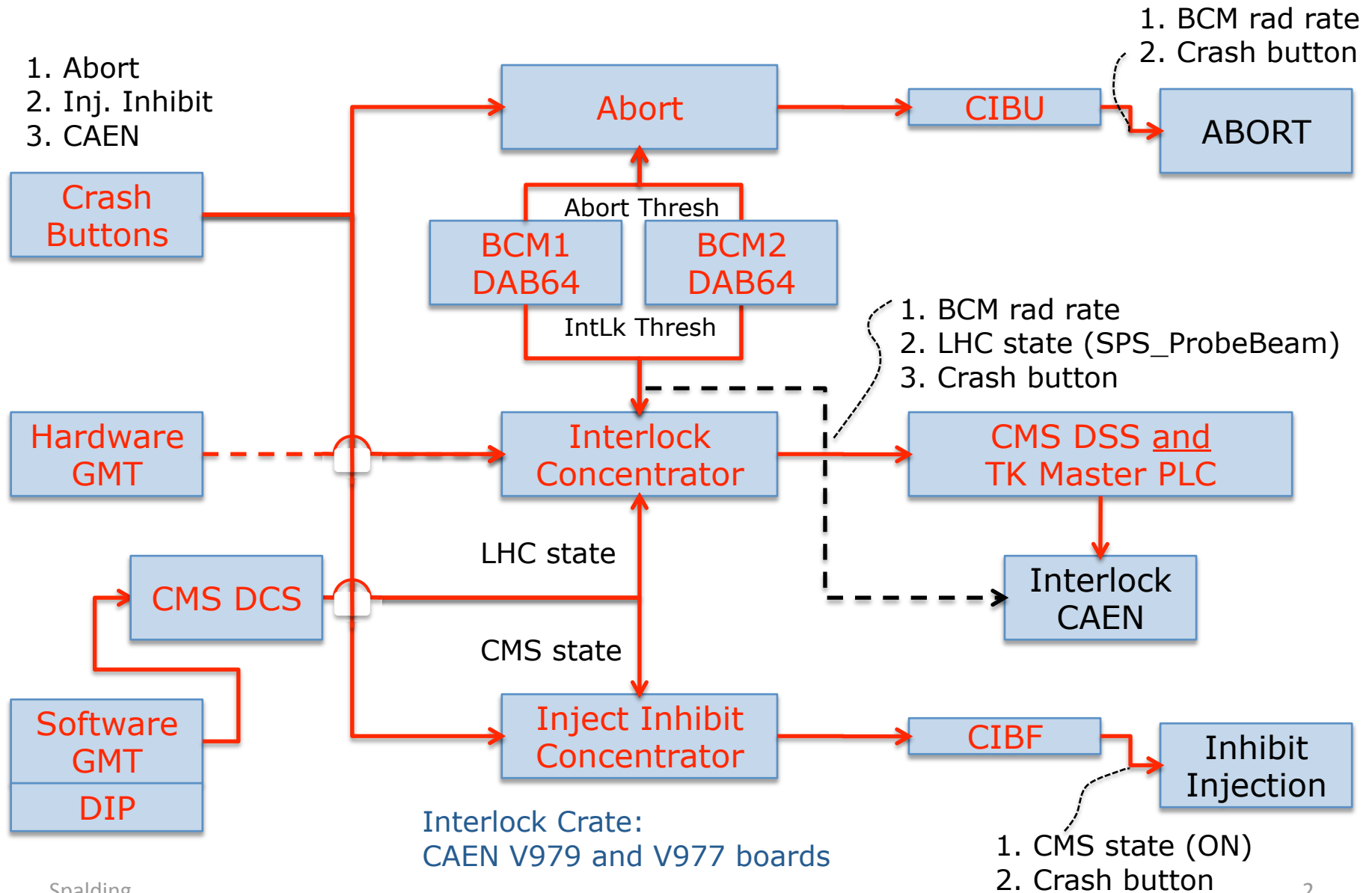# CMS Input to Injection Inhibit

- The primary "protection" will be procedural – phone calls or DIP handshakes between control rooms

- But a automated system will protect from mis-communication. The implementation is under discussion:

- For "normal" running
  - CMS must <u>NOT</u> be ON during injection. Can be OFF or STANDBY. This "state" is software in CMS DCS.
    - CMS DCS will generate the Inj. Inhibit when CMS is ON
    - CMS can hold the Inj. Inhibit with a crash button if we are in an exposed "ON" state due to mis-communication or software problems

- For early commissioning (before beam safety systems signed-off)
  - The CAEN power supplies will be interlocked OFF unless either
    - CMS is holding the Abort Crash Button
    - CMS determines there is no beam in LHC (via software) and is holding the Inj. Inhibit Crash Button

DRAFT Beam Abort, Inj. Inhibit and Interlocks

1. Abort
2. Inj. Inhibit
3. CAEN

1. BCM rad rate
2. Crash button

Crash Buttons

Abort

CIBU

ABORT

Abort Thresh

BCM1 DAB64

BCM2 DAB64

1. BCM rad rate
2. LHC state (SPS_ProbeBeam)
3. Crash button

IntLk Thresh

Hardware GMT

Interlock Concentrator

CMS DSS and TK Master PLC

LHC state

CMS DCS

Interlock CAEN

CMS state

Software GMT

DIP

Inject Inhibit Concentrator

CIBF

Inhibit Injection

Interlock Crate:
CAEN V979 and V977 boards

1. CMS state (ON)
2. Crash button

DRAFT Logic for Startup

1. Abort
2. Inj. Inhibit
3. CAEN

Crash Buttons → **Abort** → **CIBU** → **ABORT**

CAEN supplies interlocked unless:
1. Abort Crash Button
   OR
2. NOBEAM (Ibeam1/Ibeam2).AND. INJ-INH Crash Button

Interlock Concentrator → **CMS DSS and TK Master PLC** → **Interlock CAEN**

CMS DCS

NOBEAM

CMS ON

Software GMT/DIP

Inject Inhibit Concentrator → **CIBF** → **Inhibit Injection**

Implementation details under discussion

1. CMS state (ON)
2. Crash button