**New Model Ideas – Nov 2020 – Post HO Workload / Charge Rate Analysis Discussion**

**Supply and Demand Model GUI**

* Could we run the model pipeline from a web front end
* Map of UK – select force area, choose dates, choose baseline, or what if scenarios?
* Hit go – some aggregate visualisations streamed back from ABM – baseline vs scenario X

**Hazard Rates per crime type as a means to probabilistically determine event outcome**

* Should we be using delays in the system to predict charge rate
* Charge rate from empirical data could become a validation dataset

**Moving away from serial case processing to agents processing multiple cases in parallel**

* This seems key. Right now, if event numbers increase it leads to nothing but backlogs, in reality case numbers per officer are likely to increase.
* Implement case complexity resource per agent (the amount of things both number and complexity (proxied by .
* Monitor case number and cumulative complexity per officer. As demand increases caseload increases (officers spread more thinly) as there are increases in more complex cases – complexity also increases.
* Using the HO results on relationship between workload and charge rate we might be able to predict charge rate given current complexity (how would that differ by force) – guess we could make assumptions about the nature of relationship and then explore.

**Not modelling rank but modelling CID vs Response (is this the most sensible split? Ask Lee)**

Clearly not all officers are equal in terms of the jobs they can and do do.

* Modelling the entire rank structure is needlessly complex but modelling two pools of officers:
  + (1) response who deal with less complex volume incidents ~quickly and
  + (2) who deal with more complex serious offences may be useful ….
* We should know what offences CID typically deal with from the sigma data from Durham – we could also use Crime Severity Score
* It also opens the door to what if scenarios regarding the structure of recruitment / promotions – i.e. ratios response to CID 10:1 (what is the ratio – ask Lee – 3-5:1) – no guidance

**Beyond parallel processing of events – the resource required to respond/investigate likely decay over time (for some offences at least).**

* If event x requires 100 units of resource that might be 20 on day one 15 on day 2, 10 on day 3 etc. This is an interesting way to consider internal demand – as cases which proceed to charge may suddenly jump – though perhaps they should just generate new internal demand events.

**The focus on crime-related demand and a possible simple way to explore other demand.**

* It was encouraging to see that the HO were initially focusing on Crime related demand – somewhat vindicates our approach.
* If Crime only makes up 20% of demand say, is it possible to model all non-crime related demand as just a big pot of noise.
  + You could do this two ways (1) by adding many more events to the model (this I suspect is needlessly complex); (2) by reducing the resource capacity of each officer agent (it may affect CID and response pools differently – as CID may be more likely to focus on crime (ask Lee) in line with how much we believe other stuff is taking up time. MOST OF THE TIME REACTIVE CID – SECONDARY INVESTIGATORS – RESPONSE REFER JOBS TO REACTIVE CID.
  + In simplest terms we could just do sensitivity analyses around if we change the non crime demand by X% what happens to outcomes.
  + If we could find empirical data on amount of time spent in say mental health related (hospital drop off and babysitting) we could say – hey if we put that on to some other agency the impact would be roughly ….
  + This approach might be combined with the charge rate calculations to say if there is a 3% increase in mental health incidents which make up 20% of the non-crime related noise this leads to a 7% reduction in charge rates for offence X

**THINGS TO IMPLEMEMNT**

* PER OFFICER RESOURCE CAPACITY – i.e. 1 – 5 BDW at 0.2 complexity each or 1 rape at 1 complexity. Derive numbers from CSS
* Think about mapping between amount of reseources and complexity and distribution over time. decay in required resources over time per event – if a serious assault needs 100 units how do you compute that over time and daily amounts to factor in decay discussed above (should it / how does that differ by offence?)
* Graphing / recording workload – number of cases per officer, cumulative case complexity per officer?
* Separate pools of officers response / CID – and the logic for tasking jobs to them.
* Simple other-demand slider which dictates resource capacity of all officers.

**Mention HO – relationship between workload and charge rate**

**Does the SIGMA data track crime ID over time – if multiple snapshots**