

# SEMI I&CC Standards Improvement

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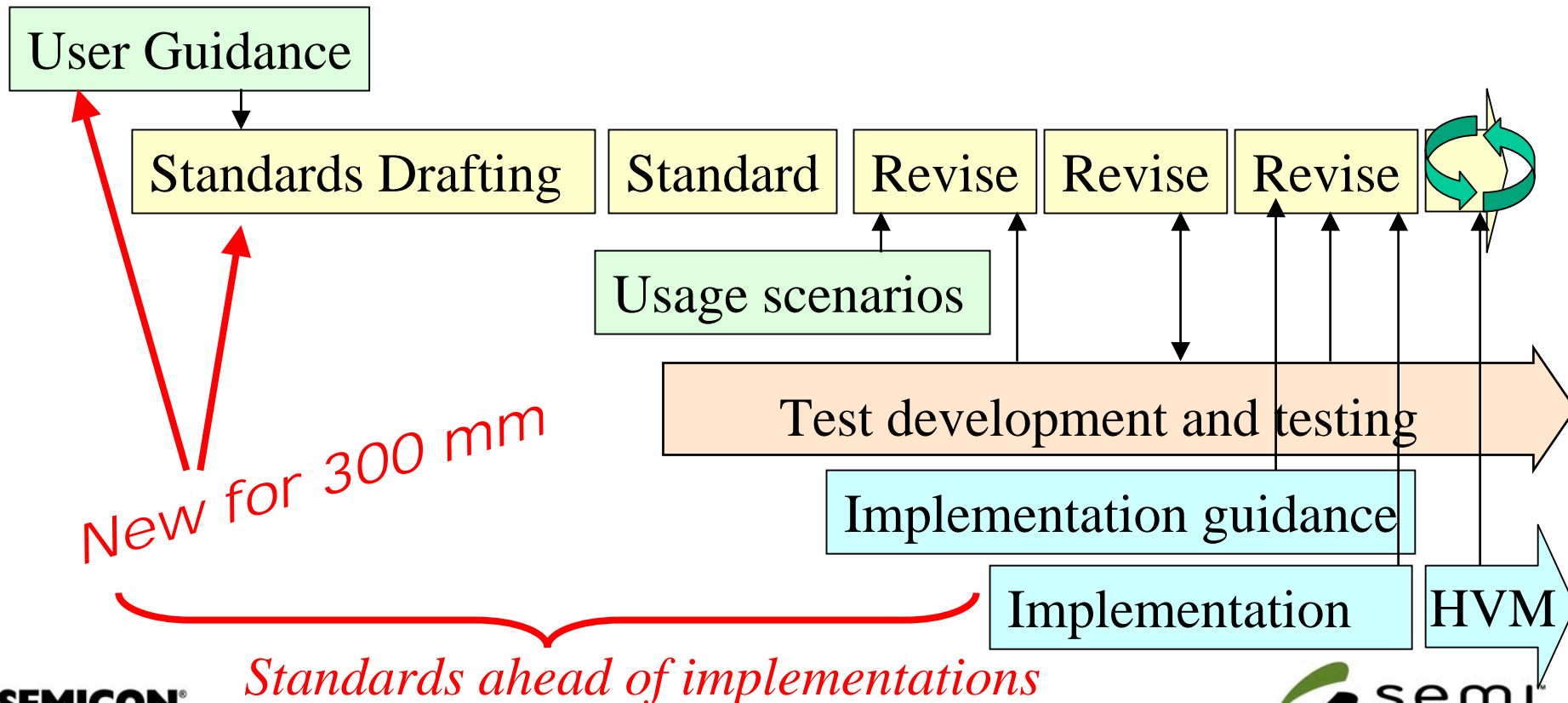
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# Outline

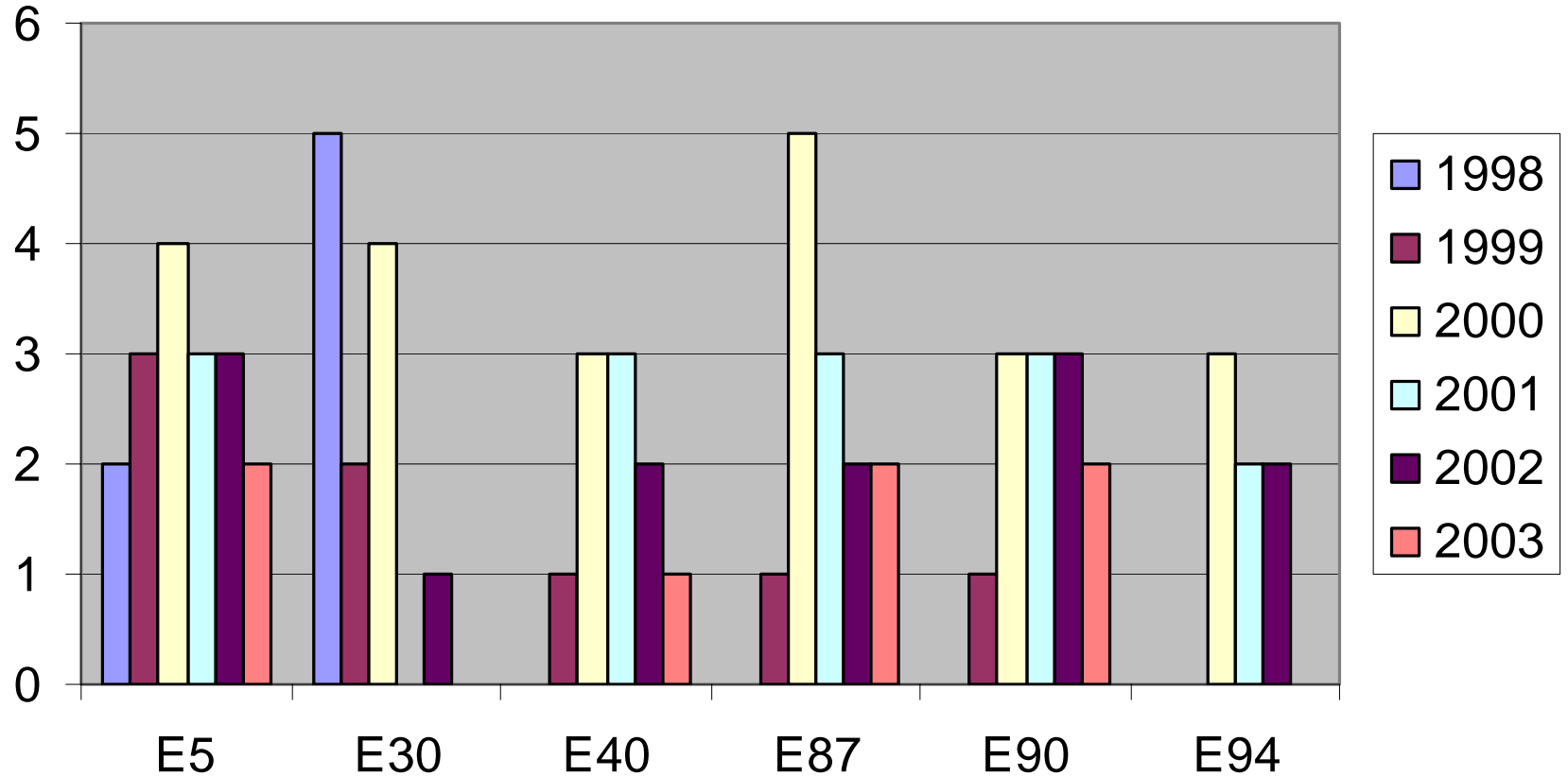
- Lessons Learned from 300 mm
- How do we improve going forward?
- SITF Purpose and Outputs
- Streamlining Procedures
- Communication
- Standard Improvement
- Concurrent Activities Concept
- Future Considerations
- Challenges

# Lessons Learned from 300 mm

- Standards were developed and documented before tools and fabs were built
- Standards requirements were difficult to identify, interpret, implement and test
- Learning from test development, implementations, testing and application in a high volume manufacturing (HVM) production environment after standards were published caused several cycles of revisions to the standards.



# 300 mm E&I Standards Published Revisions 1998 - 2003



# How do we improve going forward?

- Streamline Committee processes and procedures
- Improve communication globally
- Improve how we write standards
- Encompass concurrent industry activities in standards development plan
- The Global I&CC Standards Improvement Task Force was formed to catalyze and facilitate improvement

# Streamlining Procedures

- Updated **Meeting Motions** templates
  - Streamline and improve ballot reviews
- Templates for **line items** (single and multiple)
  - Improve format and background statement of line items
- Task force **issues tracking** template
  - Communicate issues on existing documents and track progress to resolve issues
- **SNARF** template updates
  - Identify participation needed for standards development
  - Provide history of revisions to ballot in SNARF

# Communication

- SITF and I&CC ‘Quickplace’ on SEMI website
- Standards Roadmap Timeline
  - Ballot history and forecast, and links to TFOFs and SNARFS for I&CC, PI&C, Metrics, Microlithography, Traceability, ES&H, & Silicon Wafer
  - <http://www.sematech.org/docubase/abstracts/4393beng.htm>
- ISMT 300 mm Integration and Automation Guidance
  - Manufacturing Operations and Exception Scenarios
    - <http://www.sematech.org/docubase/abstracts/4426beng.htm>
  - Equipment Integration and Automation Software Flowcharts
    - [www.ismi.sematech.org/standards/documents/300\\_os\\_v09.pdf](http://www.ismi.sematech.org/standards/documents/300_os_v09.pdf)

# Specification Template

- A Specification Template for I&CC standards is in development to include detailed guidance for authors
  - Format
  - Revision history
  - Alignment of SNARF with scope of standard
  - Location of requirements in a specification
  - Writing requirements clarity and unique identification
  - Conventions
  - Testability
  - Exception handling
  - Statement of compliance
- The draft is being sent to I&CC members to gather more input and feedback

# Writing Clear Requirements

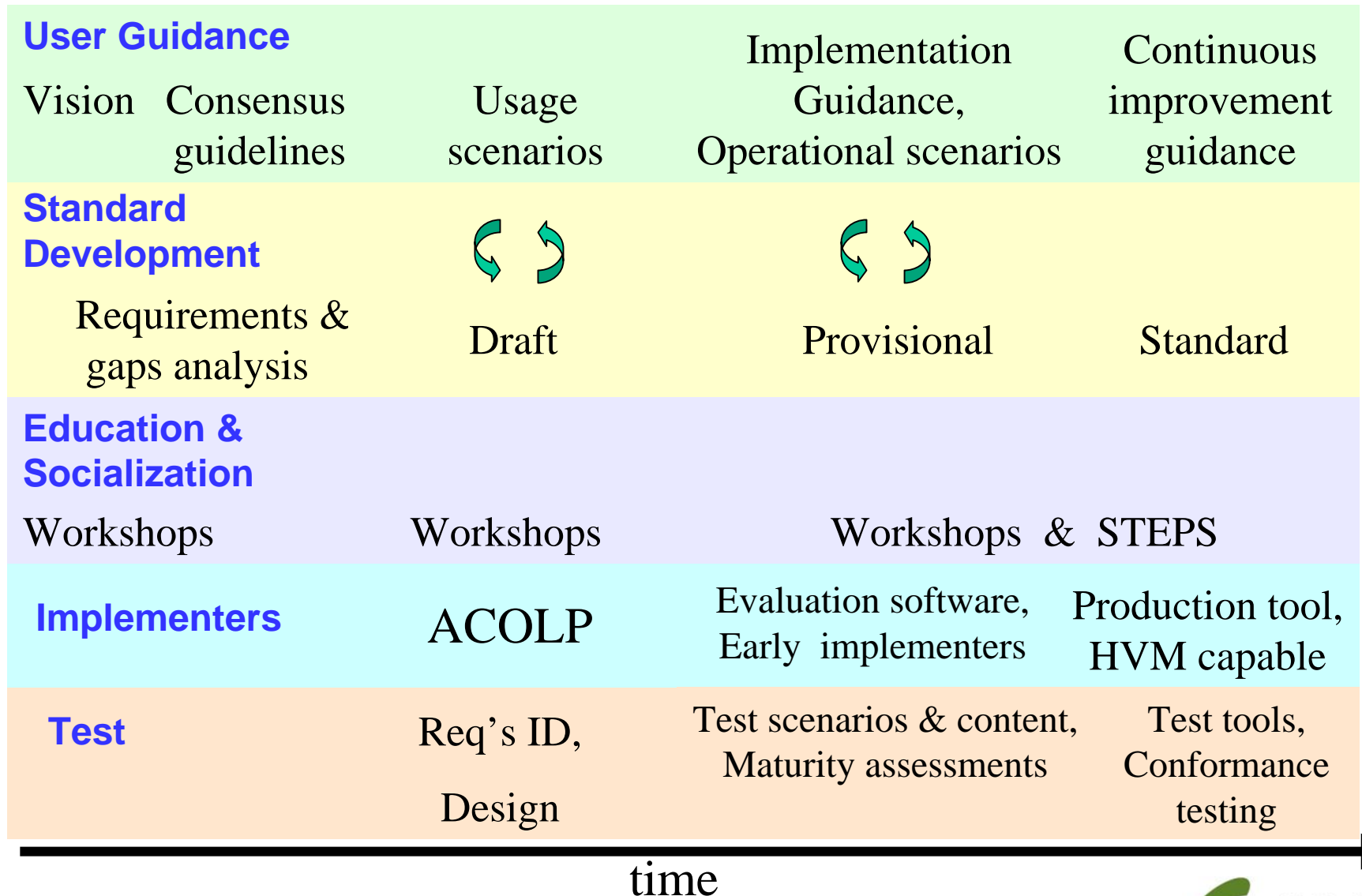
Examples of issues from current standards:

- “The equipment is responsible for communicating all EPT state transitions.”
- [Is this a requirement? Should “is” be changed to “shall be”?]
- “The EPT state model can be applied to the Equipment Front-End Module (EFEM).”
- [Is a “can” sometimes a requirement and sometimes not?]
- “The state of the EFEM/carrier/load port related modules shall not impact the overall equipment state.”
- [Since this is a negative requirement, is this testable?]
- **Implied requirements:** E94 implies that more than one process or control job can be run concurrently, but does not support parallel execution of control jobs
- E90: There are **too many possible permutations** to validate by testing that E90 events sent by an equipment actually match the location path taken by the substrates as determined by the recipe

# Unique Requirements ID

- Proposal: Each requirement shall be uniquely identified as a requirement of the standard
- Advantages
  - Drives consideration of how requirement is written, and whether it is testable
  - Identifies each requirement regardless of where it is located in the standard
  - Makes it easier to extract all requirements from a standard
  - Facilitates ease of implementation and test development
  - Mapping to requirements does not change, even if the location of the requirement in the standard changes
  - Facilitates revision tracking
- A schema and structure for Unique IDs is in development [e.g., RQ-E116-EPTSM-00116]

# Concurrent Activities Concept



# Accelerated Cycles Of Learning Prototypes (ACOLP” – *Steve Fulton, ISMI*)

- Prototypes early in the standards development cycle with the specific purpose to:
  - Assess the feasibility of a new or unfamiliar technology to be addressed by a standard
  - Assess or mitigate technical risk of approving a standard
  - Validate a standard approach from potential alternatives
  - Identify gaps and refine technical content of a standard
  - Verify specifications and test requirements
- Impact:
  - Reduce revisions of published standards
  - Reduce impact of revisions on implementations
  - Earlier implementations due to higher certainty of content

# Future Considerations

- Addendum Guidelines to Members Handbook for I&CC for standards developers
- Work with SEMI staff to provide standards in different formats (other than in .pdf )
- Test requirements strategy

# Challenges

- Global agreement on and adoption of SITF proposals for improvement
- The window of opportunity to improve emerging “e” standards is narrowing fast
- SEMI standards volunteer role definition and resources to effect change
- SEMI resource and policy constraints to support change
- Industry (device makers and suppliers) commitment and funding to support the improvements throughout standards life cycle

# SEMI Standards On-Line Collaboration

- Contact your SEMI standards coordinator for access and passwords
  - Information and Control Committee:  
[http://teams.semi.org/stds\\_ic](http://teams.semi.org/stds_ic)
  - Global I&CC Standards Improvement (SITF)  
[http://teams.semi.org/QuickPlace/stds\\_icspitf](http://teams.semi.org/QuickPlace/stds_icspitf)
  - Diagnostic Data Acquisition Task Force NA  
[http://teams.semi.org/stds\\_icdda](http://teams.semi.org/stds_icdda)
  - Object-Based Equipment Model (NA OBEM) Task Force  
<http://teams.semi.org/obemtf>