



IBM T J Watson Research Center

## Business Impact of Research on Policy for Distributed Systems and Networks

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# Team

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- **Participants (Tivoli)**

- David Kaminsky (Tivoli co-lead)
- Mike Baskey

- **Framing interviews**

- Bala Rajaraman
- Andrew Trossman
- Mark Linehan

- **Reviews**

- Mike Baskey
- Allen Gilbert
- Matthias Kaiserswerth
- Bala Rajaraman
- Ric Telford
- Alan Ganek

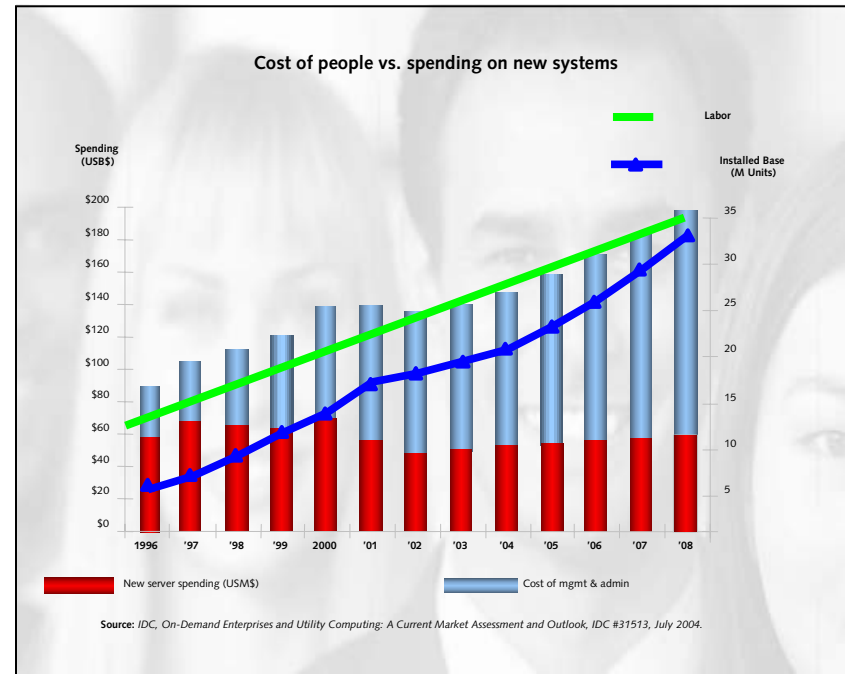
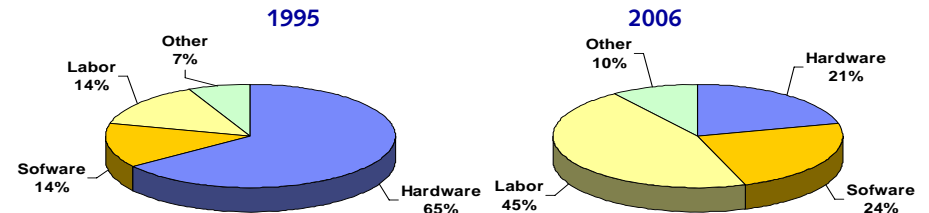
# Although policies can be used in many different contexts and layers, we focus on policies for systems management

	Focus	Metamodels	Policy Expression		
Layers of Policies	1. Strategy	<ul style="list-style-type: none"> <li>Regulations, Ethics, Standards, Best Practices, SLAs</li> </ul>	<ul style="list-style-type: none"> <li>SBVR?</li> </ul>	<ul style="list-style-type: none"> <li>Informal English</li> <li>"Structured English"?</li> </ul>	
	2. Business Des	<ul style="list-style-type: none"> <li>Business rules about "what"</li> <li>incl. IT policies / rules</li> </ul>	<ul style="list-style-type: none"> <li>SBVR metamodel</li> <li>predicate logic</li> </ul>	<ul style="list-style-type: none"> <li>"Structured English"</li> </ul>	
	3. Abstract Solution	<ul style="list-style-type: none"> <li>Rules about "how" – coupled to high-level implementation design</li> </ul>	<ul style="list-style-type: none"> <li>Object Constraint Language</li> <li>UML2 constraints</li> <li>predicate logic</li> </ul>	<ul style="list-style-type: none"> <li>UML diagrams w/OCL constraints</li> </ul>	IT Policies Lifecycle: Operation Application: SM
	4. Concrete Implementation	<ul style="list-style-type: none"> <li>Technology-specific langs. &amp; methods</li> <li>Implementation details</li> <li>Effectiveness dates</li> </ul>	<ul style="list-style-type: none"> <li>WID, Ilog, Blaze, ...</li> <li>XACML, P3P, Ponder, CIM-SPL</li> <li>DB constraints</li> </ul>	<ul style="list-style-type: none"> <li>appl. logic, process design, DB table, ...</li> <li>rule / policy languages</li> <li>human training material</li> </ul>	
	5. Deployment	<ul style="list-style-type: none"> <li>Configuration details</li> <li>Network addresses</li> </ul>	<ul style="list-style-type: none"> <li>configuration files</li> <li>firewall rules</li> <li>database table structures</li> </ul>	<ul style="list-style-type: none"> <li>specialized per domain</li> <li>custom file formats</li> <li>human organization</li> </ul>	
	6. Operations	<ul style="list-style-type: none"> <li>Monitoring, continuous assurance</li> <li>BPM</li> </ul>	<ul style="list-style-type: none"> <li>monitoring models</li> <li>BPM models</li> <li>monitoring policies</li> </ul>	<ul style="list-style-type: none"> <li>dashboards, graphs</li> <li>"Structured English"</li> </ul>	

# What is the business driver for policy based management

- **Labor costs dominate TCO for all segments of IT business.**
  - Labor costs have increased consistently since 2000.
  - The number of machines and complexity of management per administrator is increasing.
  - Labor growing linearly with number of servers.
  
- **Operator error is a leading cause of system problems & failures**
  - 60% of telco network failures are due to operator error (U.C. Berkeley)
  - 40% of unplanned enterprise downtime is due to operator error (Gartner)
  
- **Must simplify management of complex IT environment & reduce operator error**
  - We believe that the correct application of policy technologies can help address this problem.
  - Policy technologies can augment and improve other approaches like process management (ISM) and automation scripts.

The Changing Expense Profile



# Business Impact of Policy Research in IBM

- **1998:**
  - z/OS Policy Agents and NHD router Policy Agents
  - Inception of IETF/DMTF Policy related working groups.
- **1999:**
  - Policy Agents on p-Series, QoS Manager on i-Series.
  - AIM - Policy Director R3
- **2000:**
  - Tivoli Global Policy Manager with Tivoli SPBU unit.
  - Tivoli IP-seal prototype for IP-sec policy management.
- **2001**
  - WebSphere EdgeServer transactional QoS Management Tool.
  - z/OS intrusion detection system management tool.
  - IETF completes RFC 3060 on common information model for policies.
- **2002**
  - z/OS Quality of Service management tool.
  - OGSA Policy Service
  - DMTF PCIM/e Specifications
- **2003**
  - Autonomic Computing Policy Architecture
  - PMAC 1.1
  - WSLA
  - Policy Toolkit
- **2004**
  - Network Resource Manager
  - PMAC 1.2
- **2005**
  - SAN Auditor Prototype
- **2006**
  - DMTF CIM-SPL
  - TPC SAN Policy Auditor
- **2007**
  - Policy based Security for Wireless Networks
  - Privacy Policy Management OCR
  - Policy analysis for network management policies
  - CIM-SPL provider for OpenPegasus

Standards Activity  
 IBM Products/External Downloads  
 IBM Internal Products/Components  
 Research Prototypes

*Caveat: The list may not include all possible activities*

## Lessons learnt from these attempts

- **Many policy languages are here to stay**
  - Too much diversity in requirements and developer space to define a unified language
  - Adoption of policy language has to be along a evolutionary path with significant value from independent and existing languages
  
- **Ease of integration and consumption for developers is critical for adoption**
  - In current environments, internal components may be more consumable than external ones
  
- **A focus should be placed on solving specific problems, not on the technology itself**
  - Policy activities applied to specific domains to solve specific problems have been successful
    - Network System Policy Agent, TPC Configuration Auditor, ISM Role based Access Control
  - Successful adoption requires deviation from architectural principles
  
- **Standards need to address a known problem and require sustained enablement effort**
  - Failed efforts that addressed an expected problem that didn't materialize
  - Policy standards need to identify the problem being addressed and work towards that goal

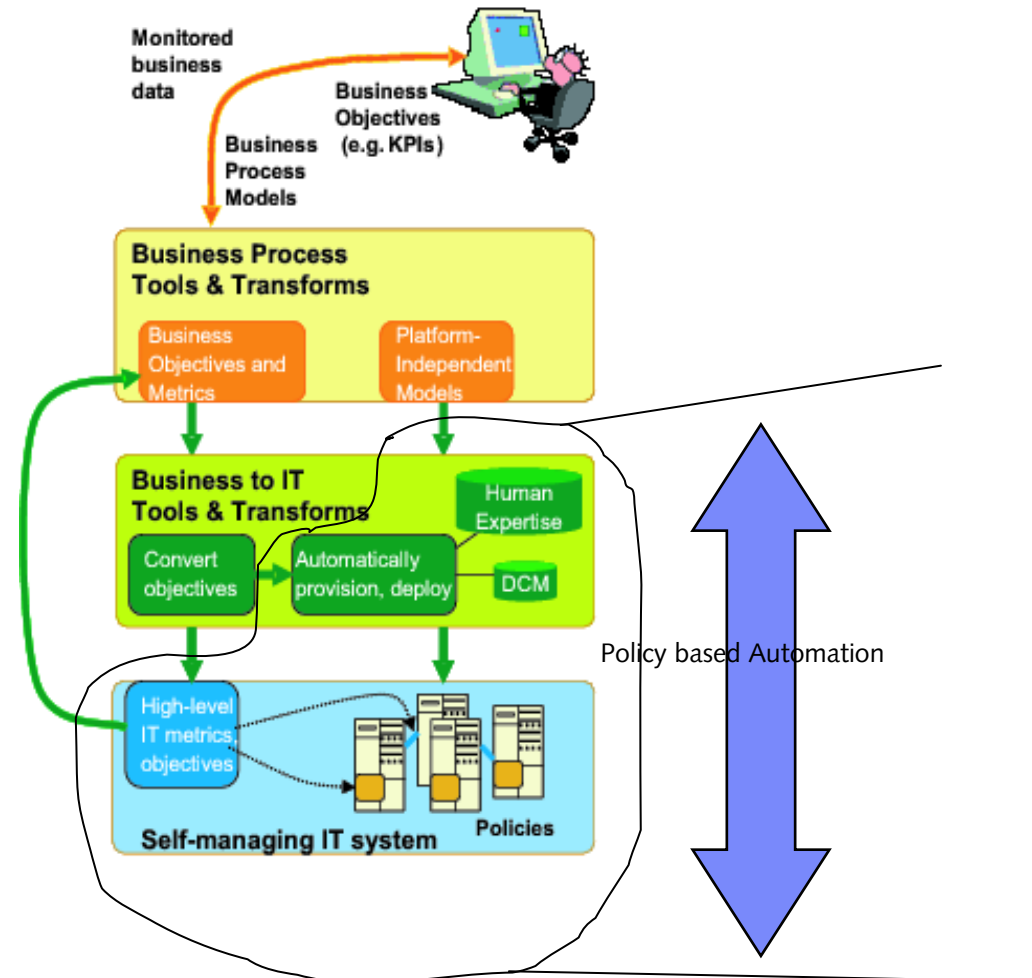
# Future: Policy based automation

- **Grand Challenge: End to end automation of configuration chores using policy based management**

  - IT systems managed according to business objectives?
  
- **Use policy based management to automate management across multiple silos and business processes.**

  - Interoperate across multiple silos of management.
  
- **Functional enhancement needed**

  - Policies for interoperation across silos
  - Support for policy based configuration infrastructure
  - Support for policy based monitoring infrastructure



# Policy-based automation

High-level IT objectives, metrics

Server Policy

Network Policy

DB Policy

Server experts

Network experts and tools

Application Experts

Database experts and tools

Mainframe experts

Workstation experts

Availability Objectives

Availability Management

Security Objectives

Security Management

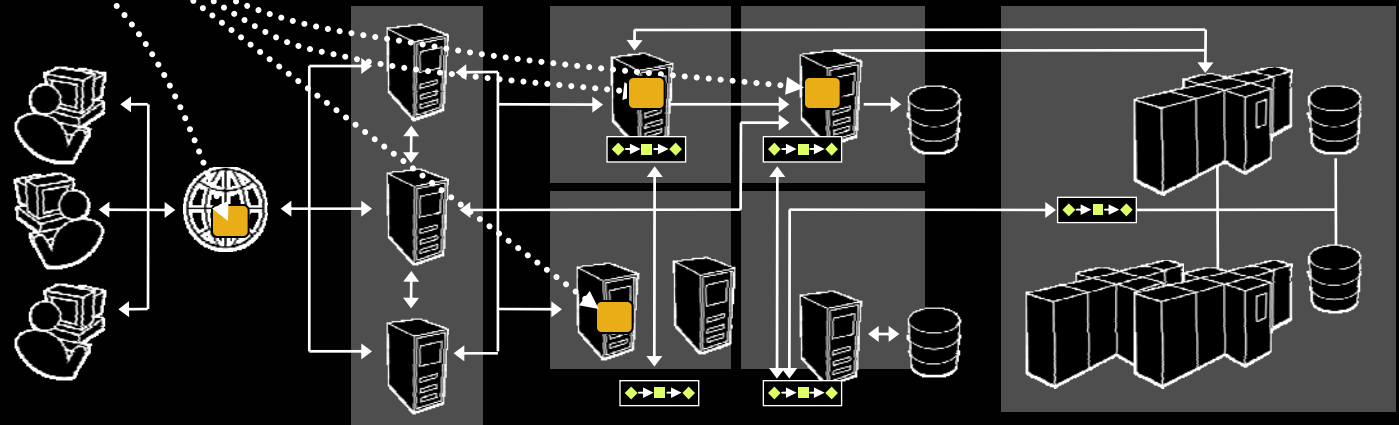
Performance Objectives

Service Level Management

Change Objectives

Change Management

Information Lifecycle Mgmt.



- **within each silo, we have made progress**
  - management discipline
  - Orchestrating between management disciplines
- **Then, for end-to-end simplification of IT processes**
  - Linking policy-based management between silos to greatly reduce manual processes



# Research scope

