Synopsys Support for OASIS

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Agenda

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Synopsys Involvement in Standards

- Synopsys supports and actively participates in many Standards efforts
  - OASIS, Verilog, SystemVerilog, VHDL, EDIF, SPF, SDF, BSIM, ….
- Member of SEMI OASIS DP Taskforce from inception

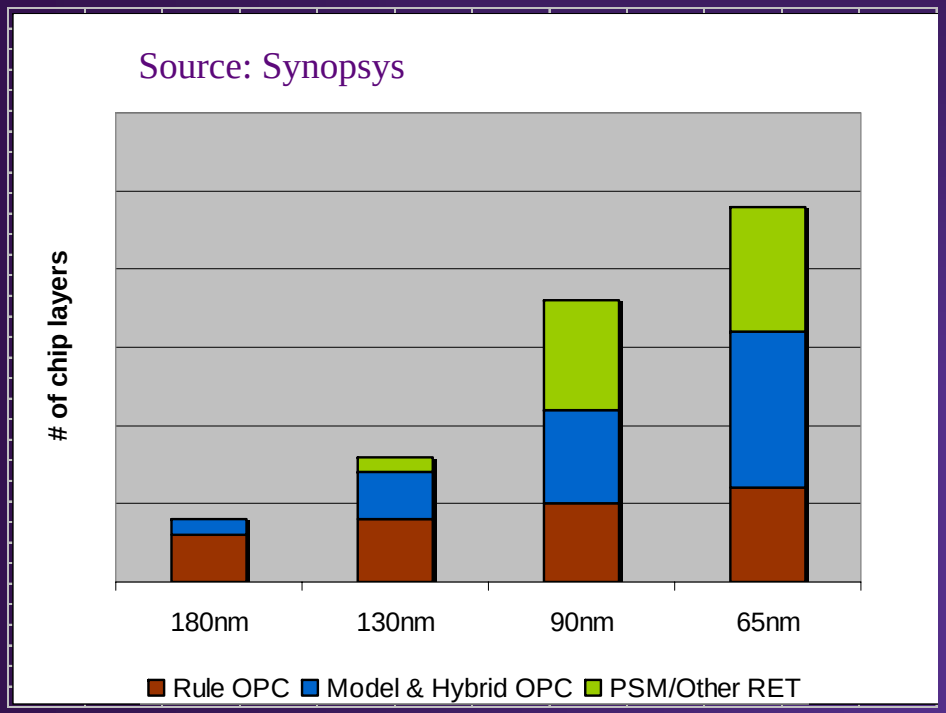
What is OASIS

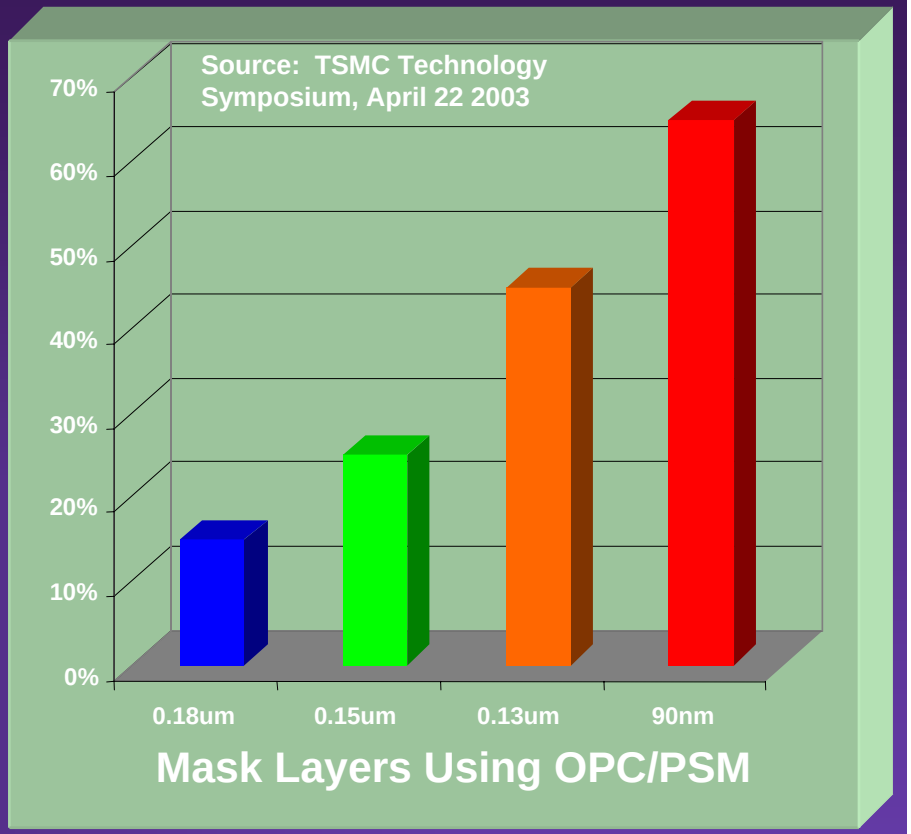
- Open Artwork System Interchange Standard
- Efficient hierarchical and flat representation of mask layout geometry
- Intended replacement for GDSII
- Key differences between OASIS and GDSII:
  - Compact representations of geometric shapes
  - Use of modal variables
  - Compact representation of variable-size integer
  - Referencing by number of strings and names
  - Encoding mechanism for repetitions
  - Data compression mechanism is supported (ZLIB)

Motivation for OASIS Support

- Dramatic data volume increase due to
  - Design complexity and size
  - RET usage
  - Redundant vias
  - CMP fill

The Increasing Use of RET





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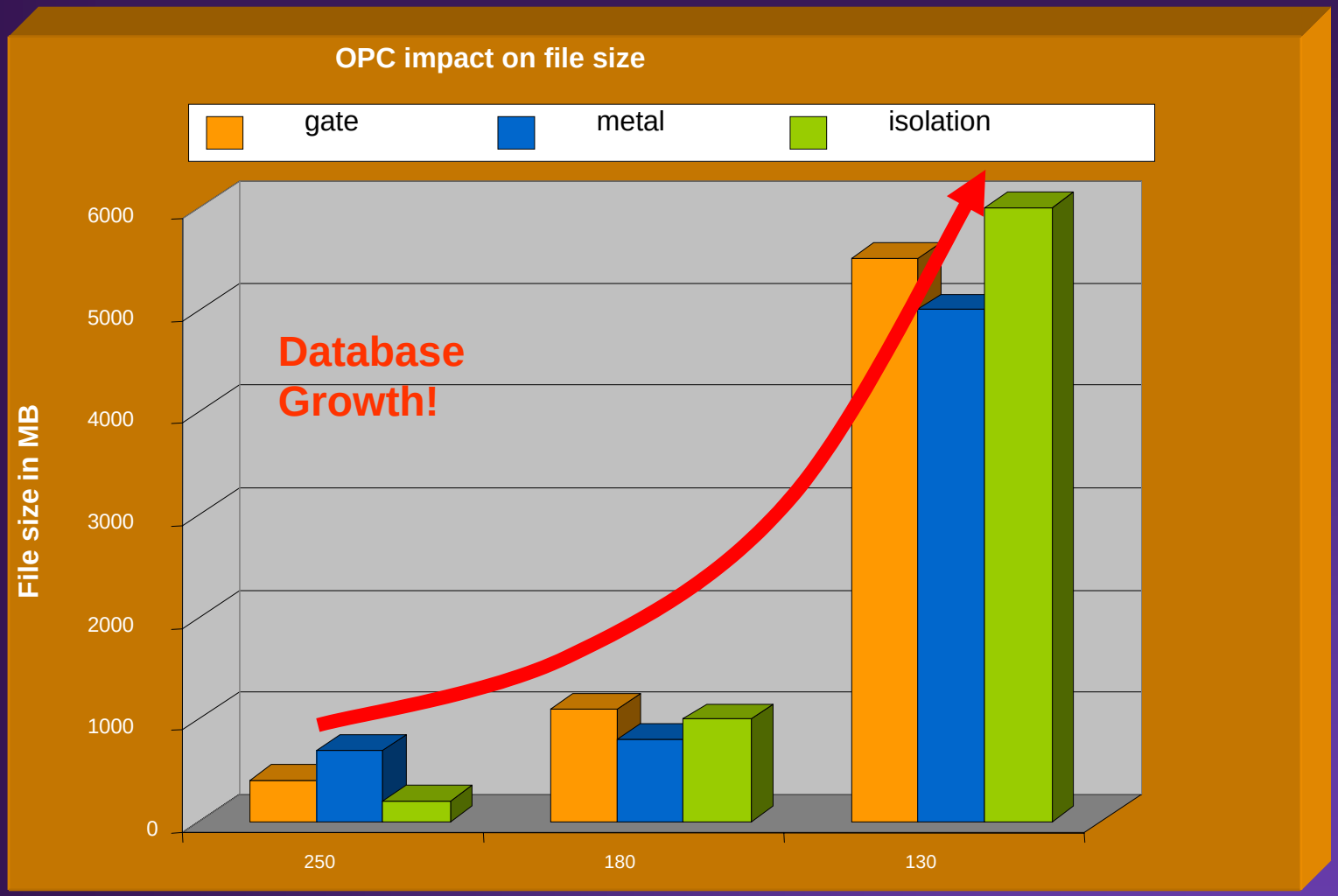
Data Volume Increases

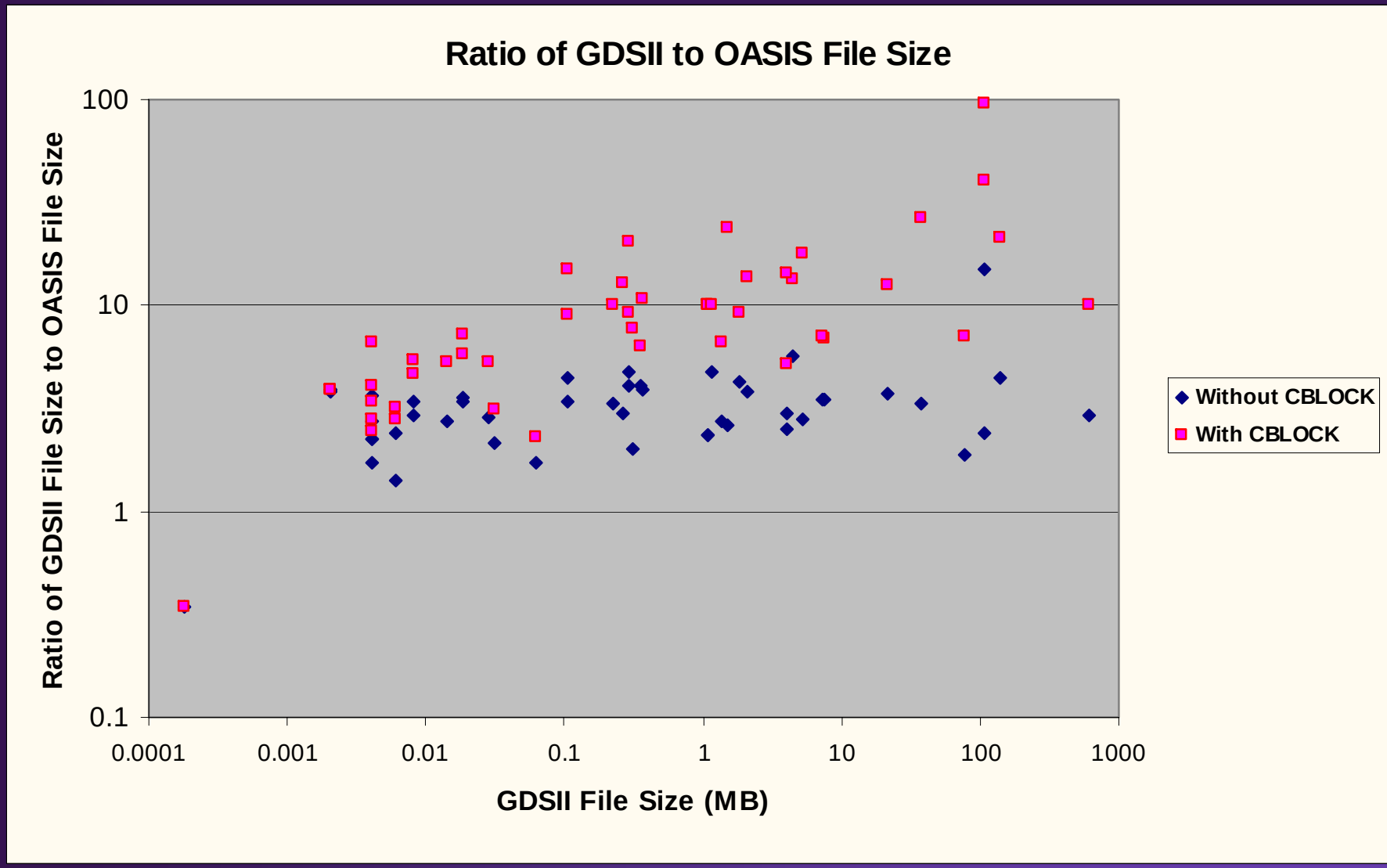


Source: Intel SPIE 2002

Motivation for OASIS Support (cont.)

- Reduced file sizes means
  - Better tool performance
    - Estimate Write/Read of GDSII can account for 15% of total cycle time
  - More efficient flow
  - Reduced compute and storage requirements
  - More reliable and faster data files transmission
  - Synopsys Highly Scalable Distributed Processing shifts the bottleneck to file I/O
- Customer demand for a better standard alternative to GDSII

GDSII and OASIS Experimental Results



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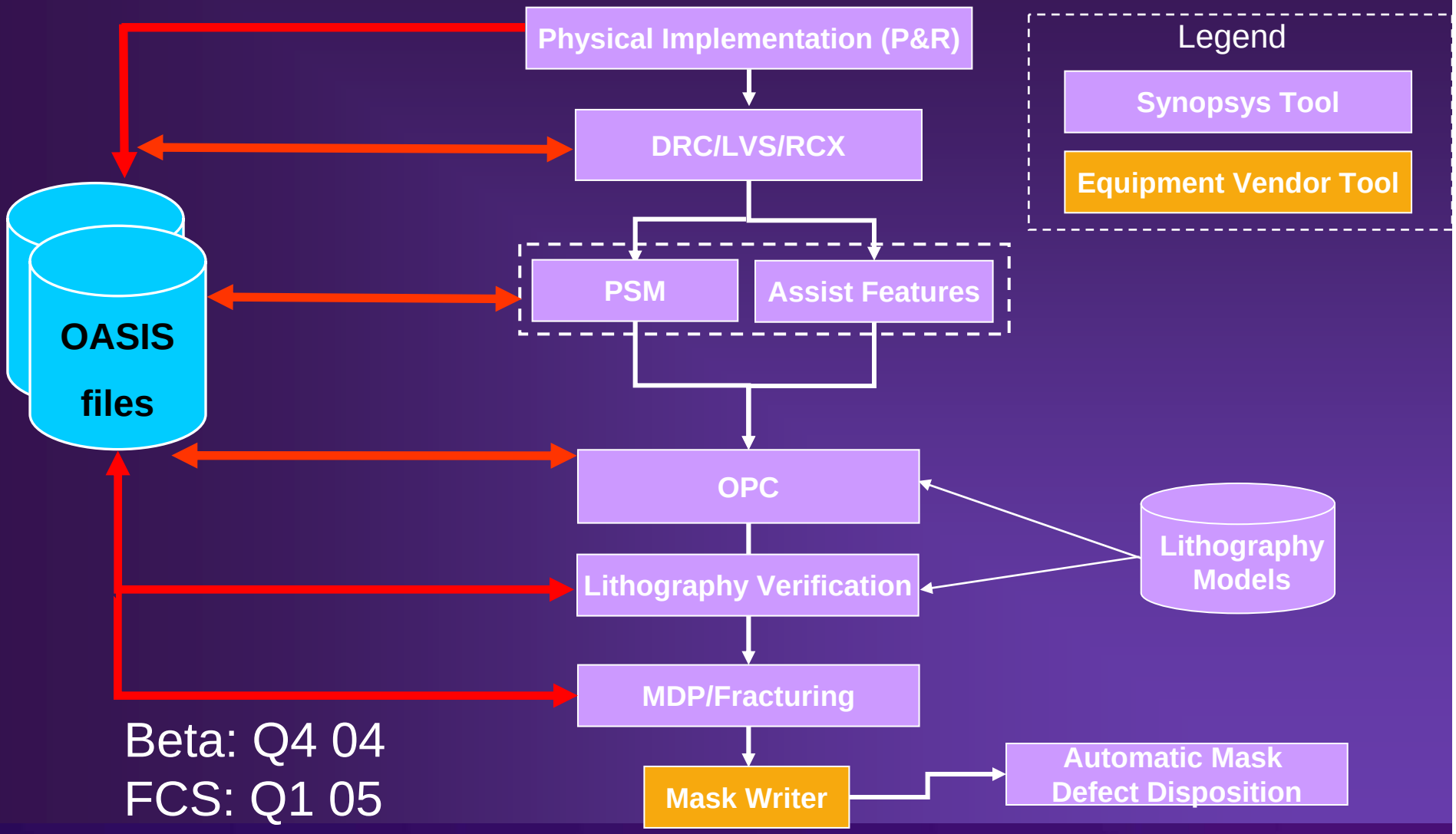
OASIS Requirements for Synopsys Tools

- 32 bit integer coordinates only
- Potential issues with more than 256 layers and datatypes
- Arcs and Circles (GDSII restriction) approximated as polygons
- Prefer Strict Mode OASIS files for faster processing due to:
  - Cell name table for random access
  - Structure bounding boxes for better geometric search
  - Top cell information
- Prefer cell offsets, compact representation of references and geometries with ZLIB compression for efficient file I/O
- Prefer checksum info (CRC32, CHECKSUM32) for file integrity validation

Typical Synopsys Tool Flow (Back-end)



Beta: Q4 04
FCS: Q1 05

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Challenges and Needs

- OASIS adoption will take time
  - EDA tool support
  - Customer internal tools support
  - Changes in customer flows
  - Customer validation and certification
- Legacy tools may not support OASIS

Challenges and Needs

- Validation:
  - Current specification only in spec form
  - Public domain test cases, checkers, and other utilities would improve quality and consistency
    - OASISTooling: Company focusing on developing OASIS compliance utilities and training
- Mix & Match of OASIS and GDSII files in the flow will present some challenges

Myths & *Facts*

- **OASIS is a database**
  - ***It is an efficient interchange format***
- **OASIS will reduce the number of translators needed**
  - ***Will need to support both GDSII and OASIS formats***
- **OASIS will solve the file size problem**
  - ***It only postpones the problem***
  - ***Additional compression technology still needed beyond OASIS***
    - ***Need OASIS standard to define/allow other compression technologies beyond ZLIB***

Myths & *Facts*

- **OASIS can be used to transfer any information across the tool flow**
  - ***Overloading the use of OASIS will add complexity to the tool and flow***
  - ***Example: One OASIS file used as input to any mask writer***
  - ***Each mask writer requires different information and data order***
    - ***File content must be different***
    - ***Each mask writer would need to do more complex pre-processing of the data***
    - ***Limiting hierarchy depth, structure extents, and gridding to the machine resolution still necessary***

Summary

- Synopsys is committed to Open Standards and OASIS
- OASIS is likely to replace GDSII, but it will take time and considerable effort
- Synopsys tools will support OASIS
  - Beta Q4 04
  - FCS Q1 05
- Details of interpretation and common usage will evolve over time
- Need industry effort to ensure consistent implementation of OASIS
- Spec available through Semi (Semiconductor Equipment and Materials International) → www.semi.org