IBM Software

Industry Trends and Software Assurance

COMPSAC 2005
Edinburgh
26th July, 2005

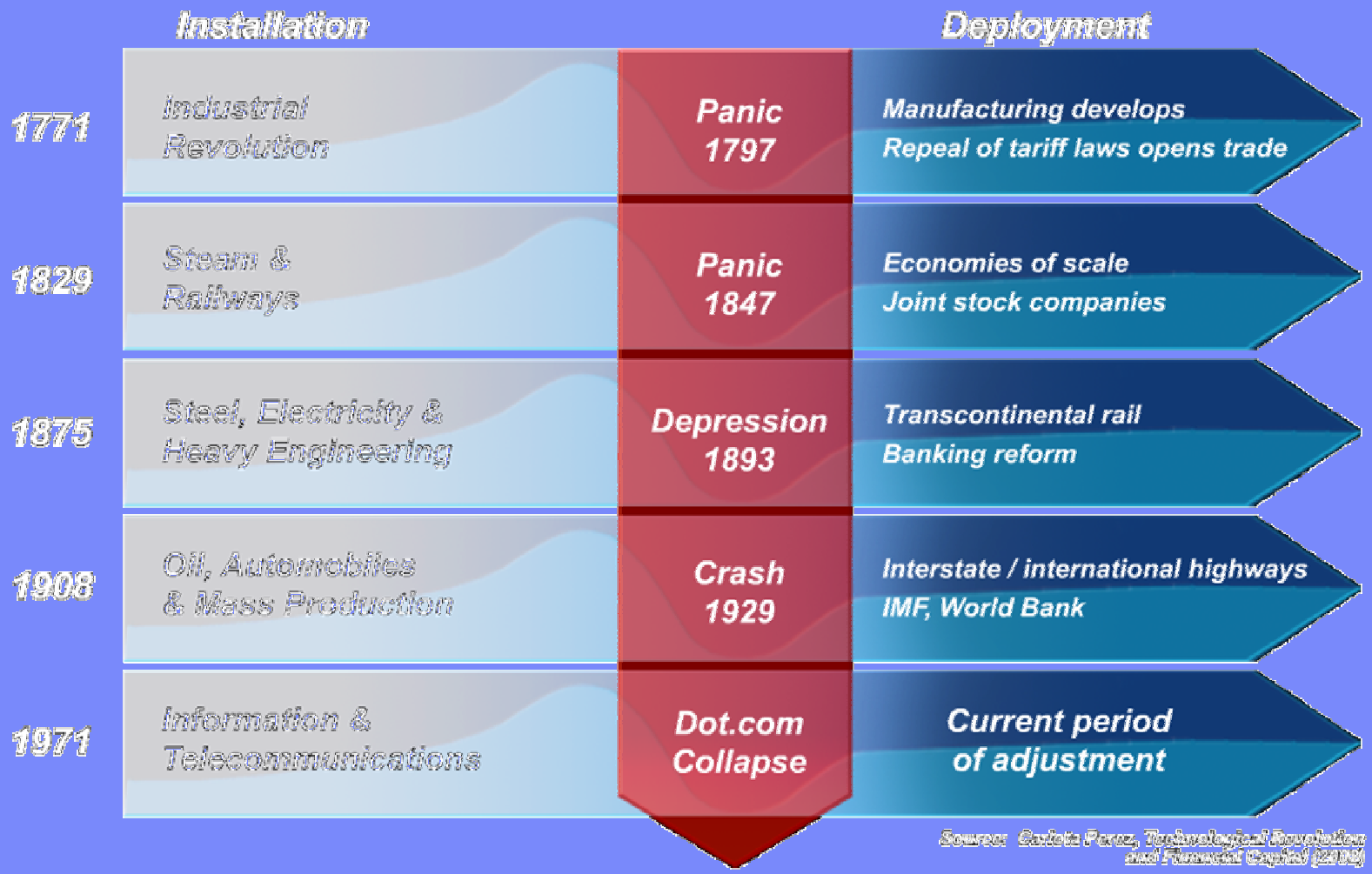
Robert Berry,
IBM Distinguished Engineer,
IBM Corporation,
Hursley, UK
brobert@uk.ibm.com

Agenda

- **Changes in the world and in the world of technology**
- **IT Trends**
- **Responses and focus areas for IBM**
- **The need for Innovation**
- **Closing challenges**

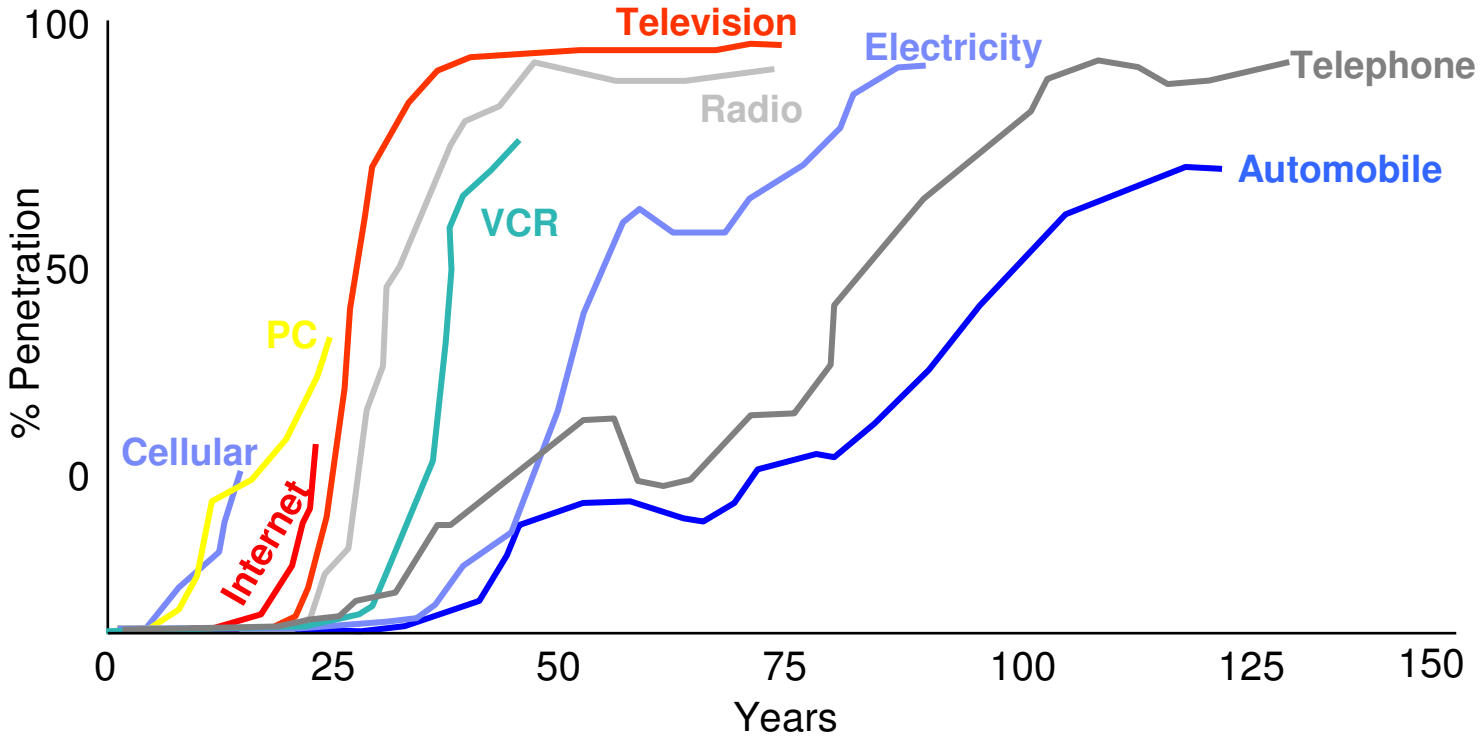
Changes in the world and in the world of technology

Historic Junctures



Pace of Innovation Accelerating

Newer technologies taking hold at double or triple previous rates

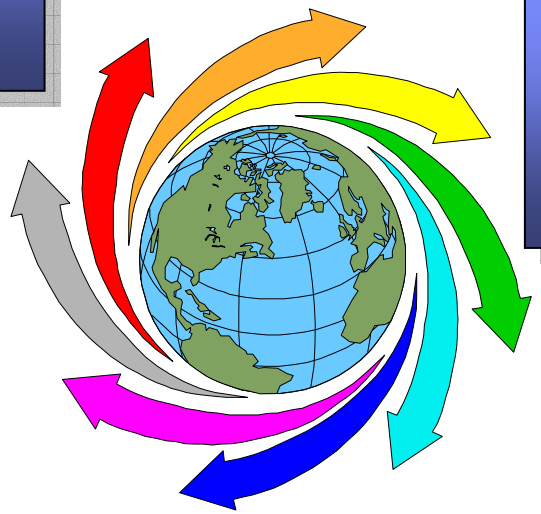


IT Trends

Evolving Market Trends Affecting Middleware

Solution buying and selling growing in importance

"More than 60% of middleware purchases are made in solution oriented combinations"



Fusion of business and IT- CIOs are taking on wider business leadership

"Business/IT Alignment" was the #1 issue in 2003 for CIOs in every geography (META Group)

New business designs are emerging to increase productivity and responsiveness

Sources: IDC/Gartner, Stonebridge, Buyer Behavior, SWG MI

Horizontal Integration is the New IT Challenge

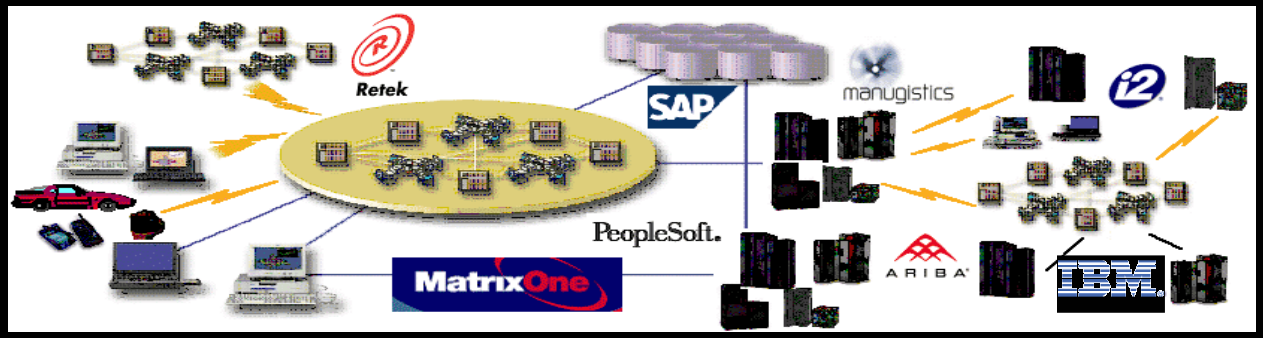
Business Processes

- Customer Relationship Management
- Enterprise Resource Management
- Product Lifecycle Management
- Procurement
- Value Chain Management

Bridging the gap between business transformation and IT

Information Technology

Customer Connections **Internal Systems** **Supplier Networks**



A Revolution in Enterprise Software

The requirements of on demand, the componentization of businesses, and emerging software technologies will fundamentally change the way enterprise software will be developed, deployed and delivered

- **Industry ecosystems are being transformed by and created from networks of companies that provide business process components**
- **Traditional IT development is struggling to support and take advantage of these new emerging ecosystems**
- **Componentization of software is accelerating, driven by Service Oriented Architectures (SOAs)**
- **Software as a Service is an emerging alternative to buying or developing solution components**
- **Industries are accelerating the creation of vertical standards, facilitating the assembly of solutions from service components**
- **These trends will cause fundamental changes in the way enterprise software will be developed, deployed and delivered**

Today: Polarization in Enterprise Application Development

Traditionally, choices were limited to developing custom software or using monolithic applications developed by ISVs

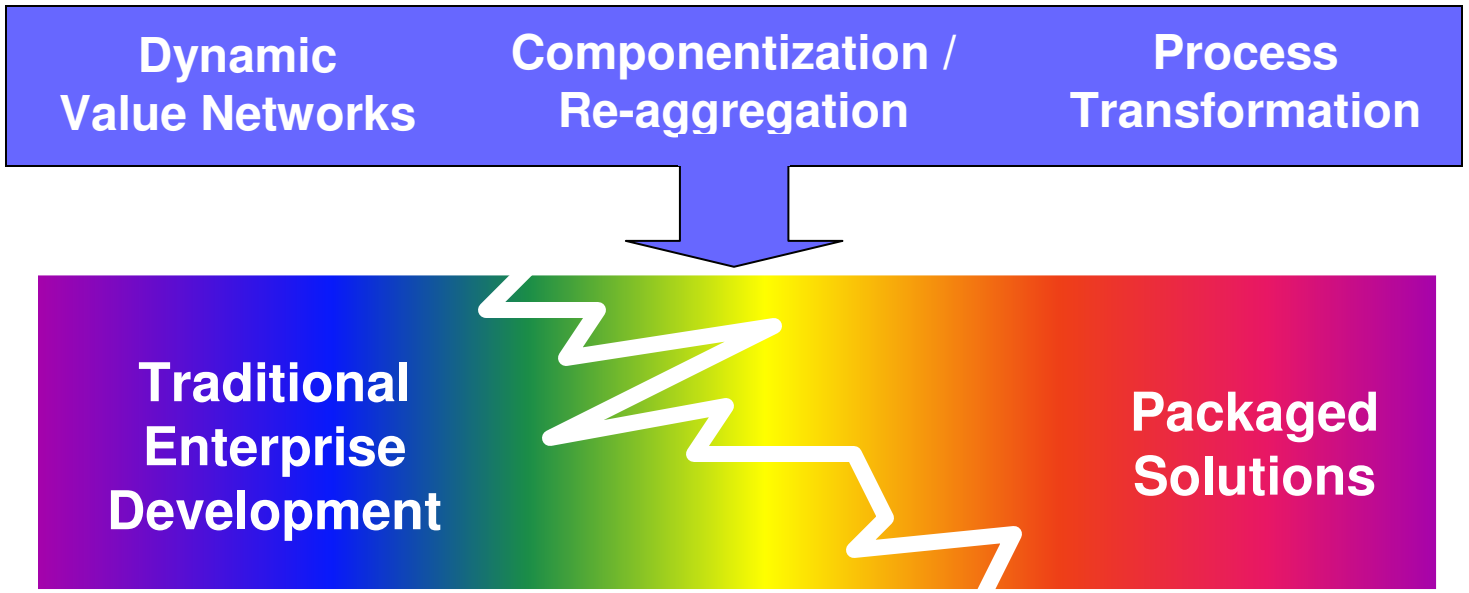
Tailored to enterprise

Higher costs
Higher risks
Longer time to deploy

Turnkey solutions

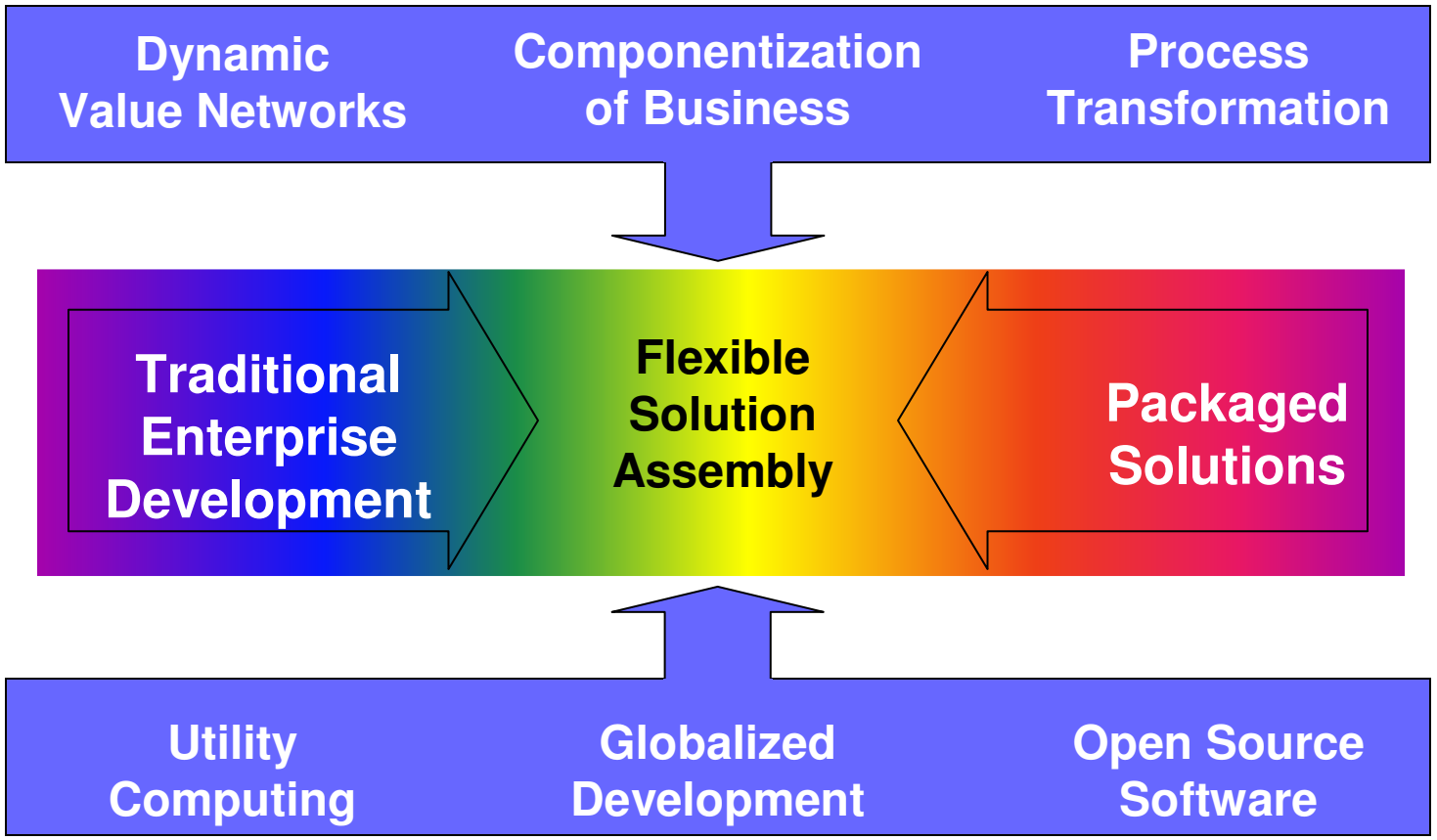
Harder to adapt to business
Harder to differentiate
Narrower scope

Today's Enterprise Software is Too Rigid to Support On Demand Businesses…



- **Companies are under pressure to deal with the inflexibility of monolithic applications in connecting with new partners and customers**
- **Business processes are disaggregating to take advantage of specialization and cost savings through outsourcing**
- **On demand businesses need IT implementations that facilitate business process transformation**

More Flexibility is Needed to Support On Demand Businesses



Pressure to quickly align IT functions to business objectives and process changes will motivate companies to embrace more flexible approaches to enterprise software development and deployment

Software Lifecycle Implications

This new flexible solution assembly approach will challenge current technologies and methodologies for discovering, reusing, developing, testing, deploying and managing applications

Software Lifecycle Implications

This new flexible solution assembly approach will challenge current technologies and methodologies for discovering, reusing, developing, testing, deploying and managing applications

- **The software industry will shift to development of components, changing the way we think about applications**
- **The discovery, understanding and reuse of components will leverage the increasing amount of standard-based business semantics and metadata**

Software Lifecycle Implications

This new flexible solution assembly approach will challenge current technologies and methodologies for discovering, reusing, developing, testing, deploying and managing applications

- The software industry will shift to development of components, changing the way we think about applications
- The discovery, understanding and reuse of components will leverage the increasing amount of standard-based business semantics and metadata

- Customization and integration of components will become key aspects of software development
- New tools and techniques will help enterprises transform legacy apps into reusable components
- Composition of dynamic, distributed, externally provided components will challenge software and application testing

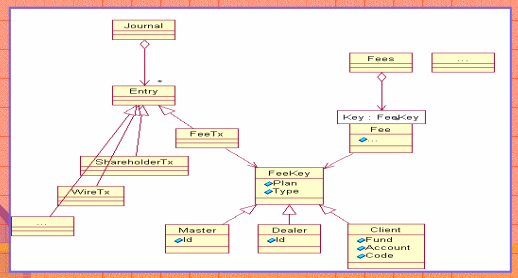
Recovering Logical Models from Legacy Apps

Tools to extract logical data and process models, as well as business rules, from legacy code will facilitate the componentization of monolithic applications and the reuse of extracted components

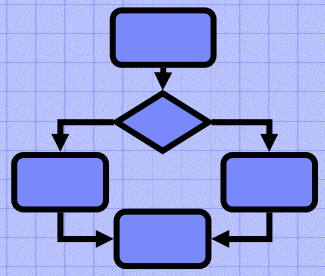
Legacy Programs

```
10  TJ-1318-DATABASE-KEY-20.
    10  TJ-1318-DATABASE-KEY-20.
        10  TJ-1318-DATABASE-KEY-20.
            15  FILLER                  PIC X(7).
            15  TJ-8343-FP-ACCT-TYPE    PIC X(1).
..          15  TJ-8348-FP-REC-TYPE     PIC 9(2).
    ..      15  TJ-VARIABLE-KEY.
            ...
```

Data Models
e.g.: class diagrams



Process Models
e.g.: sequence charts, activity diagrams, …



Business Rules
e.g.: "An order for more than $50 qualifies for free shipping"

Software Lifecycle Implications

This new flexible solution assembly approach will challenge current technologies and methodologies for discovering, reusing, developing, testing, deploying and managing applications

- The software industry will shift to development of components, changing the way we think about applications
- The discovery, understanding and reuse of components will leverage the increasing amount of standard-based business semantics and metadata

- Customization and integration of components will become key aspects of software development
- New tools and techniques will help enterprises transform legacy apps into reusable components
- Composition of dynamic, distributed, externally provided components will challenge software and application testing

- The need for assembling large number of service components and for integrating them with legacy systems will require a more flexible approach to software delivery and management, ranging from fully installed, to hybrid, to fully hosted models

Software Lifecycle Implications

This new flexible solution assembly approach will challenge current technologies and methodologies for discovering, reusing, developing, testing, deploying and managing applications

- The software industry will shift to development of components, changing the way we think about applications
- The discovery, understanding and reuse of components will leverage the increasing amount of standard-based business semantics and metadata

- Customization and integration of components will become key aspects of software development
- New tools and techniques will help enterprises transform legacy apps into reusable components
- Composition of dynamic, distributed, externally provided components will challenge software and application testing

- The need for assembling large number of service components and for integrating them with legacy systems will require a more flexible approach to software delivery and management, ranging from fully installed, to hybrid, to fully hosted models

- Software implementations of business processes will evolve from mostly static, hard-coded logic and rules to automatic, dynamic orchestration of process components driven by business policies and metrics

Responses and focus areas for IBM

Responses and Focus Areas for IBM

- **Development focus:**
  - Consumability
  - Componentisation
  - Community

Consumability

- **Customers demand high quality solutions**
- **The market demands low cycle times**
- **Software systems are becoming more and more complex.**
- **Costs are rising, and we are spending increasingly more ensuring quality**
- **We are focusing on new design approaches to facilitate consumability**

What do our Clients Say about Quality ?

Quotes from Corp WW MI Report on Software Measure Attribute

4 Feb 2005

"Quality of products has, by far, the greatest influence on Overall Sat…"

"Majority of IBM Software customers who are NOT completely satisfied recommend Improvements related to product – 34% cite quality."

"Quality of products is key competitive strength…"

69% of those not satisfied with quality cited integration, compatibility and usability

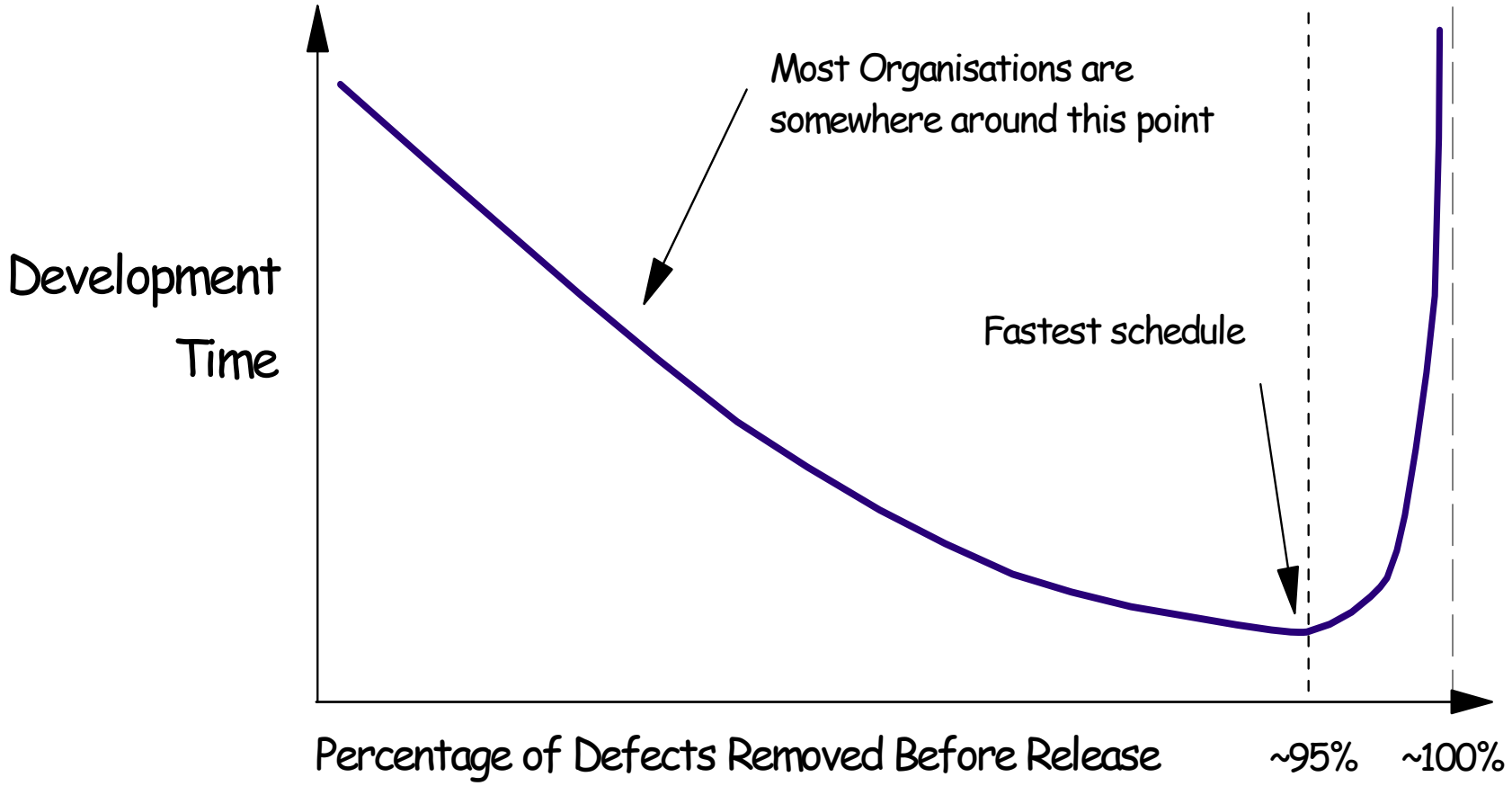
"Ease of use and ease of integration are competitive weaknesses… efforts to improve would be beneficial."

"Across all divisions, usability of s/w products is the top area for Improvement related to quality."

Per May IDC: For SMBs, product reliability & high quality are the TOP 2 factors in making I/T purchase decisions for technology and provider.

S/W Product QUALITY is the Greatest Satisfier & the Greatest Dissatisfier

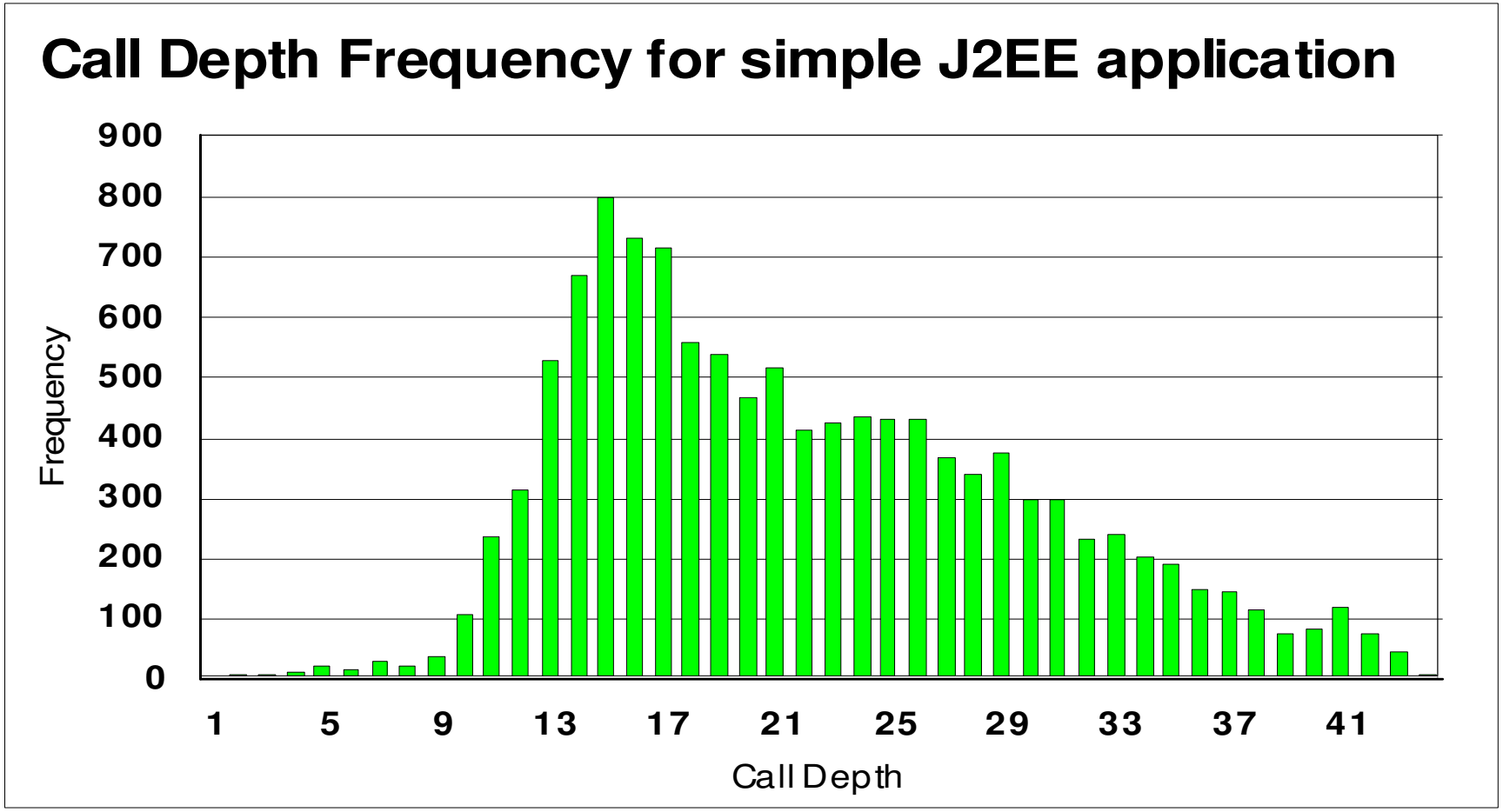
Software Quality at Top Speed



As a rule, the projects that achieve the lowest defect rates also achieve the shortest schedule

Steve McConnell - Software Development / August 1996 http://www.construx.com/stevemcc/articles/art04.htm

Complexity is increasing



Cost of Defects & Problem Reports

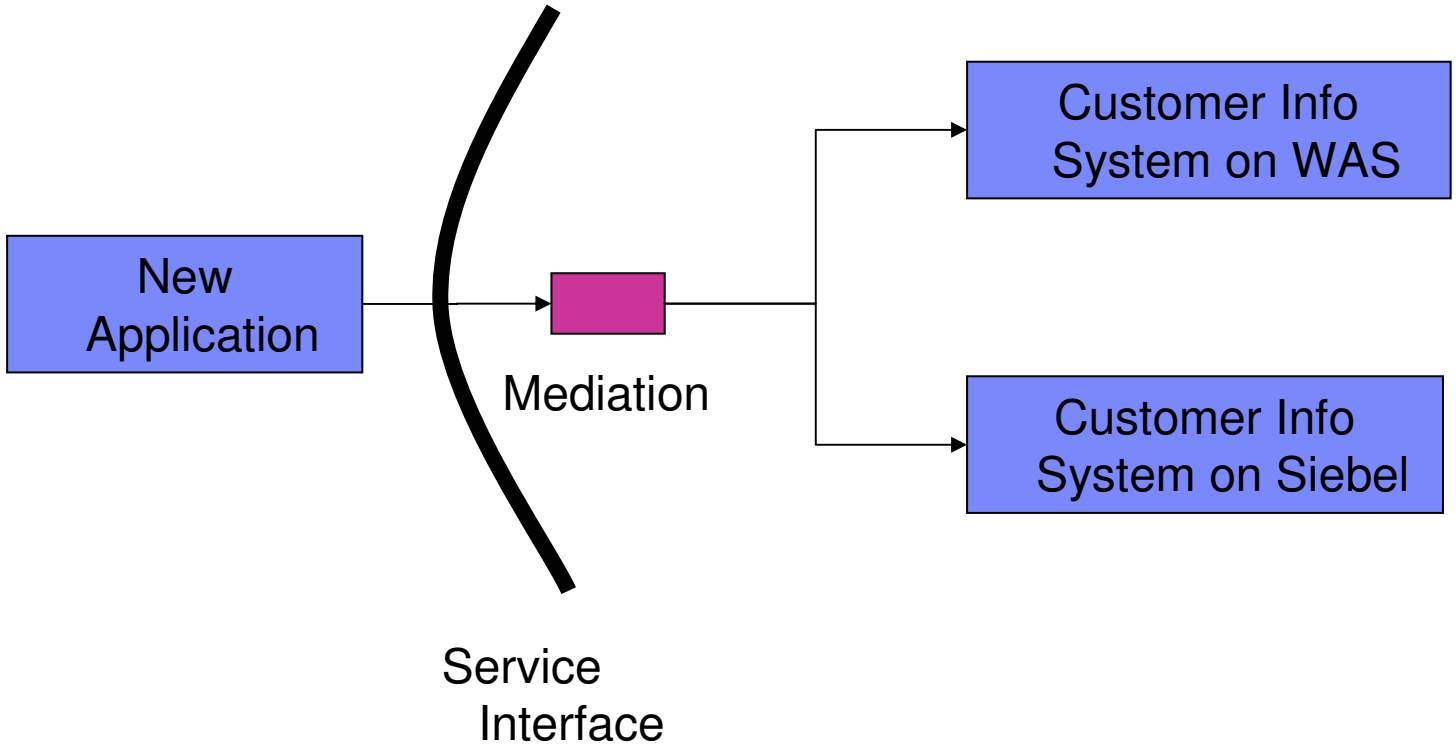
- **Intrinsic Defect Rate = 4.2 / Coder Hour - Watts Humphrey**
  - 20 per Day / 100 per Week / 400 per Month / 5000 Per Year
- **5000 Defect Project**
- **Consider the value of discovering 100 defects early**

	Coding	Unit Test	FV	ST	Field	
Cost Per Defect	$25	$100	$250	$1000	$16K	
Ratio	1x	4x	10x	40x	64x	
No	250	1000	1500	1750	500	
Percent	5%	20%	30%	35%	10%	
Total Cost	$6.25K	$100K	$375K	$1.75M	$8M	
Removal of 100 Defects Costs	$2.5K	$10K	$25K	$100K	$1.6M	

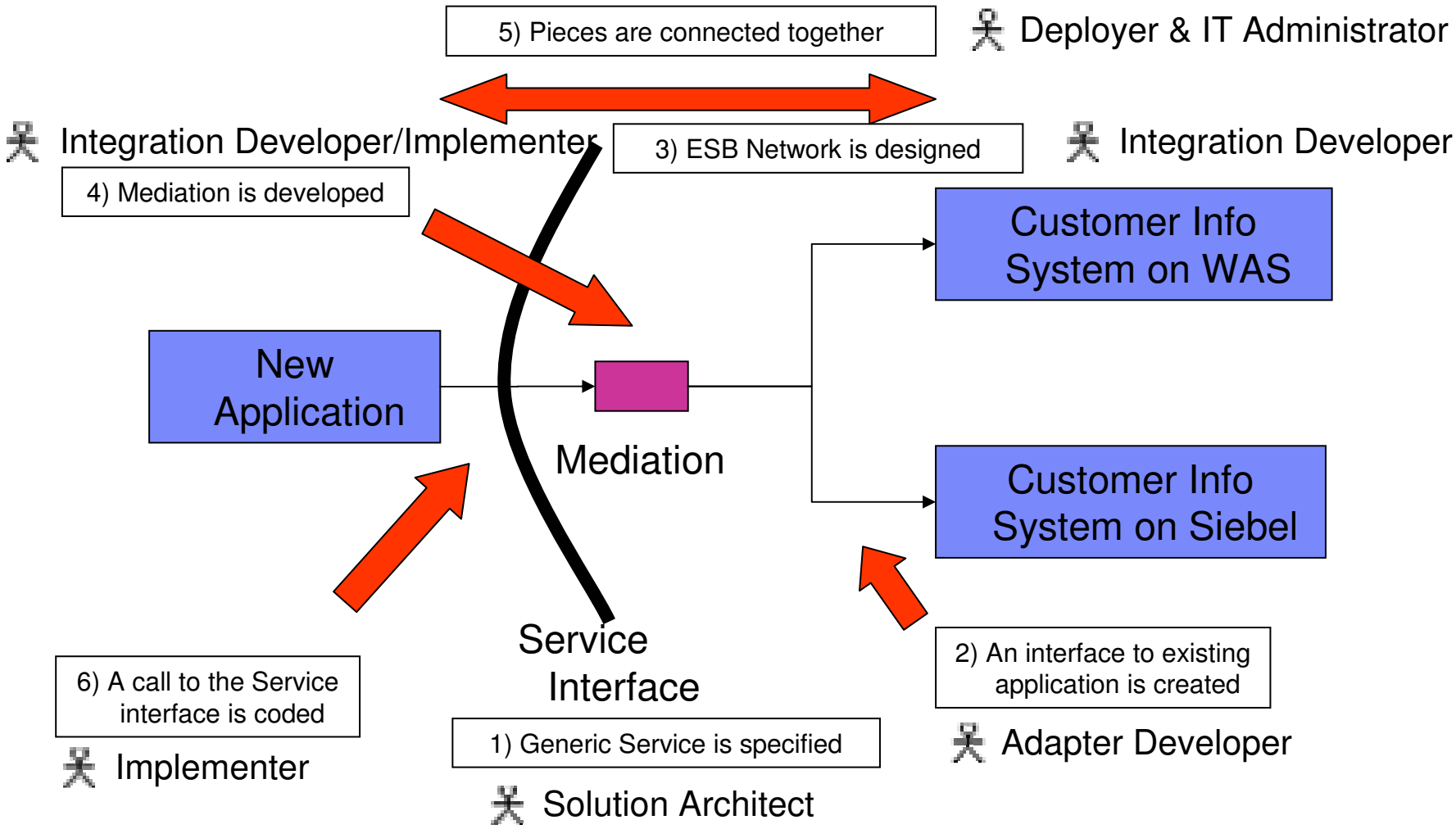
New Design Approaches to Improve Consumability

- **Outside-in design**
  - Scenario-based approach is used to better capture requirements, and to recognise the end-to-end role of middleware software.
    - Focus on Roles and Tasks
  - Scenarios and resulting designs – as UML models - are then validated with customers.

Enterprise Services Bus:
Basic Scenario – What the client is asking for ?



Enterprise Services Bus:
Basic Scenario – What needs to be done?



Componentisation

- **Horizontal integration is also important to IBM as a development organisation.**

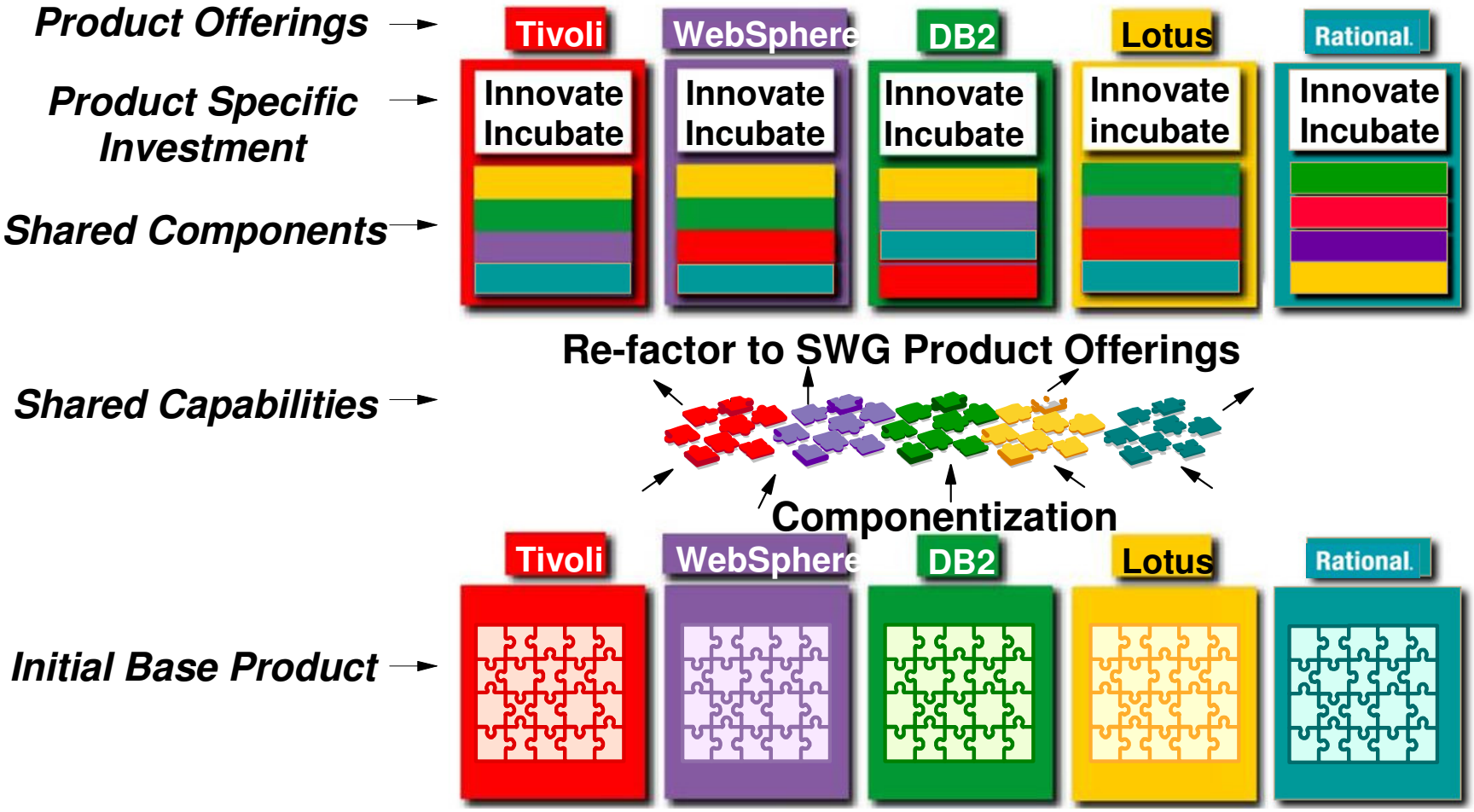
- **Compelling reasons:**

  - The opportunity to identify and create common components.
    - reduce cost, increase quality

  - The opportunity to increase reuse and reduce the amount of programming.
    - reduce defects, pmrs

  - The opportunity to leverage advances in open source.
    - reduct cost, focus on value add

Componentisation: Shared Capabilities of IBM Product Portfolio



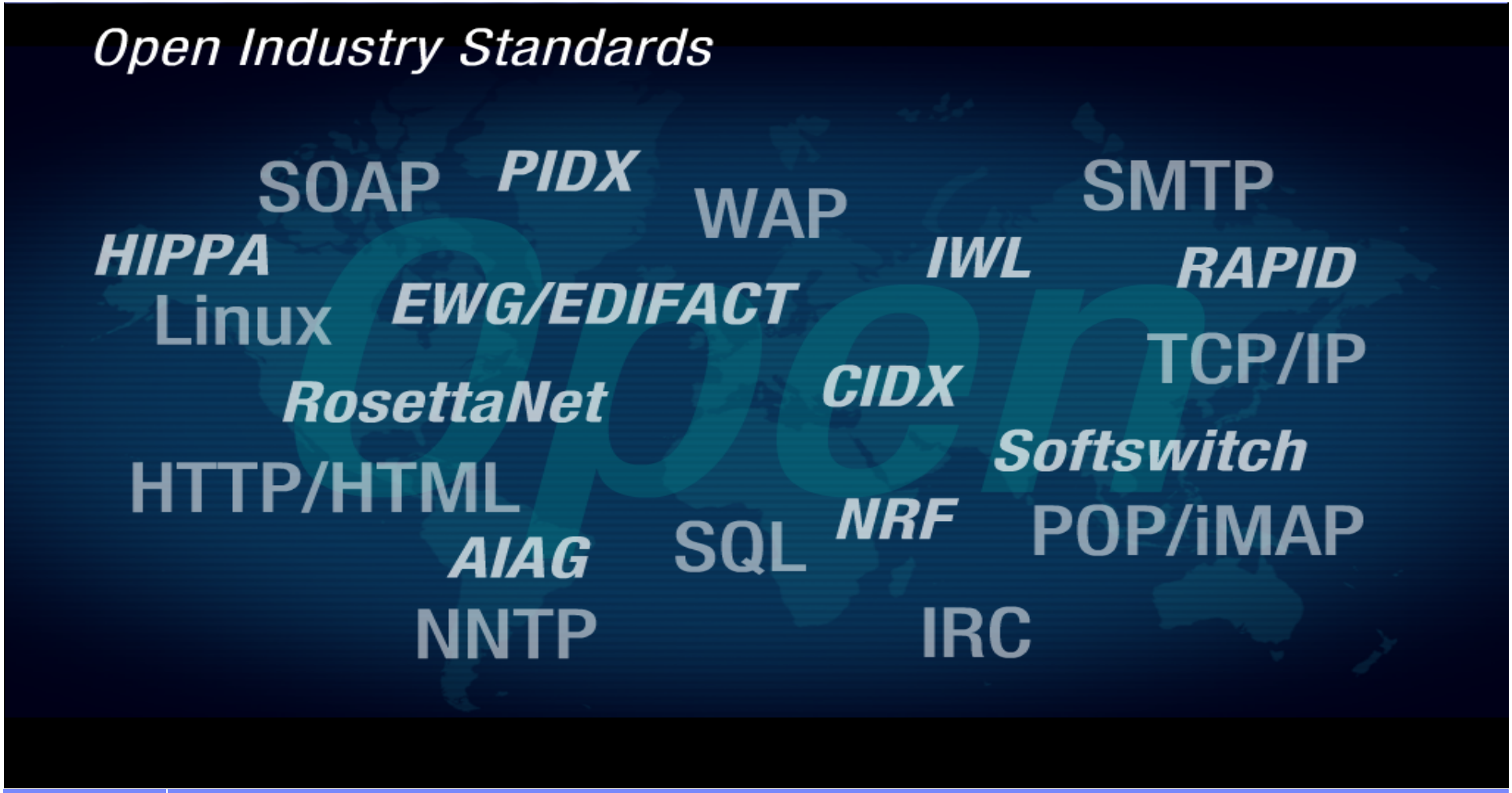
Community

- **To break down our own internal barriers, we have adopted an internal open source model to share software.**
- **The growth in standards is a key enabler for Integration (SOA).**
- **External open source is also changing the way that IBM delivers software and services.**

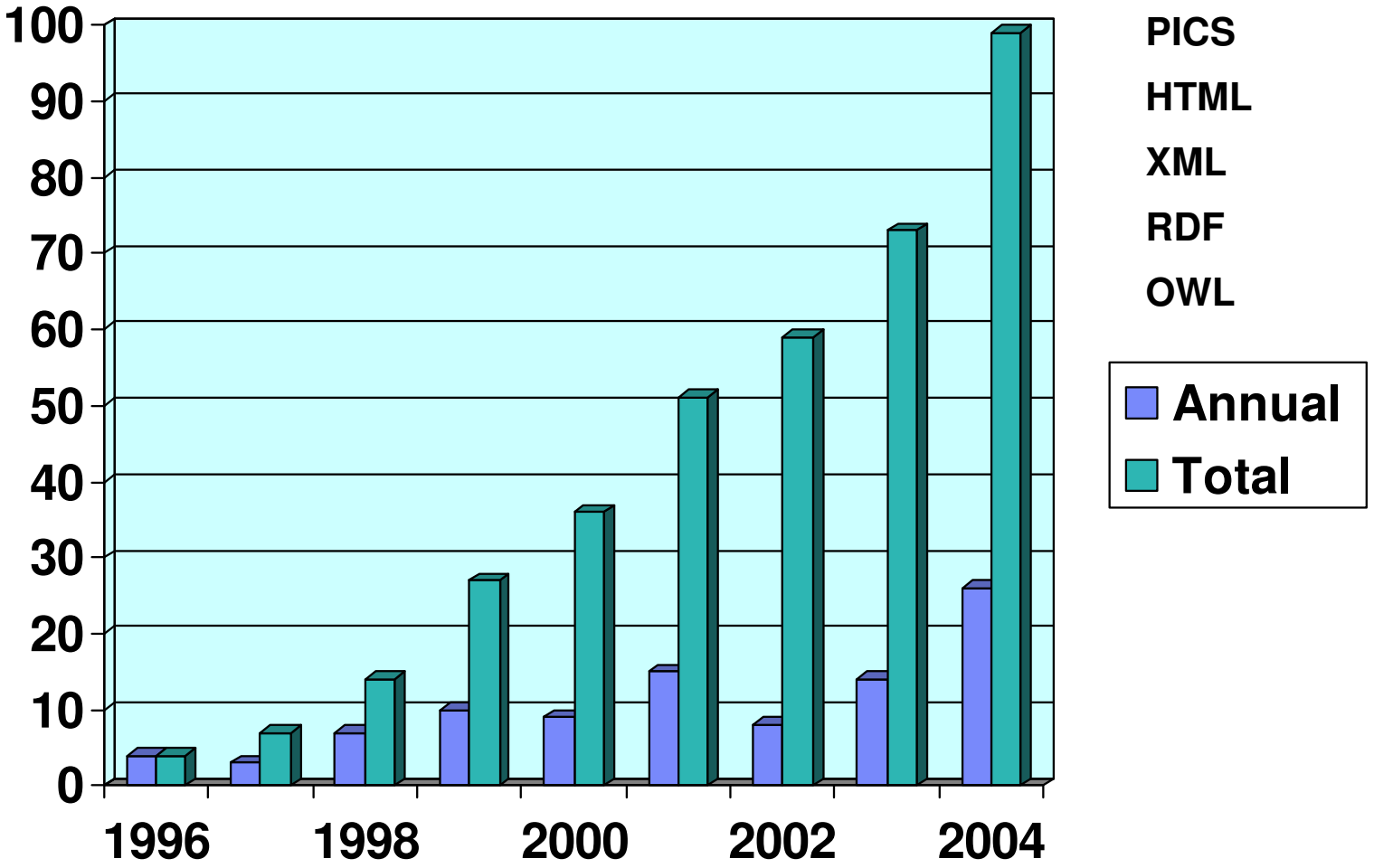
Internal open source model

- **Accelerates reuse through increased awareness, and access.**
- **Enhances quality through greater transparency and broader visibility**
- **Enthusiasm is high – but there are challenges:**
  - Provenance
  - Quality
  - Motivation

Growth in Standards



Standards Recommendations by W3C



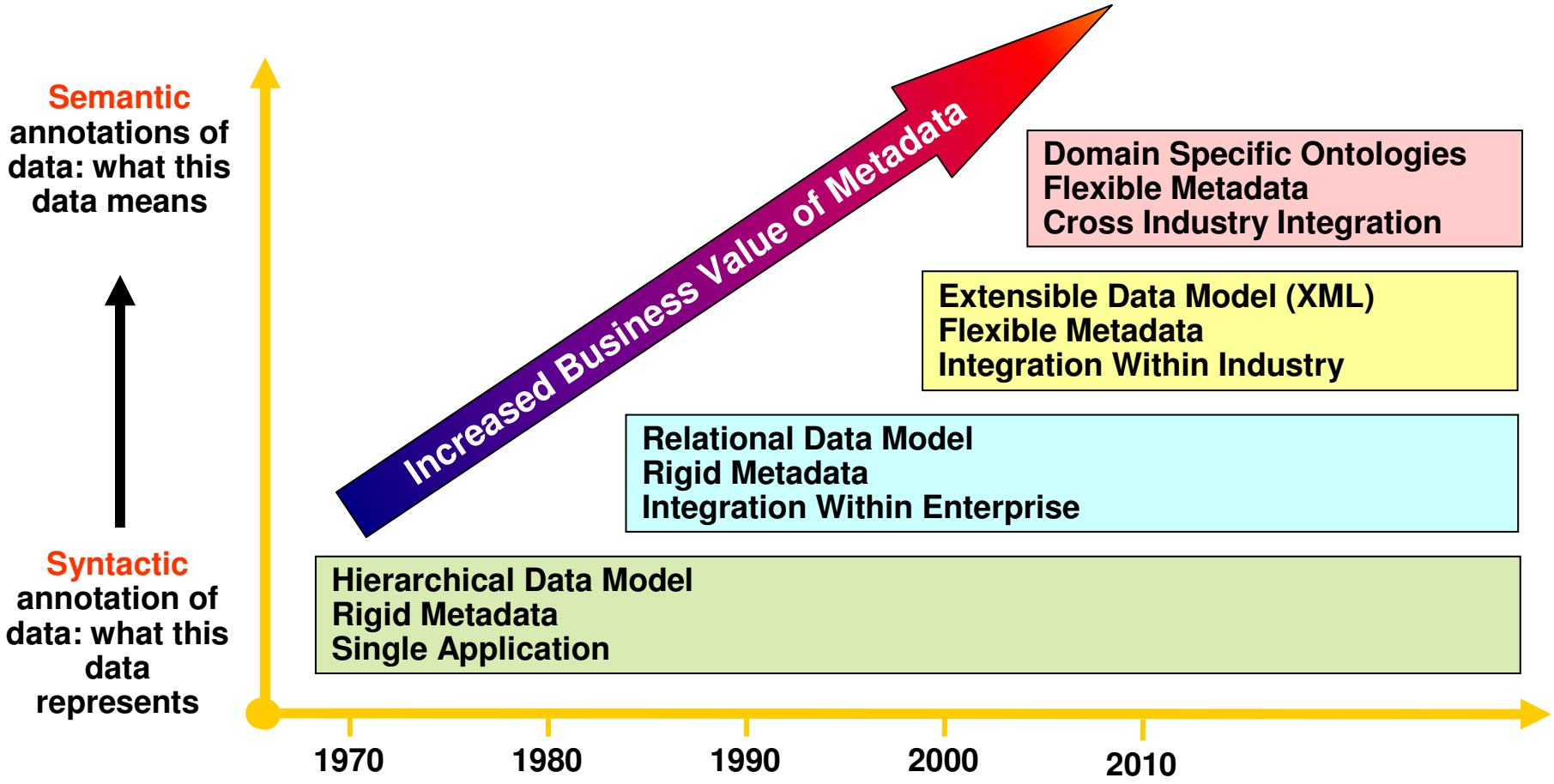
Implications of Standards

- **Heavy focus on compliance and compliance testing increases cost, and may actually detract from quality.**

- **But – standards are essential, and it is by no means the case that sufficient infrastructure is yet in place – e.g.,**
  - the up-stream part of the supply chain (materials, typically coming in from overseas).

- **Metadata is a key area of innovation opportunity.**

Historical Trends in Use of Metadata



Open Source is bringing many changes

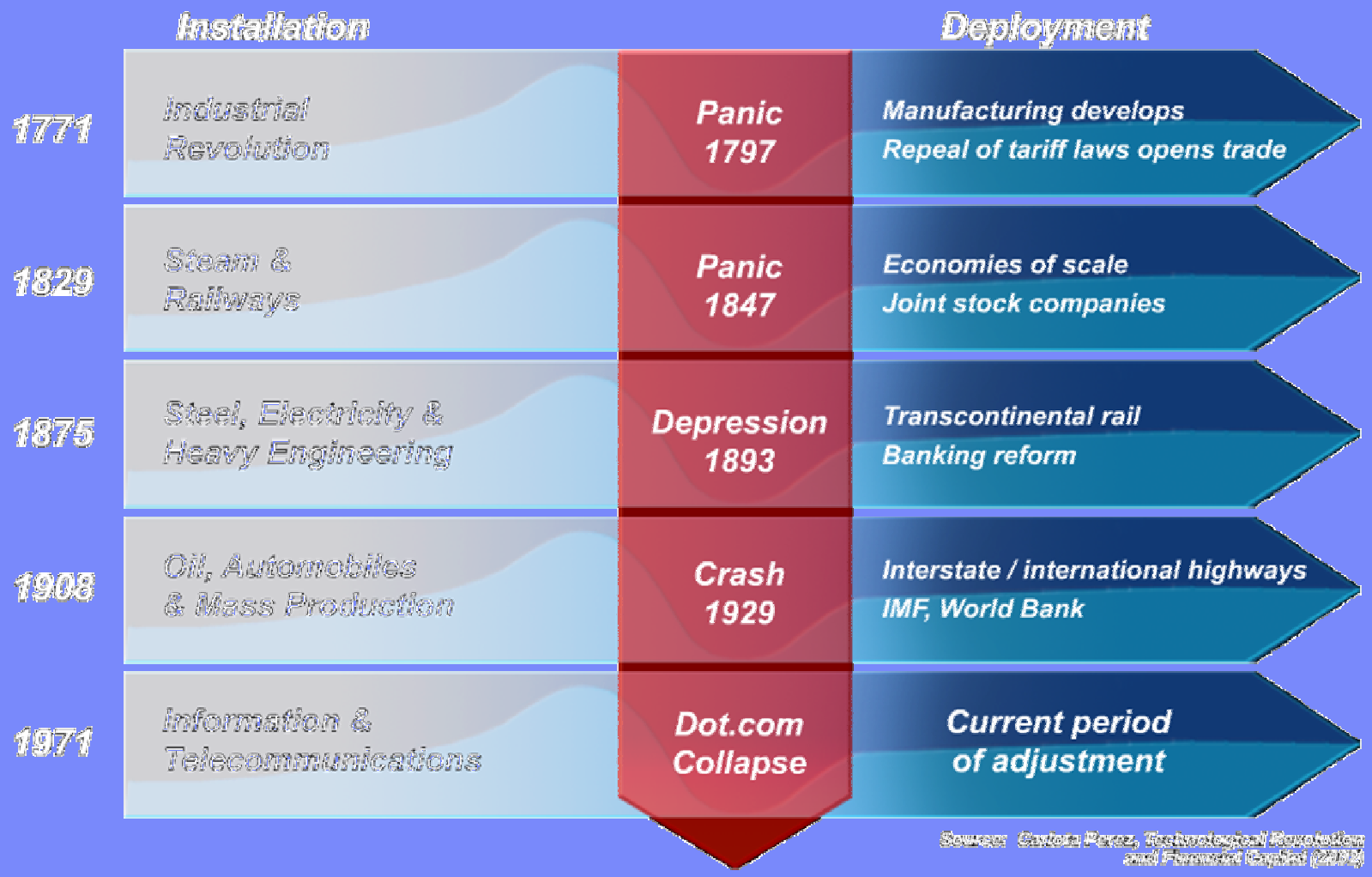
- **Software is no longer sourced from a single organisation (also a consequence of componentisation) and is not tightly integrated.**
  - Can we develop models of assurance that allow use without duplicating costs?
  - How do we deal with provenance?

Summary, and implications for Assurance

- **Product/feature cycle times are reducing significantly**
- **Cycle time reduction puts increasing pressure on testing.**
- **Growth in standards drives focus on compliance; may add confusion in marketplace; increases testing and quality requirements**
- **Products are becoming more complex, and costs associated with software are shifting**
- **Complexity drives costs in testing; and costs to delivering product service**
- **Componentisation creates new challenges for all parts of the development cycle.**
- **Increased use of open source software adds complexity to testing, to performance, to serviceability of software.**
- **Integration software is very dynamic, and is typically designed for late-binding and just-in-time decisions.**
- **Technological Innovation outpaces social consequences, which in turn must drive further technological development**

The Need for Innovation

Historic Junctures



Source: Carlota Perez, Technological Revolution and Financial Capital (2002)

Where do we go from here?

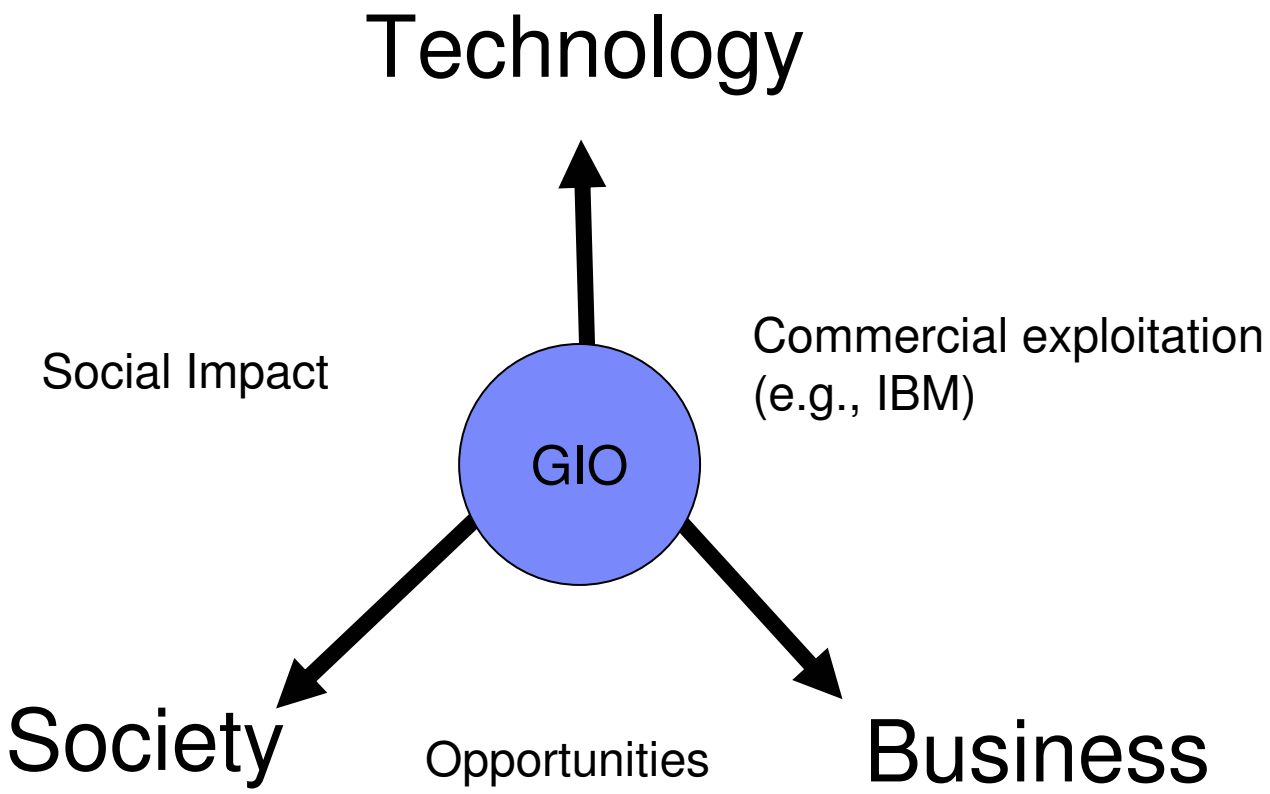
- **How do we deliver value on top of the current technology infrastructure?**
  - Services
  - End-to-end solutions, Integration
- **What is the next generation of technology infrastructure?**
- **We need innovation in both dimensions – exploiting the here and now, and laying down the next infrastructure for IT**

Innovation That Matters Is A Differentiator

- **Invention alone is not enough**
- **True innovation requires ideas and inventions in first-of-a-kind combinations**
- **Innovation is creation of new value**
  - Transforming knowledge and technologies to drive productivity and economic growth

The Bigger Picture: IBM Global Innovation Outlook (2004,2006)

- Uncover new opportunities and insights that will shape business and society



See: http://t1d.www-306.cacheibm.com/e-business/ondemand/us/pdf/IBM_GIO_2004.pdf

Consistent Themes Emerged From The GIO

- **The need for standard ways of exchanging information between members of each ecosystem (and across ecosystems)**
- **The need for more open collaboration between ecosystem members (including competitors)**
- **The primacy of the individual as a focal point for innovation**

The GIO and Assurance

- **A key theme in this year's discussion has been around security and privacy.**
  - New technologies are needed
  - New processes are needed
  - New sensitivities need to be addressed
- **The GIO reminds us that it's not just about technology and making money.**
  - Societal issues will drive new challenges.
  - And we must cope with the rapid pace of technology.

Closing Challenges

Some Closing Challenges

- **Improvements in test & quality may require innovation in *process* rather than technology.**
  - We have known about the benefit of early defect removal for ages – but we don't learn. Why?
- **Security and Privacy are profound issues. The broad population may not realise what it surrenders when it uses certain technologies. Much more work is needed in this area.**
- **Metadata is an exploding area. It has significant implications for integration. The infrastructure around metadata is not yet well established.**

Thank You