An Industry-led Platform for Interoperability

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Outline

- **Organization and Goals**
- OpenAccess Technology
- OpenAccess Interoperability
- OpenAccess Value Proposition
- Conclusions

Litmus Test for Platform Openness

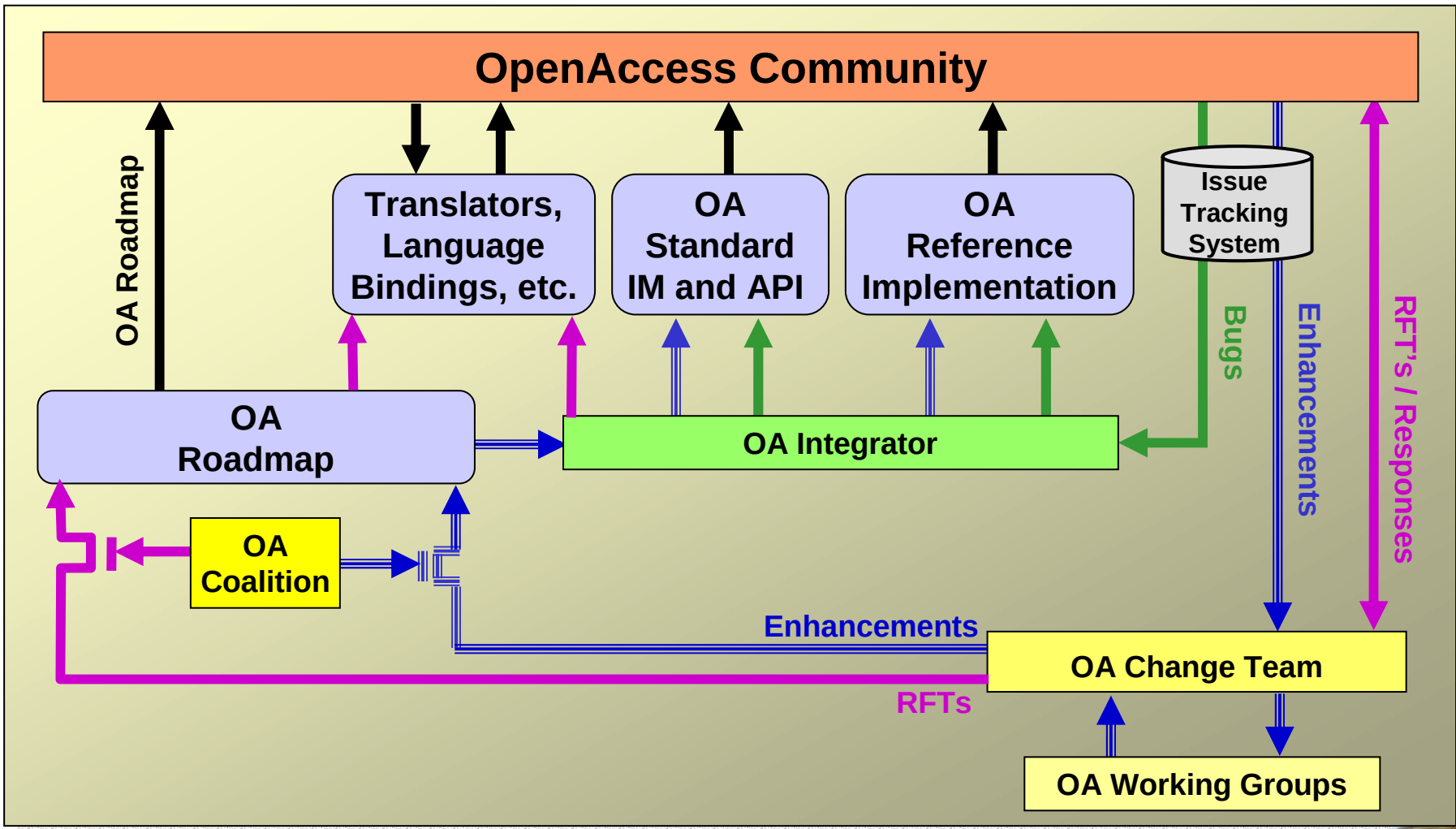
- **Accessible by all parties:**
  - Anyone can use, change, embed, or redistribute according to clearly established terms
- **Reasonable cost:**
  - Established prices are based on service value and do not present an undue barrier to any company, regardless of size
- **Managed migration by stakeholders:**
  - Controlled evolution of the technology by an elected Change Team

OpenAccess meets these criteria

OpenAccess Goals

- **Provide IC design tool infrastructure that yields**
  - ***Integrated*** systems rather than sequential flows
  - ***Choice*** of design tools and provider
  - ***Technology transfer*** of innovative research
  - ***Collaborative design*** capability for ICs
- **Promote an open standard for IC design data access**
- **Gain adoption of the standard within the EDA industry and university research programs**

OpenAccess Process



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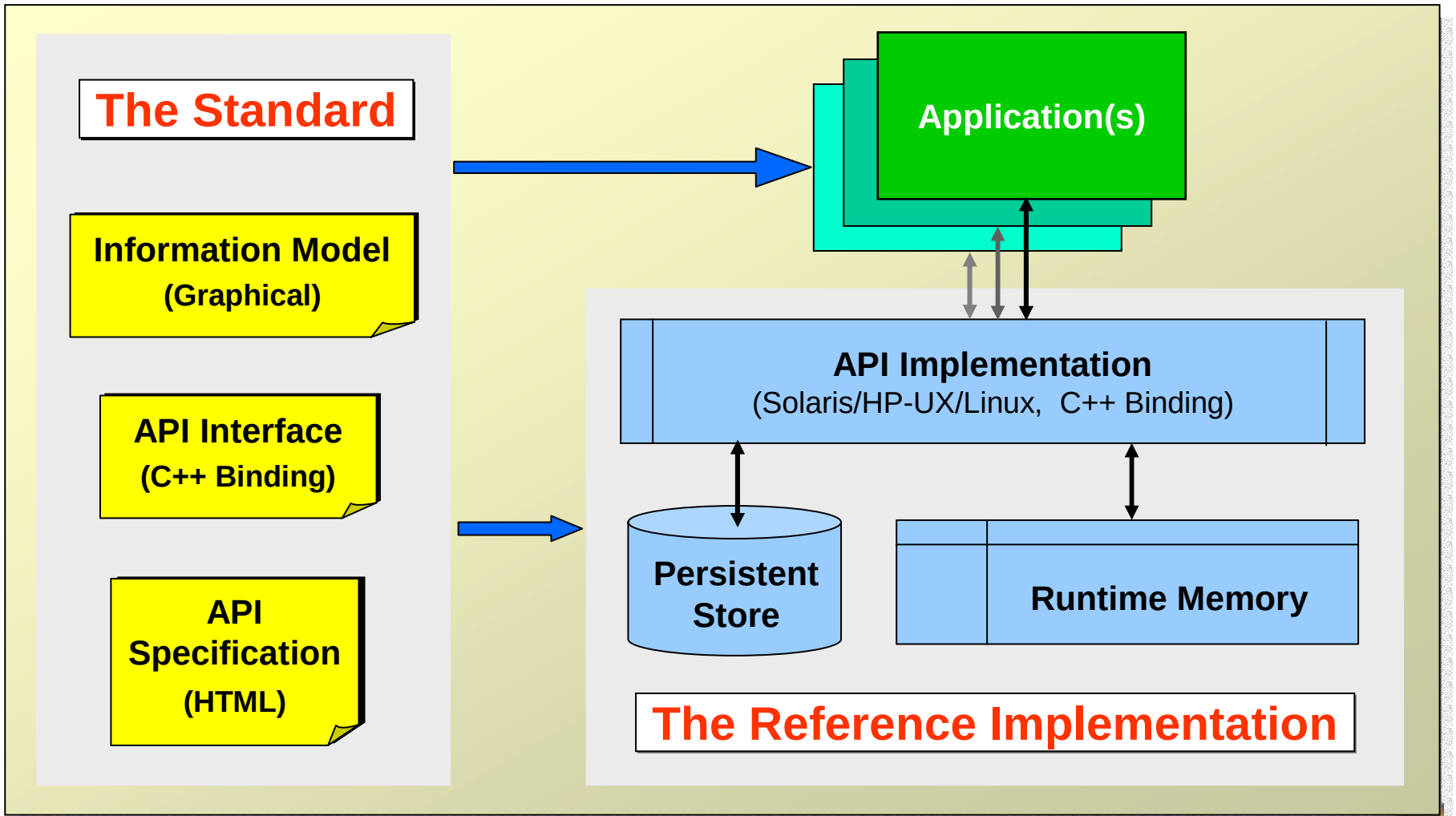
Open Access Deliverables



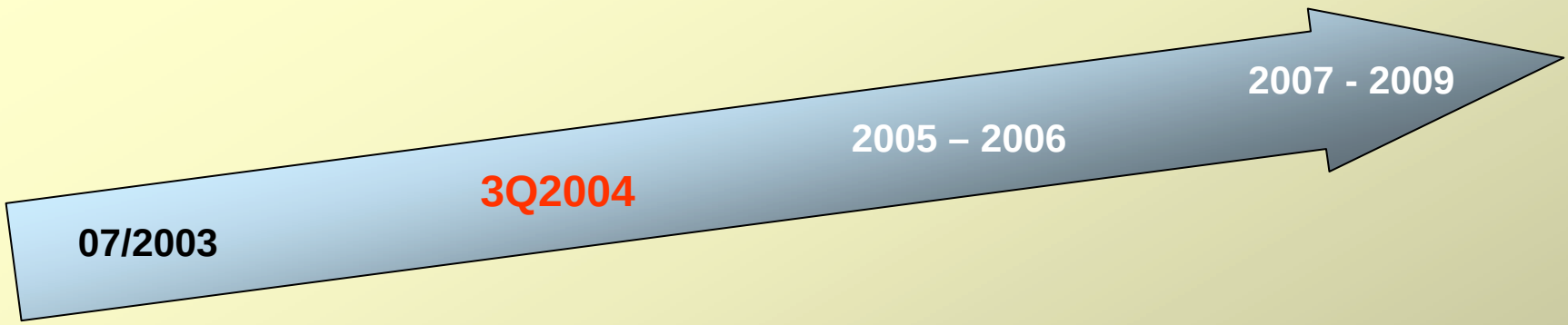
Information Model Scope

- **Design Data**
  - Hierarchical connectivity
  - Floorplan objects and attributes
  - Physical layout
  - Standardized Route and Via semantics
  - Shapes
  - Parasitics (detailed and reduced)
  - Scan chains
  - ***Extension objects (app-defined objects, attributes, groups and properties)***
  - ***Occurrence model and EMH***
  - Timing (using extension objects now, will be added as part of design data after definition of timing constraint specs)

- **Technology Data**
  - All technology features and constraints, such as, wire width/spacing, via spacing, stacked via limits, pad position/spacing, etc...

- **Library Management**
  - Light-weight support for handling:
    - Design hierarchy
    - Access control
  - DDM WG defining robust API extension to plug in DDM solutions

Moving Forward: OA Roadmap!



Key OA 2.1 items:

- Embedded Module Hierarchy (EMH)
  - Logical / Physical hierarchy
  - Occurrence Model
- Multi-threading
- And many more ....

Key OA 2.2 items:

- X-routing support
- Plug-in for custom region query
- Constraint modeling
- Major release API compatibility
- Version-independent on-disk storage
- Library & design data management
- MW-to-OpenAccess translator
- And many more ....

Potential Key items:

- Support design-to-manufacturing
- Timing/delay constraints
- Library modeling
- System-in-package
- Manufacturing test
- IP security
- Control-level tool communication API
- And many more ….

Potential Key items:

- Formal transistor-level modeling support
- Support behavioral-level data models
- Support architectural-level data models
- And many more ….

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Design Flows or Nightmares Past!

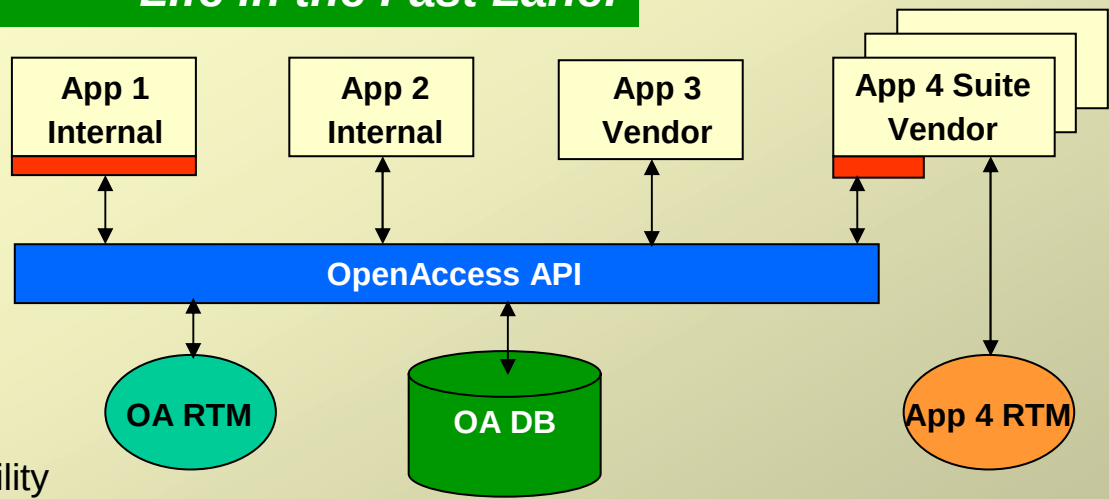
Life in the Slow and Easy Lane!

Writing translators:

- Compelling job description for a PhD? Or, how to drive him/her to your competition!
- Cost of developing and maintaining above flow 3-5X that of tool cost
- Problems in translation:
  - At any instant of time, what App(i) delivers is not what App(i+1) expects (syntax/semantics)
  - Over period of time, App(i) evolves differently from App(i+1), so translator between App(i) and App(i+1) must evolve

Streamlined Design Flows for 90nm & Beyond!

Life in the Fast Lane:

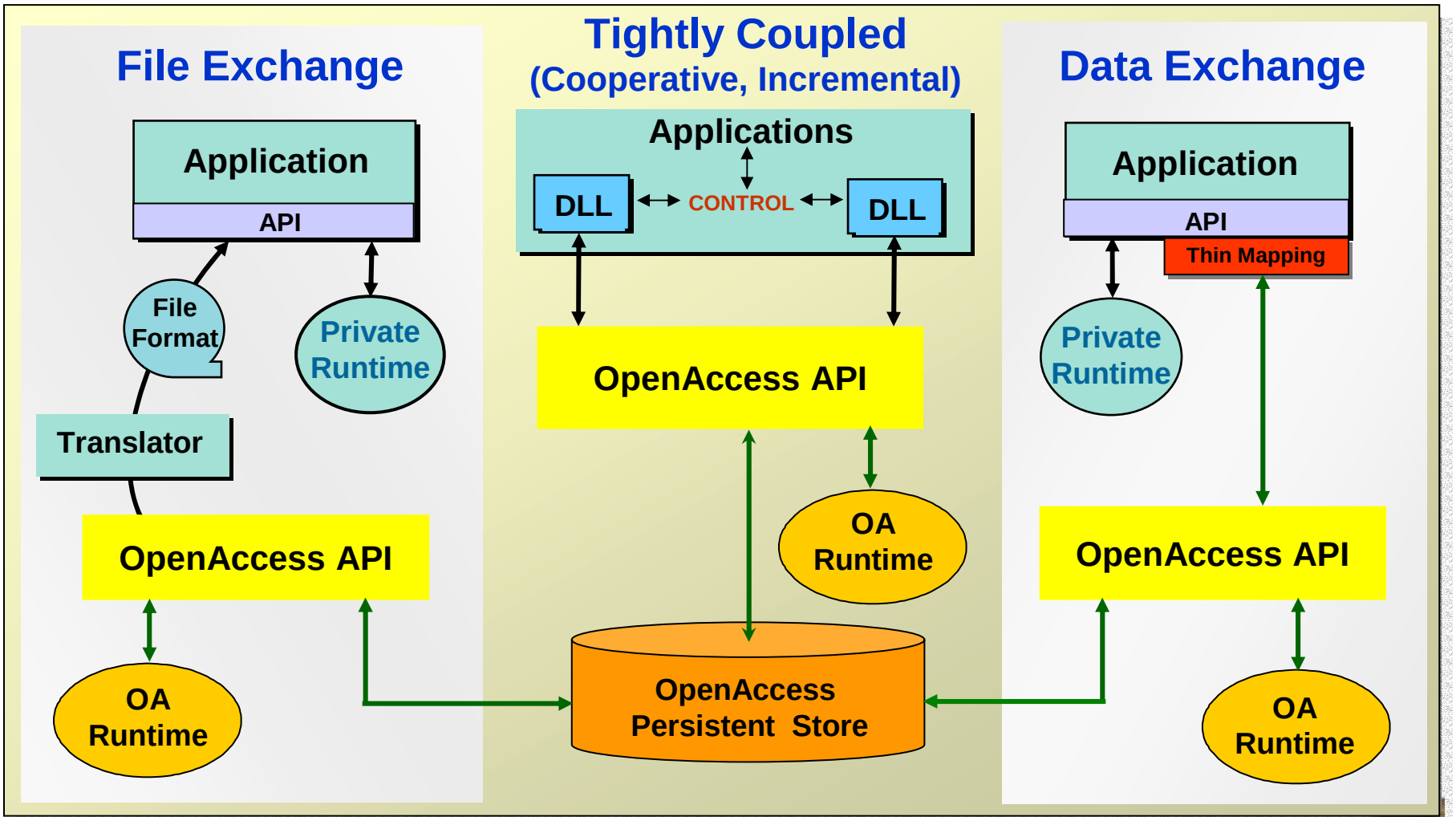


By design, OA:

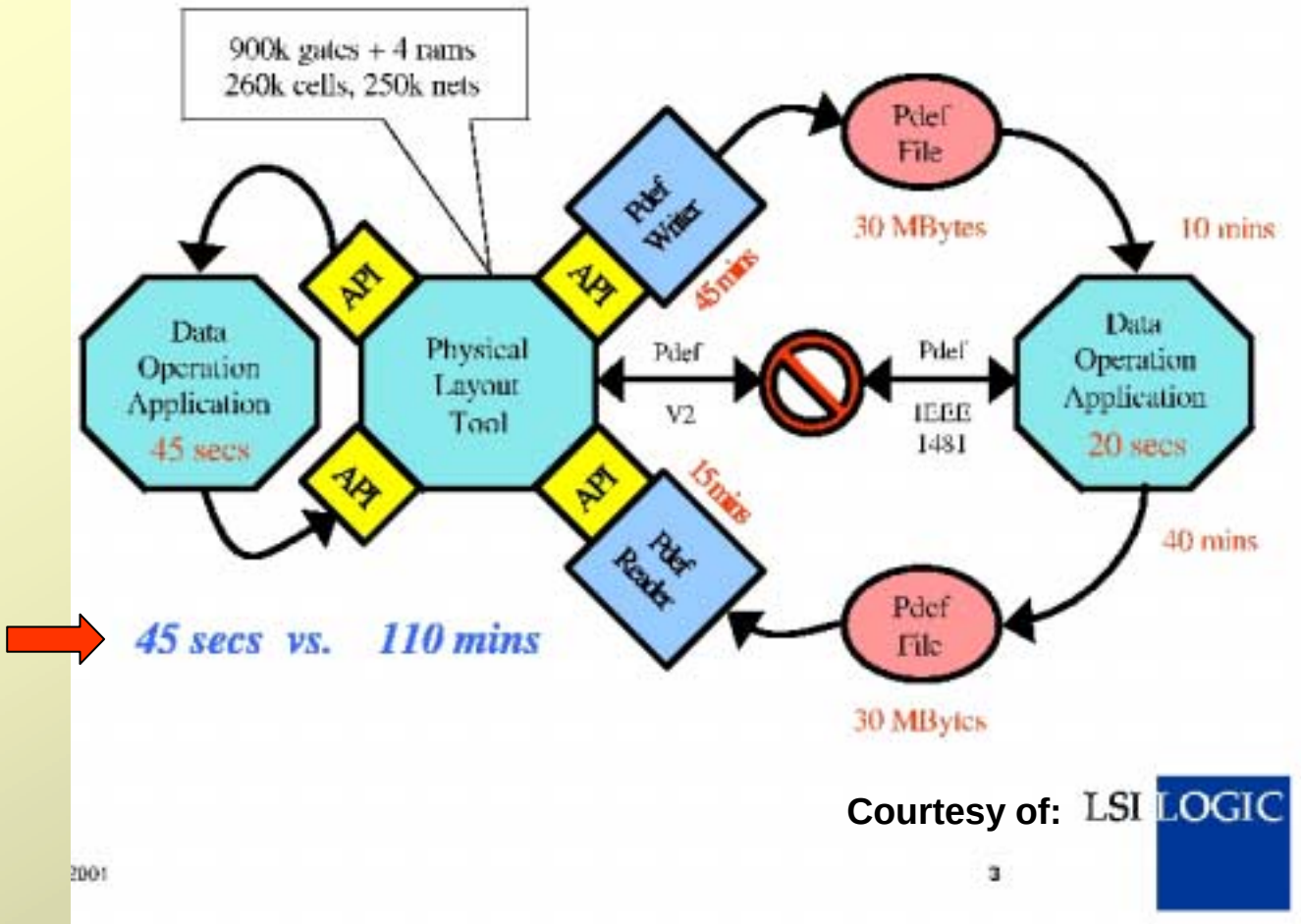
- Enables tool interoperability
- Reduces need for translators
- Creates common syntax and semantics even in non-ideal case
- RTM is context-sensitive and memory-efficient

- Private RTM may be application specific and can be considered, case-by-case, as temporary/transitional solution

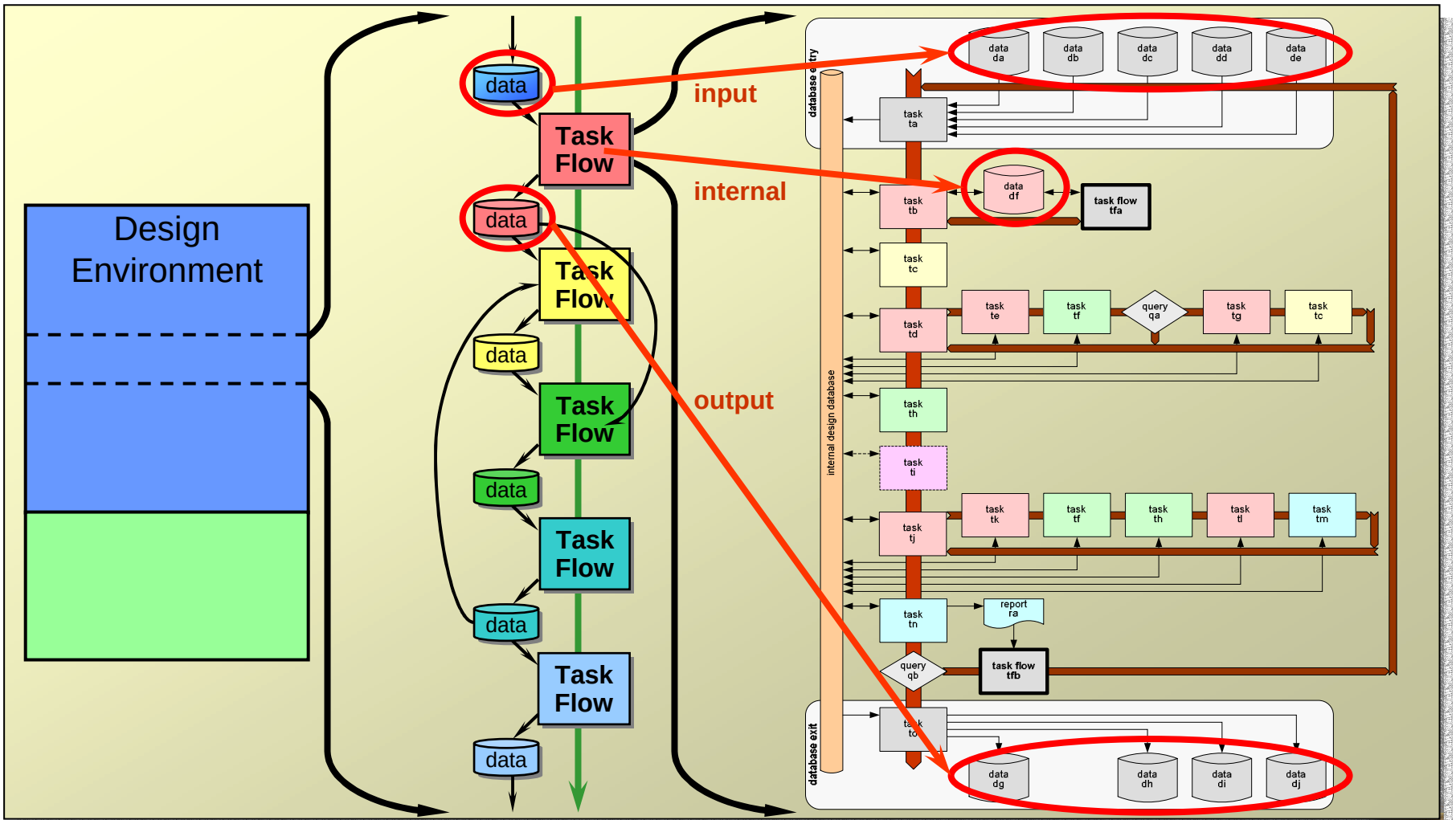
Today's Reality!



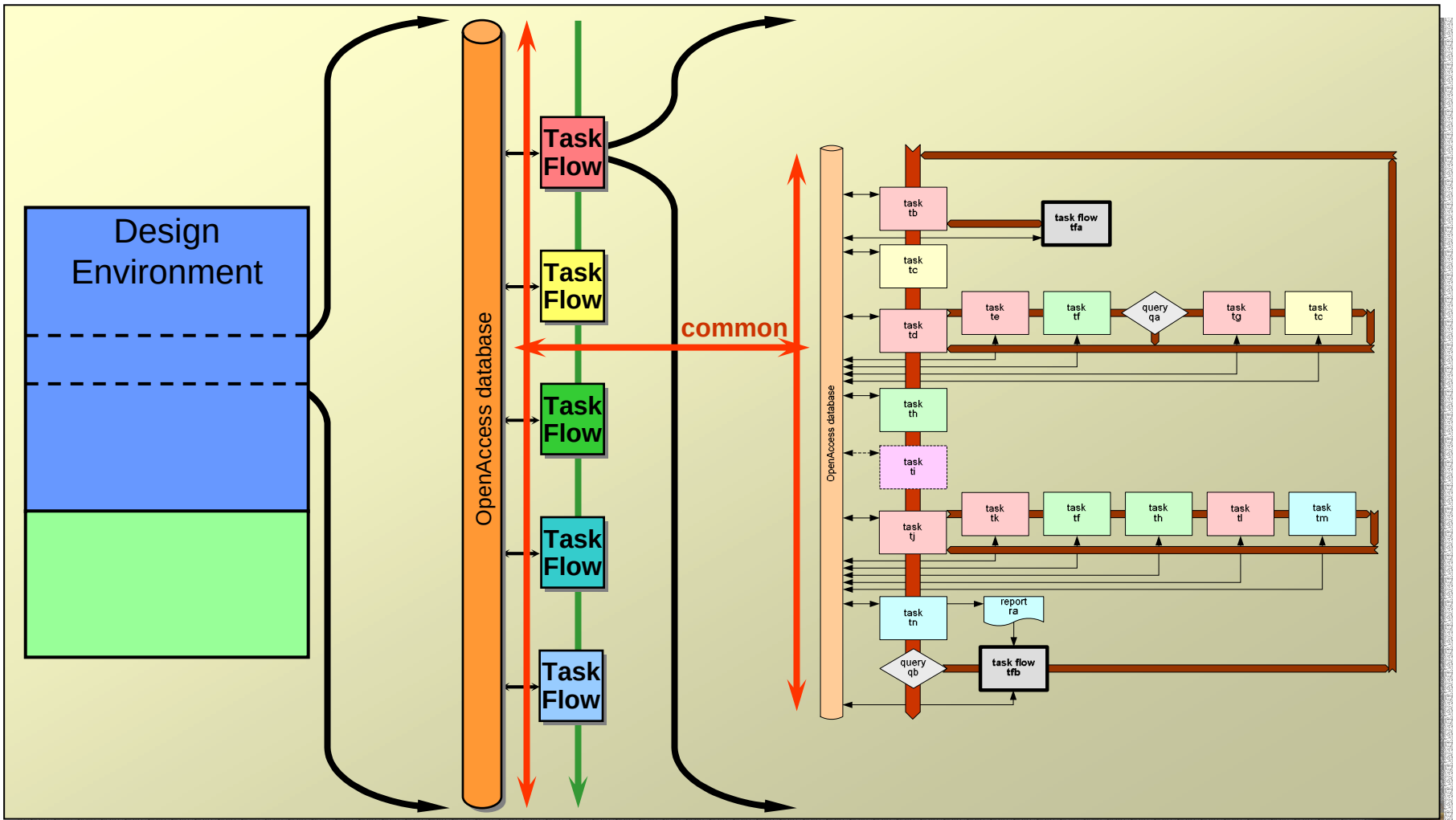
Example of API Benefits



Philips Flow: Before OpenAccess

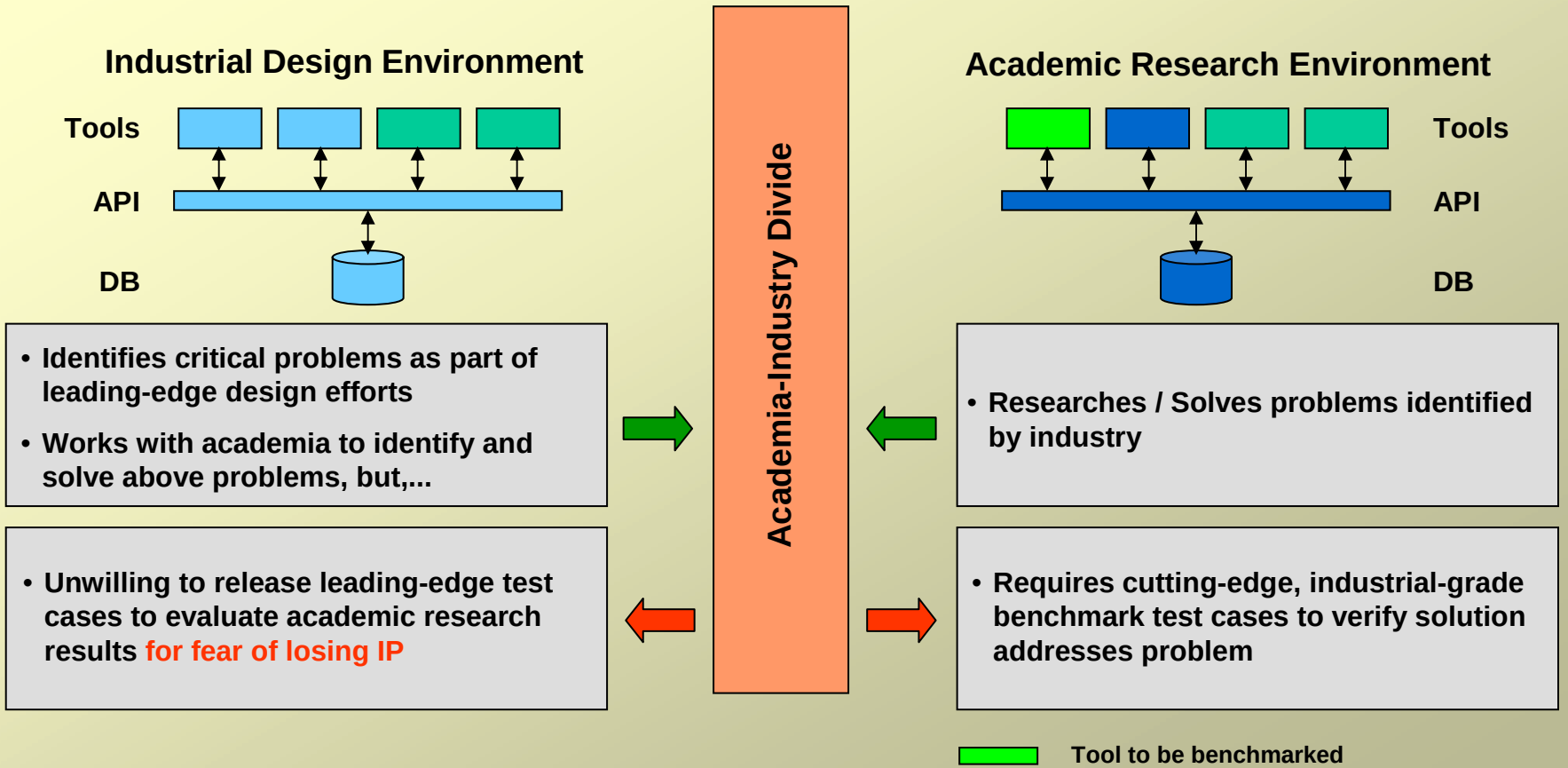


Philips Flow: Using OpenAccess



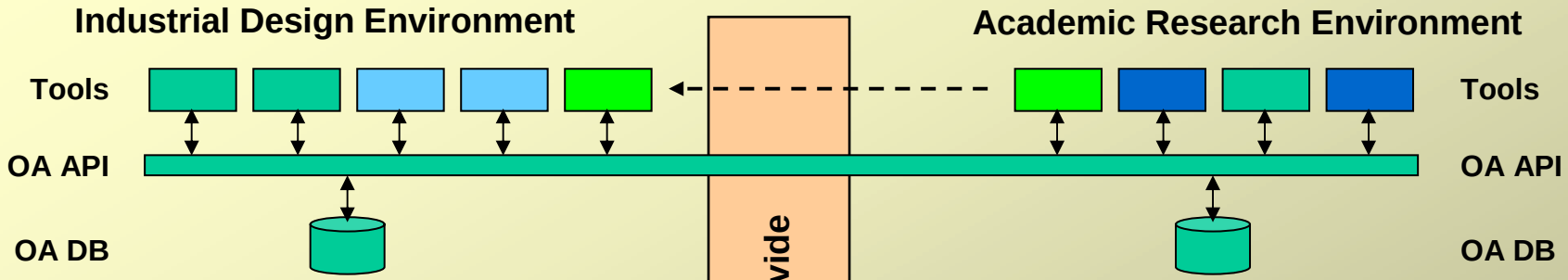
Benchmark Test Cases Conundrum!

Benchmarking Today:



OpenAccess Benefits: Benchmark Test Cases

Benchmarking based on OpenAccess: A Proposal!



• Identifies critical problem as part of leading-edge design efforts • Works with academia to identify and solve above problem, but,...	→	• Researches / solves problem identified by industry
• Assists academic partner benchmark solution using leading-edge design within corporate network, then transfers normalized results to academic partner	→	• Installs solution in industrial partner's internal design system to benchmark in partner's environment
• Industry gets proven solution to problem inhibiting progress without releasing IP	→	• Academics get proof-of-concept and publication data

Academia-Industry Divide

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OpenAccess Benefits

- **End-users**
  - Saves investment in proprietary infrastructure, ***leverage open, industry-standard solution***
  - Reduces/eliminates translators between tools, ***thus reduces integration/performance impact***
  - ***Plug-and-play access to new tools*** reduces integration costs
- **EDA companies**
  - Easier access to customers: ***Simpler integration into their flows***
  - Easier to integrate tools from acquired companies
  - For small companies, ***reduces barrier to entry***, i.e., quicker “startups”, faster ROI
    - Less unique infrastructure, hence lower barrier to acceptance
    - Less interfacing effort into existing flows - quickly sell to a larger market
- **Academia**
  - Access to commercial database and its users
  - Ability to influence standard
  - ***Access to industry benchmark examples***
  - Infrastructure for: Student training, research platform, ***technology transfer***

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- **OpenAccess Status:**
  - Release 2.0 / 2.1 available from Si2's OpenEDA.si2.org website
  - ***Release 2.2 planned for 3Q2004***
- **OpenAccess Proliferation:**
  - ***Rapid adoption underway at EDA companies*** (big / small / start-up)
    - Proof: Demo's at 2004 OpenAccess Conference
  - ***Use at end-user companies rapidly increasing***
    - 3 end-user companies designing chips with OA-based flows, ***1 has working silicon***
    - All flows in use or development based on ***exploiting interoperability of internal and external tools on OpenAccess***