(Digital) Packaging for the future

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Space products versus commercial

- The trend towards

  more speed / performance

  more complexity

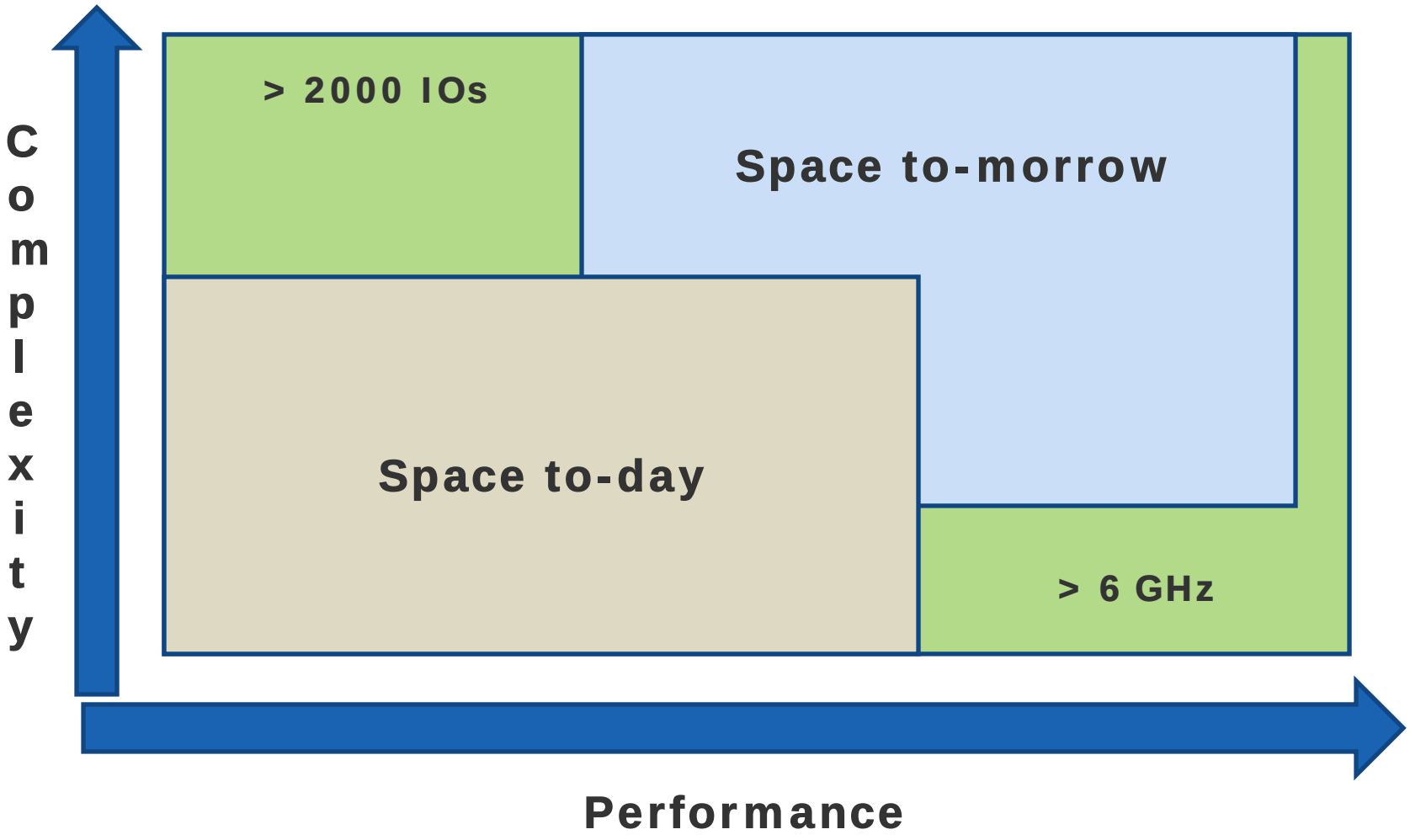
  applies to all semiconductor products

- Space digital products do not differ and

  do not use older technologies anymore

  must achieve high pincount capability

Space products versus commercial



Reliability

- Proven reliability is a must that

  cannot be achieved anymore by screen of low volume series

  and must be based on stabilized volume manufacturing techniques

  with added checks and statistically based process controls

Package reliability

- While wafer technology can piggy back established wafer manufacturing lines

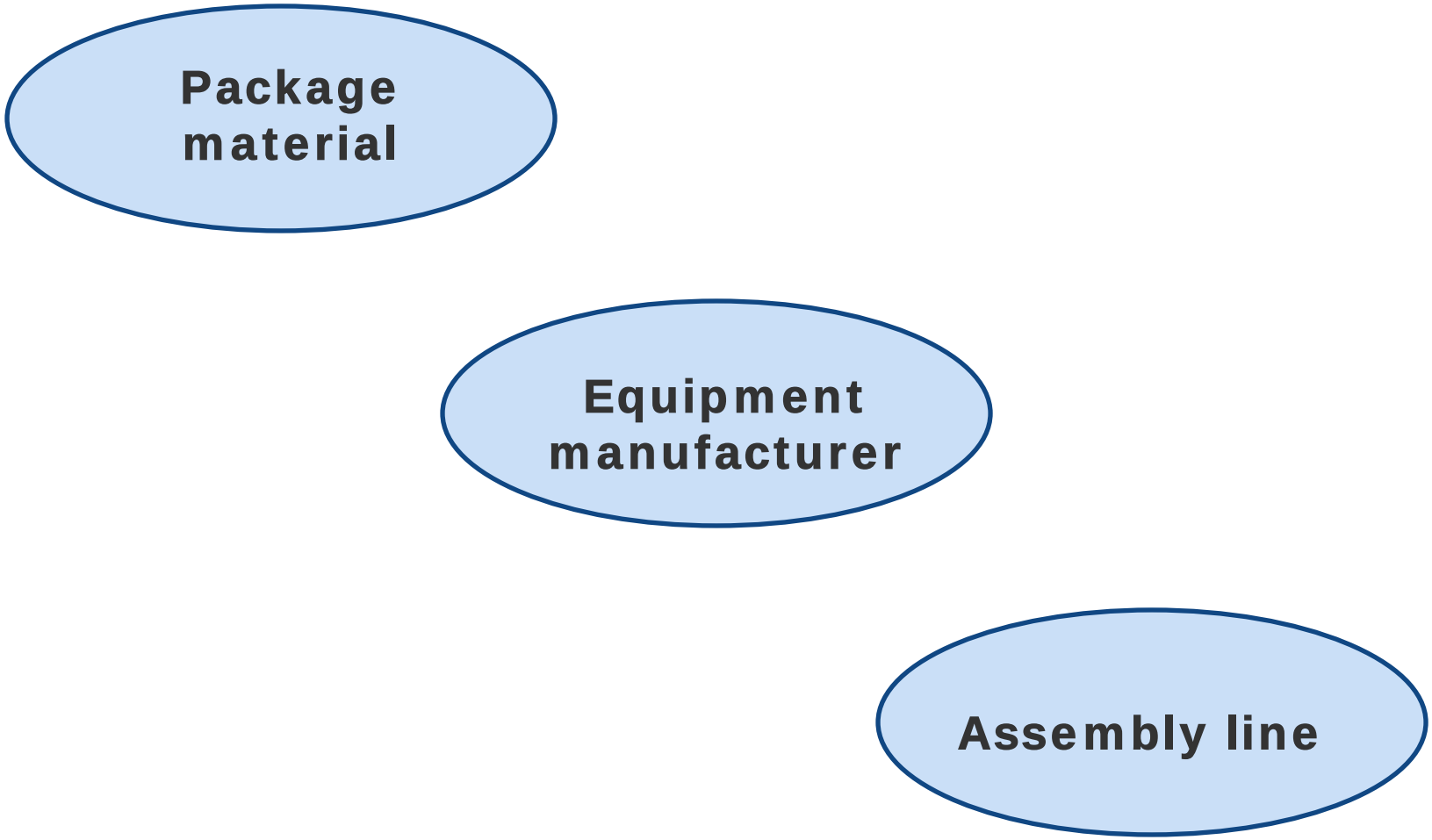
  packaging technology is still bounded by

  hermiticity requirement

  conventional packaging material

  that are not supported by commercial market

The package supply chain



The critical points

- Package material suppliers are phasing out some materials that are not called by commercial high volume market
- The assembly equipment manufacturers focus on large series and drop the specific or old fashioned equipment
- Assembly lines must manufacture regular volume in order to deploy efficient process controls

The packaging performance

	Commercial	Space
More IO's	BGA	QFP or Columns
Higher Speed	Copper traces Low K material	Tungsten traces Ceramic interlayers
More power	Underfills Exposed die	Dissipation by the leads
Multi-die	Stack dice	Multi-cavity

The future / Next steps

- Pushing the packaging technology limits for space applications shall require:
  - development of new material,
  - development of new techniques

- Steps to achieve this objective:
  - selection of potentially use able solutions,
  - customization to space requirement,
  - assessment of their reliability capability

Short / medium term requirement

- Requirement for higher pin count is already here
- Column attachment technique shows it's limits
- Flip-Chip or BGA solutions are expected

- Some products are reaching the power dissipation limits, more shall come soon
- Conventional package material are not enough to fix the problem

- Deep Sub Micron technologies are emerging for Space
- Pad to lead connection improvement is mandatory

Thank you !