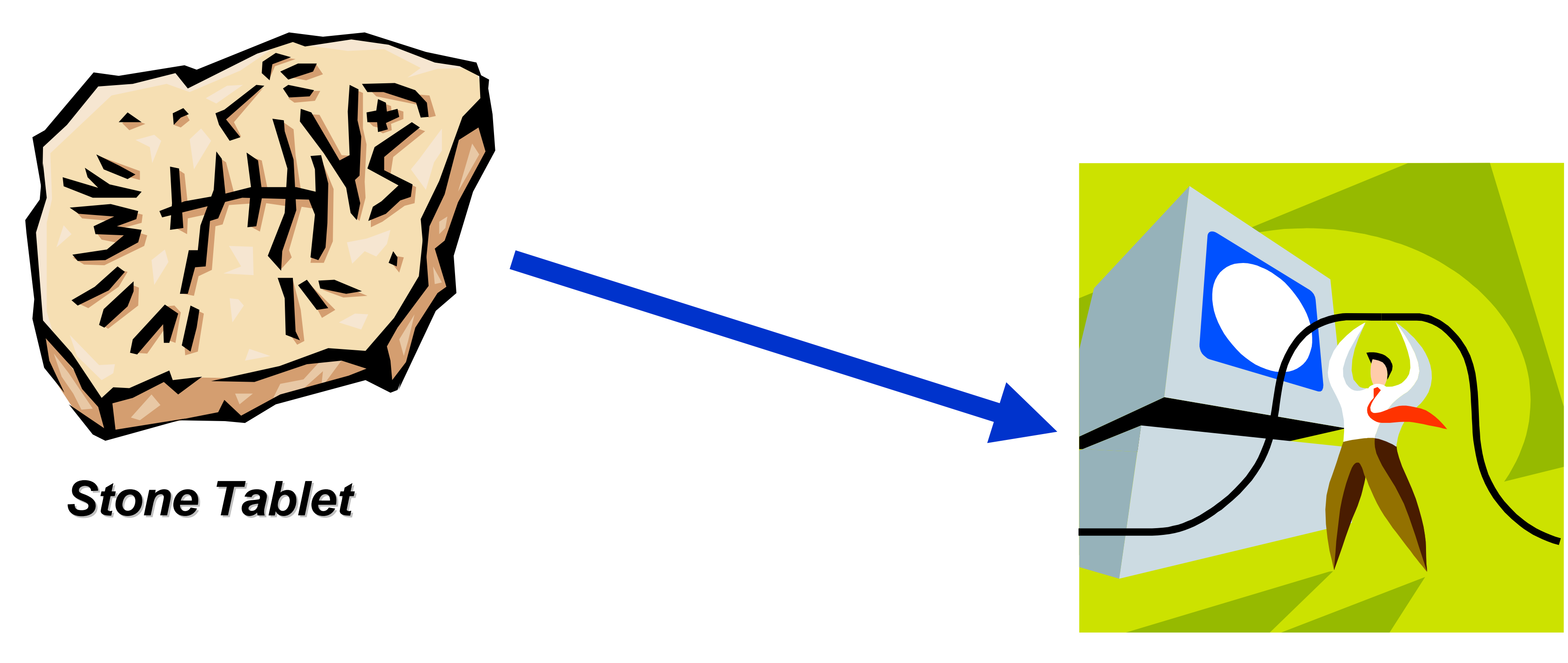
Sematech Mask Tool Automation

Critical Reticle Data Required
In the Correct Format



Stone Tablet

Online Data

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We need precise data that is easily accessible to help lower cost and drive multiprobe yield.

Reasons for Concern

- Increasing Reticle Costs
- Wafer process margins shrinking
- Increasing complexity of current reticles
- *TI receives reticle data from multiple mask suppliers.*

What Can the Requested Data Provide?

1. Better control of wafer processes
2. Improved reticle specifications
3. Reduced wafer cost (Eliminating IQC)
4. Raise wafer yields

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Physical Reticle Data

- **Required Data**
  - General Information
  - CD Control
  - Registration/Overlay/ Closure
  - Phase/Transmission
  - Defect Data / Inspection Files

- **Data Format**
  - Semi P10 Format
  - XML Output
  - Database Storage

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Reticle Data Format

Semi P10 – Terminology understood by multiple mask suppliers

Issues – All specification changes do not have the terminology defined in the current Semi P10 version. It is a slow process to get new terminology approved.

XML Format – Allows for the easy interchange of documents over the internet.

Issues – Implementation across multiple suppliers

Database – Storage location of XML data files and Inspection Reports (TI – Reticle Database System)

Allows for Automated Specification verification

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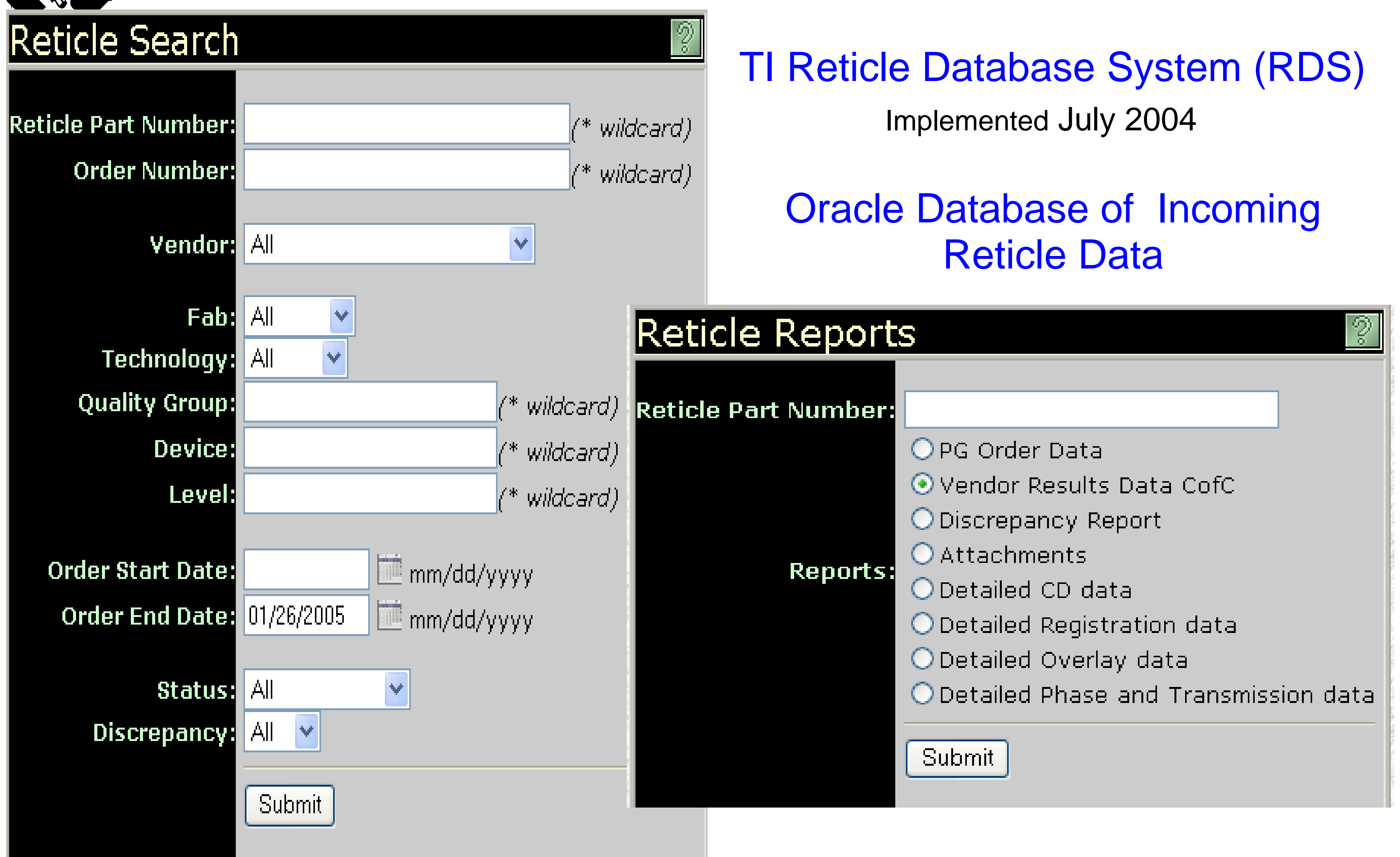

TI Reticle Database System (RDS)

Implemented July 2004

Oracle Database of Incoming Reticle Data

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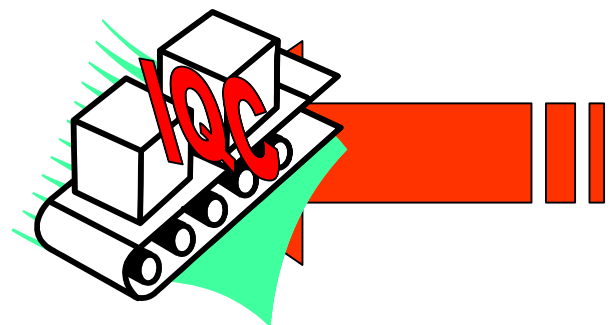
Quality Assurance

- **Old Method (Wafer Fab)**
  - IQC (Redundant Pattern Inspections)



- **Current Method**
  - Standardized Specifications
  - Suppliers Audits
  - Reduced IQC

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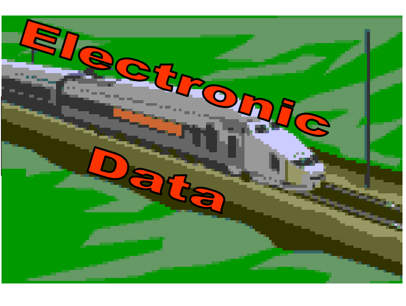
Quality Assurance



- **Future Method (Reticle Supplier)**
  - Offline Review of Suppliers Reticle Inspections
    - IR / Inspection Files
  - Reticle Inspection Simulation (Printability)
    - Defect Scoring/Binning
  - Reduced Operator Involvement

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- **Extended Ideas**
  - Reticle Supplier Website
    - Supply chain software
      - Need Dates, Actual Dates
      - Wafer Status, Wafer Log point Schedule
    - Finished Product results
      - Inspection Reports, IR Files
      - Inspection Simulation results
      - Database of Reticle Data

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- **Summary**
  - Electronic Reticle data and inspection results
    - Help improve reticle specifications
      - SPC of incoming data allows relaxing/tightening of critical parameters by watching trends in the data.
    - Improve wafer processing
      - Better controlled processes by using reticle data
      - More efficient use of data by automating use of data in factory control systems.
    - Drive higher yields
      - Better controlled processes
      - Understanding defectivity of reticles
    - Drive lower wafer costs
      - No need for redundant Inspection tools
      - Higher process yields

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- **Summary**

TI's wafer fabs need mask data and inspection results delivered electronically.