A Comparative Case-Study: the Electronic Cat-Flap

Observations that have been extracted from two different – but closely related – LSD specifications of an electronic catflap are attached. Study these carefully, then attempt the exercises below.

Observations for Simon Yung model for catflap (1990)

with helpful annotations by WMB in italics

```
agent flap() {

        (int) lflap                     // length of flap
        (analog) angle                  // how open is the flap?
        (bool) switch           // is the electronic switch operating?
        (int) fourWay Lock  // in range 1..4
        (int) radius                    // range of detector of electronic lock
        (bool) pushOut, pushIn      // is cat pushing out or in?
        (int) pos
        (bool) elecLock                         // is the catflap locked?
        (bool) canPushOut, canPushIn    // can catflap be pushed out or in?

}

agent man() {       // should be "agent manorwoman()" - wmb

        (bool) switch
        (int)   fourWayLock
        (int) angle
        (real) smell                    // interpretation to be supplied

}

agent cat() {                           // nb cat = tomorshecat

        (int) height                    // height of cat
        (int) pos                       // position of cat
                                        // pos > 0 – out
                                        // pos < 0 – in
        (int) intention                 //      1 – going out
                                        //      0 – staying put
                                        //     –1 – coming in
                                        //nb discrete cat, without a real intention
        (int) lflap, angle
        (bool) obstructOut          // cat is obstructed by flap
        (bool) obstructIn           // cat is obstructed by flap
        (bool) pushOut
        (bool) pushIn
        (real) smell                    // tomcat only

}
```

Observations for Ian Bridge model for catflap (1991)

with helpful annotations by WMB in italics

```
type   flapPosTyp   = ENUM (fpOut, fpVert, fpIn)
       lockPosTyp   = SET OF ENUM (lpOut, lpIn)
       catIntTyp    = ENUM (ciGoOut, ciStayPut, ciGoIn)
       pushDirTyp = ENUM (pdOut, pdIn)
       // flap clearly designed for cat with very high IQ: ci = cat intention

agent flap() {

       lockPos : lockPosTyp
       flapPos : flapPosTyp
       pushDir : pushDirTyp              // NB not pushDirtyP

}

agent man() {// apparently needs a man to handle this catflap

       flapPos : flapPosTyp
       lockPos : lockPosTyp

}

agent cat() {

       catInt : catIntTyp
       catPos : int    // > 0 : outside, < 0 : inside        // how about = 0?
       pushDir : pushDirTyp
       flapPos : flapPosTyp
       catEngag : boolean          // cat is engaging with the flap
       catObstr : boolean          // cat is obstructed by the flap

}
```

Simon Yung's model has yet to be implemented on the system.
Ian Bridge's has been prototyped but has yet to be field tested.

Questions:

1) can you decide how to classify the above observations:
   state, oracle, handle, derivate
   – possibly more than one classification for same agent sometimes
2) both specifications assume that the 4-way-lock is rotated only if the flap is closed – how would you specify this?
3) is the **length** of the cat significant? if so, is it **invariant**?

Ex: Supply the missing protocols and briefly **explain** your specfication.