, with the minimum time between the self exclusion and interaction being 23 days, and the maximum being 305 days;



- Of the nine Member tranches that self excluded after a follow up or observation, those that were spoken with predominantly indicated that they were not experiencing difficulties with their gambling. All Members that are subject to an interaction with an RGA as part of the Crown Model are furnished with information about responsible gaming programs and services available at Crown. This information is of interest, and will continue to inform the refinements of the Crown Model.

**Table 1**

Tranche	No. of Members	Prior RG interaction	Engaged/Observed	Post RG Interaction (as at 30 June 19)	No Visit	Subject to SE (as at 31 October 19)
1	100	16	47	9	39	2
2	100	18	73	14	5	2
3	100	28	62	22	8	0
4	100	18	61	15	10	2
5	100	25	62	16	11	6
6	100	11	73	7	16	1
7	100	15	84	9	7	0
8	100	12	77	9	15	1
9	100	6	63	2	21	1
<b>Total</b>	<b>900</b>	<b>149</b>	<b>602</b>	<b>103</b>	<b>132</b>	<b>15</b>

A visual representation of this data is provided below. When considering the above information, the Crown Model Trial has served a useful purpose in that Members who may be playing in a mode similar to persons who subsequently self exclude, appear to have been impacted by early intervention in a Member considering their play behaviour.





## Crown Model Trial Conclusion

The Crown Model objective was to build a predictive model that identifies Members who exhibit potential problem gambling behaviour based on data obtained from Member historic gaming activity and some demographic information.

The purpose of the Crown Model Trial was to determine, by way of a 12-month trial, if the Crown Model can be utilised as an additional tool to identify loyalty program Members who may benefit from a responsible gaming intervention.

Data collected and reviewed during the Crown Model Trial provided encouragement to continue and refine the Model. The final combined data collected shows that an intervention appears to have made some impact on Member behaviour (see Table 1).

There were some adverse reactions to intervention by RG staff with Members. Possible unintended consequence of interactions include:

- encouraging Members to play un-carded;
- encouraging card misuse;
- inhibiting Members' help-seeking behaviour; or
- creating paranoia.

RGAs reported that the response to interactions over the past 12 months have been mixed. They reported that approximately 70% of Members were polite, although appeared uninterested in what they had to say and then ended the interaction. About 25% of Members 'brushed off' the approach and 5% of the conversations were meaningful and could take some time discussing a wide range of issues.

Some reactions may be counterproductive to the desired RG practice. As such, Crown will continue to consider the most optimal interaction strategy, including the use of other tools that will reduce perceived stigma commonly associated with responsible gaming interactions and overcoming inhibitions to help seeking.

### Future Directions

The Crown Model Trial provided a good range of indicators based on data, and whilst not refined to 100% accuracy, it will assist in further refinement and building of the base. As has been part of the Crown Model Trial since inception, in order to validate results, time is required. It was noted that that when potential problem gambling behaviour is identified, it does not necessarily mean that the Member is actually engaged in problem gambling behaviours and that other factors are also equally important to consider.

A major component of assessing the success of the Crown Model continues to be time and volume of data to build the most accurate model. Any machine learning product such as the Crown Model requires sufficient volumes of data and the time to realise the success of the algorithm via validation and the impact an interaction may have.



In relation to real time data analytics predicting potential problem gambling behaviours, Crown is not aware of any land-based program that is able to achieve this result. Crown is committed, however, to develop data analytics or predictive modelling that can detect patterns of play that can provide an opportunity for early intervention with Members who may be likely to develop difficulties with gambling, and for this detection to be as close to real time as is practicable. Crown is mindful that there are limitations associated with this goal; and will additionally be continuing to review external product solutions that are research and market tested.

Crown intends to continue to refine and develop the Crown Model guided by new literature as it becomes available in consultation with external experts in the field; the Customer Analytics Team and the Responsible Gaming Department.

## Appendix A | Crown Model Trial



### Responsible Gaming Data

#### Tranche 1

25 June 2018 – 15 September 2018

- 100 Members were provided to Responsible Gaming from the Customer Analytics Team;
- Of these 100, 16 have had a prior interaction with RG in the preceding five years;
- 31 of these Members were engaged with and 16 Members were observed (47);
- 39 Members had no recorded visit; and
- As at 31 October 2019, two Members from this Tranche have self excluded.

#### Refinements

*Members from Tranche one were kept on the pager for 17 days after Tranche two went live. Of the list of 100 provided by the Customer Analytics Team, nearly half did not come in and play in the time period. The Customer Analytics Team was advised at the monthly meeting, this was resolved for the next Tranche.*

#### **As at 30 June 2019**

*Fourteen unique post Responsible Gaming interactions occurred from eight Members on Tranche 1, who were interacted with or observed:*

Attempted Breach	3
Breach of Self Exclusion	3
Play Periods	3
Revocation Follow Up	2
Revocation Information	1
Self Exclusion	2

*One unique post Responsible Gaming interaction occurred from one Member on Tranche 1 who **did not have a data follow up interaction** (as at the time the Tranche concluded):*

Play Periods	1
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*Confidential and commercially sensitive*



## Tranche 2

30 August 2018 – 14 November 2018

- 100 Members were provided to Responsible Gaming from the Customer Analytics Team;
- Of these 100, 18 have had a prior interaction with RG in the preceding five years;
- 67 of these Members were engaged with and 6 Members were observed (73);
- Five Members had no recorded visit; and
- As at 31 October 2019, two Members from this Tranche have self excluded.

## Refinements

*Members were removed from the pager after three attempts of following up without an opportunity presented to engage. Some Members who were unable to be engaged with/observed, were followed up by Service Managers.*

*All Members provided have had some sort of activity (ratings) within a month before start date. The Model was revised and rebuilt after review and 100 Members selected from Model outputs, while also considering recency (staff feedback) and sampling at all tiers.*

## **As at 30 June 2019**

*Twenty-three unique post Responsible Gaming interactions occurred from 11 Members on Tranche 2, **who were interacted with or observed:***

Self Exclusion	1
Mail Suspension	1
Observable Signs	1
Play Periods	17
Seeking other Assistance	1
Self Exclusion Information	1
WOL (Withdrawal of Licence ban)	1

*Five unique post Responsible Gaming interactions occurred from three Members on Tranche 2 **who did not have a data follow up interaction (as at the time the Tranche concluded):***

Mail Suspension	1
Play Periods	3
Self Exclusion Information	1

*Confidential and commercially sensitive*



### Tranche 3

1 November 2018 – 6 December 2018

- 100 Members were provided to Responsible Gaming from the Customer Analytics Team;
- Of these 100, 28 have had a prior interaction with RG in the preceding five years;
- 59 of these Members were engaged with and three Members were observed (62);
- Eight Members had no recorded visit;
- 49 Members were engaged with and three Members were observed by the RG team, 10 Members were engaged with by the Service Managers; and
- As at 31 October 2019, no Members from this Tranche have self excluded.

### Refinements

*In this Tranche, due to initial difficulty interacting with premium Members, commenced Platinum Members spoken to by Gaming staff (who were provided with briefing/script).*

### Customer Analytics Team changes

*Customer Analytics Team comment - Same model and selection process used as for Tranche 2.*

**As at 30 June 2019**

***Seventy-eight unique post Responsible Gaming interactions occurred from 16 Members on Tranche 3, who were interacted with or observed:***

WOL recommendation	2
WOL	4
Alert Notice Generated	1
Observable Signs	6
Play Periods	58
Seeking other Assistance	1
Time Out	1
Welfare	5





Twenty-five unique post Responsible Gaming interactions occurred from six Members on Tranche 3 **who did not have a data follow up interaction** (as at the time the Tranche concluded):

Play Periods	24
Welfare	1

#### **Tranche 4**

14 December 2018 – 15 January 2019

- 100 Members were provided to Responsible Gaming from the Customer Analytics Team;
- Of these 100, 18 have had a prior interaction with RG in the preceding five years;
- 53 of these Members were engaged with and eight customers were observed (61);
- 10 customers had no recorded visit;
- 51 Members were engaged with and eight Members were observed by the RG team, two Members were engaged with by the Service Managers; and
- As at 31 October 2019, two Members from this Tranche have self excluded.

#### **Refinements**

No changes from the previous Tranche.

As at 30 June 2019

Twenty-two unique post Responsible Gaming interactions occurred from five Members on Tranche 4, **who were interacted with or observed:**

Observable Signs	4
Play Periods	12
Seeking other Assistance	1
Welfare	1
WOL	3
WOL recommendation	1

Forty-nine unique post Responsible Gaming interactions occurred from 10 Members on Tranche 4, **who did not have a data follow up interaction** (as at the time the Tranche concluded):

Alert Notice Generated	1
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Breach of Self Exclusion	2
Attempted Breach	2
Observable Signs	1
Play Periods	31
Self Exclusion	2
Welfare	5
WOL	4
WOL recommendation	1

### Tranche 5

17 January 2019 – 18 February 2019

- 100 Members were provided to Responsible Gaming from the Customer Analytics Team;
- Of these 100, 25 have had a prior interaction with RG in the preceding five years;
- 57 of these Members were engaged with and five Members were observed (62);
- 11 customers had no recorded visit;
- 43 Members were engaged with and 5 customers were observed by the RG team, 14 Members were engaged with by the Service Managers; and
- As at 31 October 2019, six Members from this Tranche have self excluded.

### Refinements

*No changes from the previous Tranche.*

### **As at 30 June 2019**

*Thirty-three unique post Responsible Gaming interactions occurred from nine Members on Tranche 4, who were interacted with or observed:*

3rd Party Assistance / Inquiry	1
Attempted Breach	2
Breach of Self Exclusion	7
Mail Suspension	1
Observable Signs	3

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Play Periods	13
Self Exclusion	2
Self Exclusion Information	1
Welfare	3

*Sixteen Post RG interactions from Members in Tranche 7 that did not have a data follow up interaction:*

Mail Suspension	1
Play Periods	9
Self Exclusion	1
Self Exclusion Information	2
Welfare	3

### **Tranche 6**

28 February 2019 – 01 April 2019

- 100 Members were provided to Responsible Gaming from the Customer Analytics Team;
- Of these 100, 11 have had a prior interaction with RG in the preceding five years;
- 62 of these Members were engaged with and 11 customers were observed (73);
- 16 customers had no recorded visit;
- 55 Members were engaged with and 11 customers were observed by the RG team, seven Members were engaged with by the Service Managers;
- As at 31 October 2019, one Member from this Tranche has self excluded.

### **Refinements**

*No changes from the previous Tranche.*

**As at 30 June 2019**

*Twelve unique post Responsible Gaming interactions occurred from 7 Members on Tranche 6, **who were interacted with or observed**:*

3rd Party Assistance / Inquiry	1
Mail Suspension	2

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Play Periods	7
Seeking other Assistance	1
Self Exclusion	1

*There were no Post RG interactions from Members in Tranche 6.*

### **Tranche 7**

4 April 2019 – 6 May 2019

- 100 Members were provided to Responsible Gaming from the Customer Analytics Team;
- Of these 100, 15 have had a prior interaction with RG in the preceding five years;
- 76 of these Members were engaged with and eight Members were observed (**84**);
- Seven Members had no recorded visit;
- 65 Members were engaged with and eight Members were observed by the RG team, 11 Members were engaged with by the Service Managers; and
- As at 31 October 2019, no Members from this Tranche have self excluded.

### **Refinements**

*No changes from the previous Tranche.*

**As at 30 June 2019**

***Fifty-six unique post Responsible Gaming interactions occurred from nine Members on Tranche 7, who were interacted with or observed:***

3rd Party Assistance / Inquiry	1
Mail Suspension	3
Observable Signs	2
Play Periods	34
Seeking other Assistance	1
Self Exclusion Information	2
Self Harm	1
Time Out	1
Unpaid Parking	3

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Welfare	3
WOL	4
WOL recommendation	1

*There were no Post RG interactions from Members in Tranche 7.*

### **Tranche 8**

9 May 2019 – 3 June 2019

- 100 Members were provided to Responsible Gaming from the Customer Analytics Team;
- Of these 100, 12 have had a prior interaction with RG in the preceding five years;
- 69 of these Members were engaged with and eight Members were observed (77);
- 15 customers had no recorded visit;
- 58 Members were engaged with and eight Members were observed by the RG team, 11 Members were engaged with by the Service Managers; and
- As at 31 October 2019, one Member from this Tranche has self excluded.

### **Refinements**

*No changes from the previous Tranche.*

**As at 30 June 2019**

*Eighteen unique post Responsible Gaming interactions occurred from nine Members on Tranche 8, who were interacted with or observed:*

3rd Party Assistance / Inquiry	1
Mail Suspension	1
Play Periods	14
Self Exclusion	1
Self Exclusion Information	1

*There were no Post RG interactions from Members in Tranche 8.*



### Tranche 9

4 June 2019 – 30 June 2019

- 100 Members were provided to Responsible Gaming from the Customer Analytics Team;
- Of these 100, six have had a prior interaction with RG in the preceding five years;
- 52 of these Members were engaged with and 11 Members were observed (63);
- 21 Members had no recorded visit;
- 48 Members were engaged with and 11 Members were observed by the RG team, four Members were engaged with by the Service Managers; and
- As at 31 October 2019, one Member from this Tranche has self excluded.

Of the six Members who had a prior interaction with RG, three had a data follow up interaction. None of these three Members had a post interaction with RG.

### Refinements

*No changes from the previous Tranche.*

**As at 30 June 2019**

*Two unique post Responsible Gaming interactions occurred from two customers on Tranche 9, who were interacted with or observed.*

Mail Suspension	1
Play Periods	1

*There were no Post RG interactions from Members in Tranche 9.*

### All Tranches – 30 June 2019

*There were 258 unique post Responsible Gaming interactions from 76 Members from all nine Tranches, who were interacted with or observed:*

3rd Party Assistance / Inquiry	4
Alert Notice Generated	1
Attempted Breach	5
Breach of Self Exclusion	10
Mail Suspension	9

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Observable Signs	16
Play Periods	159
Revocation Follow Up	2
Revocation Information	1
Seeking other Assistance	5
Self Exclusion	7
Self Exclusion Information	5
Self Harm	1
Time Out	2
Unpaid Parking	3
Welfare	12
WOL (Withdrawal of Licence (Ban))	12
WOL Recommendation	4

*There were 96 unique post Responsible Gaming interactions from 27 Members in all nine Tranches, **who did not have a data follow up interaction (as at the time the Tranche concluded):***

Alert Notice Generated	1
Attempted Breach	2
Breach of Self Exclusion	2
Mail Suspension	2
Observable Signs	1
Play Periods	68
Self Exclusion	3
Self Exclusion Information	3
Welfare	9
WOL	4
WOL recommendation	1



**Customer Analytics Data**

Sent to RG Team	Tier	Average Total Visits			Average Hours Per Visit			Average ADT		
		30 Days Before	30 Days After	% Change	30 Days Before	30 Days After	% Change	30 Days Before	30 Days After	% Change
Sent to RG Team	Platinum	19.0	15.4	-19.1%	3.2	3.0	-6.3%	\$873	\$847	-3.0%
	Gold	16.1	12.4	-22.7%	2.3	1.9	-17.4%	\$243	\$210	-13.2%
	Silver	14.0	9.7	-30.8%	1.6	1.3	-18.8%	\$119	\$97	-18.6%
	Member	7.8	4.4	-44.0%	1.4	1.1	-21.4%	\$45	\$48	5.7%
	<b>Total</b>			<b>-25.81%</b>			<b>-9.52%</b>			<b>-4.48%</b>

  

Control Group	Tier	Average Total Visits			Average Hours Per Visit			Average ADT		
		30 Days Before	30 Days After	% Change	30 Days Before	30 Days After	% Change	30 Days Before	30 Days After	% Change
Control Group	Platinum	28.1	25.0	-11.2%	3.2	2.9	-9.7%	\$798	\$681	-14.8%
	Gold	29.1	24.0	-17.4%	2.0	1.7	-12.4%	\$178	\$171	-4.1%
	Silver	18.1	14.4	-20.6%	1.3	1.1	-15.3%	\$75	\$72	-3.4%
	Member	7.3	6.5	-11.0%	1.2	1.2	-0.8%	\$46	\$55	19.7%
	<b>Total</b>			<b>-15.44%</b>			<b>-10.53%</b>			<b>-11.23%</b>

- Note: (i) Tier represents Member's Crown Rewards level at the time of Model execution  
(ii) ADT (Average Daily Theoretical) represents a Member's spend per visit  
(iii) Visit, Hour and ADT metrics are calculated 30 days pre and 30 days post RG interaction for group sent to RG team  
(iv) Visit, Hour and ADT metrics are calculated 30 days pre and 30 days post model execution date



## Appendix B | Crown Model Trial



### Follow up Interview with Members who had been Previously Approached

The aim of the follow-up interview is to gain self-report data on Members' initial responses to being approached in the first instance, impact of intervention on subsequent gaming behaviour, the extent to which the approach prompted consideration of seeking formal or informal forms of assistance, and if the approach resulted in a transition to or increase in non-casino gambling formats.

The target members were those previously approached as part of the Crown Model Trial

The timing of the interview is approximately seven months post Responsible Gaming Advisor intervention as part of the Crown Model Trial. The interactions took place in November 2019.

#### Post Approach Evaluation

Questions posed to the randomly selected members:

1. *Do you recall being approached by a member of our staff some time ago talking to you about your gambling?*
2. *Did you feel the staff member was genuinely interested in your wellbeing?*
3. *Did you change any of your gambling behaviour after that interaction, for example:*
  - a. *How often you come here*
  - b. *How much time you spend here*
  - c. *How much money you spend*
4. *Did you speak to anyone about your gambling after the interaction? (e.g. counsellor, friends or family).*
5. *Do you think this is a useful interaction and if so would you talk to others about it.*

*Record their demeanour, happy or annoyed to be approached.*

#### Results

Ten members who were approached by staff as the result of the player data tracking were later followed up by staff to ask about their experience.

Most people recalled being approached by a staff member to talk about their gaming; Seven 'yes', two 'no' and one "not really, it was so long ago".

More than half the people approached found the staff member was genuinely interested in their wellbeing, with six members responding as 'yes', and four member responses as inconclusive as they could either not recall any or some of the interaction or chose not to comment.



A modest number of people (three out of seven who responded to this query) indicated that the staff interaction helped change their gaming behaviour. Four people indicated no change of their gaming behaviour.

The three members who responded positively to the interaction further stated that:

*"Yes, I reduced the amount of money and time I spent here."*

*"I came to the casino and gambled less."*

*"Not really but spending less now."*

Three out of seven members who had a response recorded, admitted to having spoken to others about their gaming after the interaction. One of them spoke to a counsellor (whom they were already seeing about a separate matter), one talked to her mother, and the other stated that she *"told a lot to people that I got approached"*. The other four patrons reported that they did not talk to anyone.

Nine members indicated that the interaction was useful and would talk to others about it.

Interviewing staff recorded approached patrons' demeanour mostly positive - eight *"happy"*, one *"neutral"*, one *"no"* (annoyed) – *"Patron asked please leave me alone"*.

## Attachment C | Crown Melbourne Uncarded Real Time Player Data Analytics – Uncarded Play



### Recommendation 8 (b)

*for uncarded play (that is, all other player activity), Crown Melbourne will, by 1 January 2019, commence a comprehensive study of all the practical options for a real time player data analytics tool, with a view to reporting in detail (including legal, technical and methodological issues) to the VCGLR by 1 January 2020 and the tool being in operation by 1 July 2022.*

Crown Melbourne Limited (**Crown**) refers to its letter dated 24 December 2018 to the Victorian Commission for Gaming and Liquor Regulation (**VCGLR**), 'Sixth Review of the Casino Operator and Licence (Sixth Review) – Recommendation 8 (b)'.

Crown commenced its study on exploring options available to it and has been assessing and analysing information and seeking research reports and expert evidence available, which supports data analytics tools on uncarded play that may enhance Crown's responsible gaming framework.

### Research Evidence

Crown has conducted a comprehensive literature search on electronic databases including peer-reviewed articles from primary sources:

- Psychology Databases
- Public Health Databases
- Consumer Health Databases

As well as Google Scholar being used as a more general search engine. Table 1 below represents the scope of the queries undertaken.

*Table 1: Result of search for relevant topics involved in strategies to track gambler's behaviour for responsible gambling purpose.*

Search terms	Peer Reviewed Journals	Google Scholars
1. gambling player tracking algorithm for un-carded games	0	244
2. gambling behaviour tracking	1,956	17,200
3. gambling behaviour tracking system	1,804	41,900
4. gambling behaviour tracking algorithms	641	19,100
5. gambling behaviour tracking strategies	1,595	25,500
6. gambling player tracking algorithm	345	18,400
7. gambling player tracking system	660	54,100
8. gambling player tracking strategies	588	28,800



Search results from peer-reviewed journals found no literature available for topics specific to tracking systems for un-carded play. Improved returns were found when the search was broadened to a more general term involving 'gambling player behaviour tracking systems/algorithms/strategies', with the results focusing on on-line gambling.

Overall, review of the literature suggested that there are generally two systems available to help track player's gambling behaviour for responsible gambling intervention purpose. These included:

1. Player Data Tracking Algorithms (**PDTA**), which can be used for carded gaming only; and
2. Tracking players' observable signs that can be used for both carded and un-carded gaming.<sup>1</sup>

Limited research has been published in the peer-reviewed literature on these algorithms in general, and no peer-reviewed articles have directly examined their effectiveness for preventing problem gambling. This would be partly due to intellectual property issues, as the peer review process would entail releasing the algorithm itself. There has been no detected research entailing an objective measure of effectiveness and efficacy of algorithms.

Crown is aware that Focal Research is currently focusing on the development of a system that can identify gamblers of interest that are playing uncarded on an Electronic Gaming Machine (**EGM**). To date, no further information is available, however, Crown will continue conversations with the Focal Research team.

A recent article noted that the UK Betting and Gaming Council will introduce Artificial Intelligence technology called the Anonymous Player Awareness System (**APAS**). APAS is a real-time algorithm for gaming machines, which identifies areas of player behaviour that could indicate harmful play. Such behaviour will trigger an alert on-screen and force a break in play or 'cooling-off period'; simultaneously staff will be alerted, allowing for a Responsible Gambling Interaction where appropriate. Mark Griffiths, Professor of Behavioural Addiction at Nottingham Trent University told the BBC: "This is a step in the right direction but obviously needs to be monitored and evaluated. Little is known about this technology". Crown will monitor progress.

### Potential Legal Issues

In terms of Legal Issues, Crown's Legal Department noted the following:

- The Privacy Act only applies to the collection and use of personal information of an identified (or identifiable) individual. For un-carded play, Crown would not generally know the identity of the individual and in any event, the purpose of the tool is to pro-actively identify for intervention, customers at risk of harm from gambling. Given that the tool would not be required to collect or use personal information of any identified individual, the *Privacy Act* would not be offended; and
- Crown's Conditions of Entry Signage to the Casino refers to both the use of surveillance and Crown's practice of the responsible service of gaming.

<sup>1</sup> Such as those used by Crown and defined in the Responsible Gambling Code of Conduct, pp. 16 and 17



Crown has further requested external legal advice on the matter, which identified the same issues and came to the same conclusion, this advice is attached at **Appendix (i)**. As such, there are no current known legal impediments to continuing to pursue investigations in the area of uncarded play interventions.

However, consideration must be given to the concept that tracking individuals (who have not elected to be tracked) may have ethical issues and offend some individuals' sense of civil liberties, exposing Crown and the VCGLR to public criticism. Negative public sentiment may also create a number of unintended consequences, for example:

- Patrons may change their behaviours to avoid being tracked, which may result in greater harm;
- An expectation of intervention where patron's stop managing their own behaviour;
- Stigma attached pushes patrons to gamble on line where there can be no interaction and greater harm may result; and
- Any small errors could mean that players be given false labels/diagnoses, also leading to liability and ethical concerns.

The major weakness of PDTA is the near-total lack of peer-reviewed research that directly evaluates the algorithms' effectiveness.

#### **Potential Technical and Methodological Issues**

Crown has reviewed how existing technology in use as part of casino operating systems such as Dacom<sup>2</sup> could be used to overlay a real time data analytics tool as part of the technical solution.

The current use of the Play Periods Program's technical solution, the Splunk program, will be interrogated to establish if this technology can be used in a similar manner for uncarded play.

Focal Research is currently working on a tool to be used to identify gamblers of interest who play uncarded, and Crown will continue to monitor this work.

Furthermore, Crown has commenced investigations with vendors using Artificial Intelligence and tracking persons from a play length perspective (as part of real time monitoring). The first of these is the Israeli based 'Razor Labs'<sup>3</sup> company and again, Crown will monitor progress and developments.

#### **Conclusion**

After conducting a comprehensive study, Crown has to date not found any peer reviewed research, commercially available program or method that can be considered a real time player data analytics tool to proactively identify for intervention, uncarded customers who may be at risk of harm from gambling.

<sup>2</sup> Dacom is the Electronic Monitoring System in use for EGMs at Crown

<sup>3</sup> <https://www.razor-labs.com/>



Crown will continue to investigate internally based solutions and externally available programs as they develop.

# MinterEllison

19 December 2019

## BY EMAIL

Ms Michelle Fielding  
Group General Manager – Regulatory and Compliance  
Crown Resorts Limited  
Crown Towers  
8 Whiteman Street  
Southbank VIC 3006

Dear Michelle

### Advice to Crown Resorts Ltd (Crown) on tracking casino users

We refer to our conversation and email exchange.

You have instructed us to advise Crown about the legal implications of tracking patrons using data analytics tools to monitor patrons' activities, in real-time, based on patrons' 'uncarded play'.

#### 1. Background

1.1 We understand that:

- (a) the Victorian Commissioner for Gambling and Liquor Regulation (**VCGLR**) has recommended that Crown develops and implements comprehensive data analytics tools for all patrons, to proactively identify patrons at risk of harm from gambling;
- (b) the data analytics tools would utilise both historical data (with parameters developed from the second player model), and real-time monitoring of play periods;
- (c) Crown has been asked to report to the VCGLR on, amongst other things, the legal issues associated with the use of such tools for uncarded players; and
- (d) 'uncarded player' means patrons that are not using a Crown loyalty card and, as such, Crown is not generally able to identify a particular patron.

1.2 Please let us know if we have misunderstood any of the above, as it may impact our advice.

#### 2. Privacy and surveillance requirements

2.1 We have set out below our advice regarding the possible privacy and surveillance law impacts associated with the proposed use of the data analytics tools for uncarded players.

##### *Privacy Act*

2.2 The *Privacy Act 1988* (Cth) (**Privacy Act**) applies to Crown when it collects and holds personal information. 'Personal information' is defined under the Privacy Act as any information or an opinion about an identified individual, or an individual who is reasonably identifiable:

- (a) whether true or not; and
- (b) whether recorded in writing or not.



- 2.3 Where it is not reasonably possible for Crown to identify individual patrons whose information Crown collects (eg an individual's gambling habits), the Privacy Act does not apply.
- 2.4 We understand from your instructions that Crown will not be able to identify patrons through the data analytics tools who play on an 'uncarded' basis because the monitoring activity does not involve visual surveillance of patrons for the purpose of identifying their play, nor is the patron required to provide any information to Crown (and Crown does not otherwise collect any information) that would enable Crown to identify a particular patron. Therefore, the Privacy Act would not apply to the information that would be gathered solely via the data analytics tools.
- 2.5 However, this position could differ in the event that Crown is able to reasonably combine information gathered from its various monitoring tools (including surveillance cameras), and as a result, it is able to reasonably identify individual patrons (even if this did not occur in real-time). Please let us know if this is possible and we can advise further on the privacy impacts of this.

*Surveillance Devices Act*

- 2.6 The *Surveillance Devices Act 1999 (Vic) (SD Act)* regulates the use of surveillance devices in Victoria. The SD Act applies to the following types of devices:
- (a) listening devices to listen to conversations;
  - (b) optical surveillance devices to visually observe an activity;
  - (c) tracking devices to determine the location of a person; and
  - (d) data surveillance devices that monitor the input into, or output out of, a computer.
- 2.7 You have instructed us that the data analytics tools that would be used to track a patron's activity does not fall within the definition of the surveillance devices listed in paragraphs 2.6(a) - 2.6(c) above. Although the data analytics tools *could* be a data surveillance device, the prohibition on the use of data surveillance devices in the SD Act applies only to law enforcement officers. Therefore, the SD Act will not impact the project specifically.
- 2.8 Finally, as referred to above, we are aware that Crown also uses other means of surveillance throughout the premises (such as optical and audio surveillance devices), and we understand Crown has taken measures to comply with the requirements of the SD Act in respect of the use of those devices.

Please let us know if you would like to discuss the above.

Yours faithfully

**MinterEllison**



Contact: Susan Kantor T: [REDACTED]

Partner: Glen Ward T: [REDACTED]

OUR REF: SEK: GBW 1076473