



- Our goal in the next six months: **not** to design a **complete system**;
- Pin down a limited **number of options** and define a clear path to arrive at choice;
- Define a clear R&D strategy.
- **Work** strictly nested with the one of the **others WG**.
  
- Key specifications for detector design:
  - **Pixel size**;
  - **Event rate per pixel**;
  - **Charge measurement/resolution**;
  - **Time resolution**;
  - **Radiation load**.
  - **Power consumption**
  - **.....**



- Minimum cell size in the range **50 um x 50 um** to **100 um x 100 um**.
- In a hybrid pixels the “key specifications” affect both the minimum cell size and the size of the periphery.
- Limiting factor in hybrid pixel: material budget and cost (bump bonding);
- **Power consumption** can be kept reasonably low and might depend mostly on **digital processing**....
- R&D activity already on-going at CERN on **cheaper alternatives** to bump bonding (**electroless** bump deposition);
- R&D activity also on-going on **thinning**.
- These activities can be carried-out with existing sensors/FE chips.



- In monolithics most of the signal processing is done at the periphery: more **stringent performance** requirements translates in **increased dead area**.
- **TID** is more of a concern with respect to hybrid (**diode leakage**);
- **Neutron damage** is a primary concern.  
How often can we replace the sensors??
- State of the art: **185 us** integration time with **170 mW/cm<sup>2</sup> (STAR)**.
- Can be made much faster (**10 us?**)
- A very personal feeling: **very fast monolithics** might not be so advantageous with respect to hybrid in term of **power consumption**. However they will retain their advantages in term of cost and sensor thickness.
- Watch new developments with **thick epitaxial** substrates.



- High resistivity: ( $400 \Omega \text{ cm}$  or more)=**50  $\mu\text{m}$**  depletion and collection by drift;
- **Larger** signal and **more** radiation **tolerance**;
- **90 nm**: enough interconnect capability to read-out **simultaneously** each pixel.
- Sensor which is **monolithic**, **fast** and **rad-hard**.
- Sounds beautiful, but still in its infancy.
- Detector concept can be proven within next year.
  
- Can we have a “sensor independent” read-out architecture?