



Building the Enterprise of the Future Through Virtualization

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Internet Business Solutions Group (IBSG)

January 2005

Market trends: Tech Providers shifting focus from cost reduction to growth and productivity

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- Recession is over
- Growth is slowly coming back
- Short-term outlook is soft

Recession over

- Tech Sales up in 2003 after 3 yrs. 2004 IT spending growing 5% overall. 6% by 2005.
- CIOs in India (86%) and China (75%) most optimistic, say their companies plan to increase spending (a third project increases of 26% or more)

Slow Growth

- Many CIOs still cautious – only 57% in North America and 34% in Europe say will increase spending
- Small business (>10%) spending outpacing more cautious large enterprises (3%)

Soft Short-term

- Some tech executives cite growth outlook weakening from a strong FY04
- Semiconductor firm growth softened during summer CY04; Jul-Sep chip factory utilization at 92.7%, from Apr-Jun was 95.4%, first decline in 2 years

Soft short-term outlook globally effecting Korean market trends

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- 2004 a growth year overall - 1st half GDP growth 5.4%
- Slowdown emerging - Q3, 2004 GDP increased 4.6 %, down from previous quarter's 5.5%
- Slowdown projected to continue - Korean economy forecasted to grow only 3.8 % in 2005

Domestic consumption weakening due to worsening employment and wage growth

Exports may lose vigor from softer markets in U.S. and China, rapid price commoditization and appreciation of Korean Won



Korean companies need to rejuvenate (again) to continue innovation and cost leadership and reignite growth in a soft global environment

Current Top of Mind Issues for Technology Provider Executives

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This Session is Related to Current Business Challenges and Extended from the Last Summit

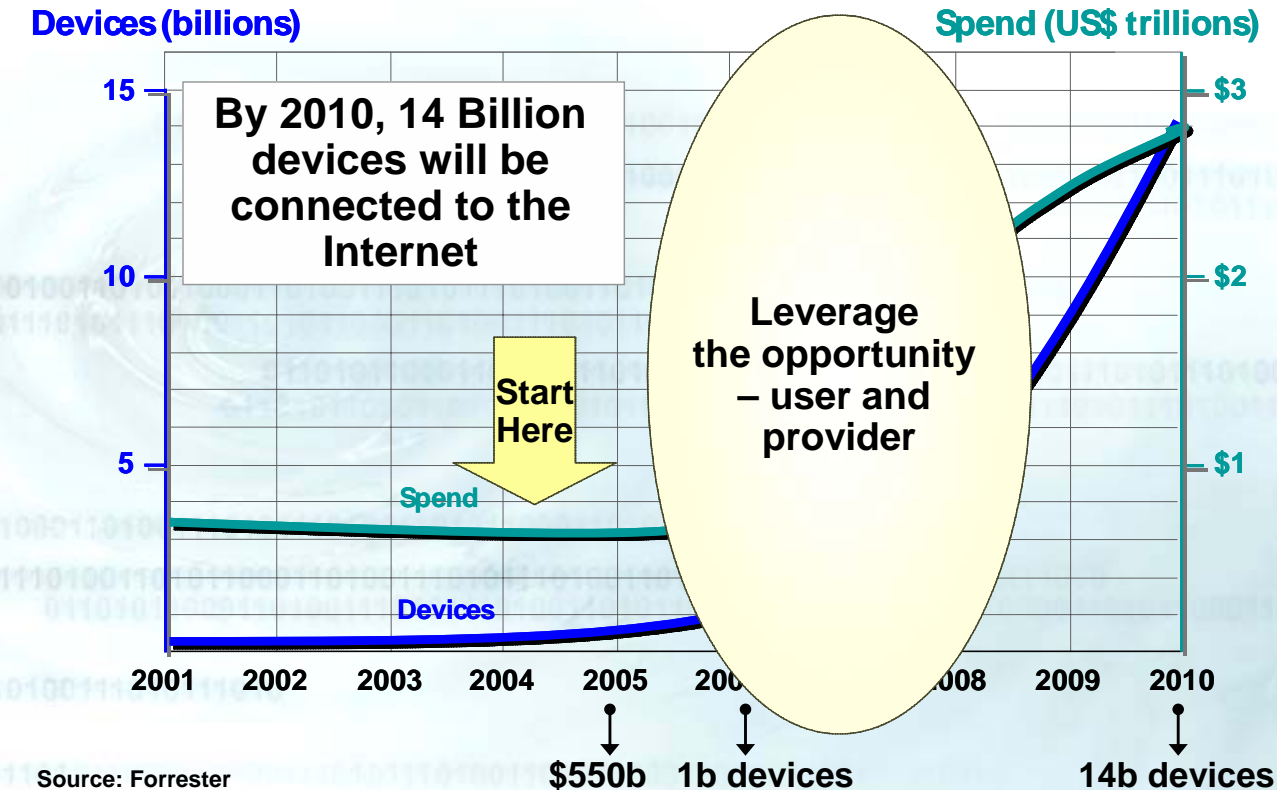
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The focus of today's discussion is virtualization enabled by the use of key technologies

- **Extended internet is here to stay driven by key emerging technologies**
- **Enterprises are using these technologies to drive virtualization across the value chain**
 - **Sell/Support → Customer Interaction Network**
 - **Manufacturing → Auto Test**
 - **Design → Design Collab, Net Workspace**
- **Security as an enabler**

As a reminder, there are four solutions driving the extended internet with visible results

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- HP using **RFID** to drive inventory accuracy and more efficient shelf pick and pallet build (from 90 to 11 seconds)
- High end global medical equipment manufacturers using **remote monitoring** to reduce MTTR by 80%
- IBM implementing end-to-end **IPC** to reduce IT costs (e.g., conference calling by 50%) and drive employee productivity via collaboration

Intelligent Remote Monitoring

Industrial Ethernet

RFID

IP Communications

Extended internet technologies are enabling the next wave of virtualization beyond manufacturing

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Virtualization moving
from manufacturing
into design and
service

Dell opens another support
call center in India.....

NEC opens design center
for 3G handsets in China ...

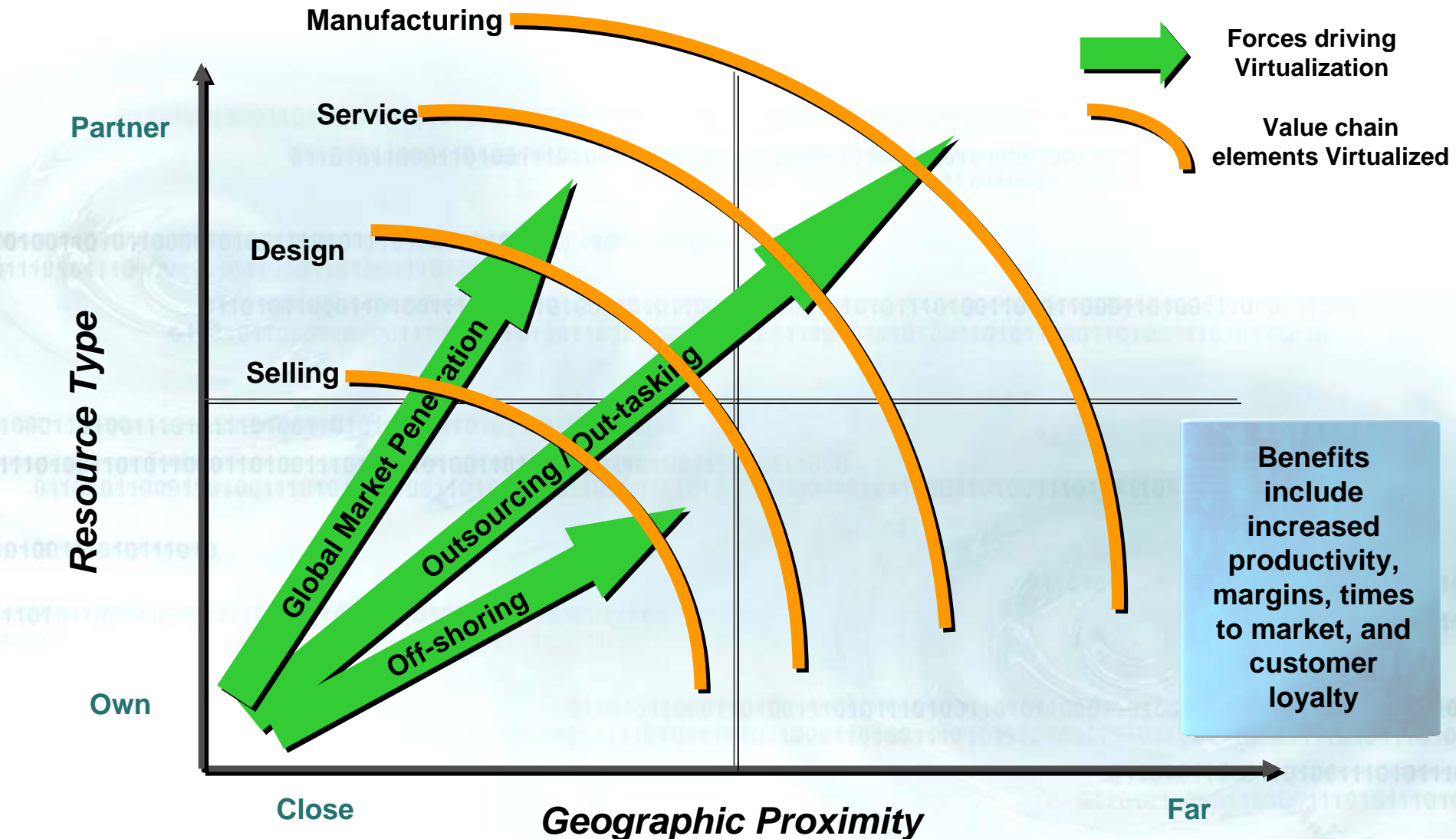
Samsung expanding U.S.
plant for nano-scale
semiconductor memory

Hynix Semiconductor
outsources semiconductor
test and packaging to U.S.
company

What is Virtualization?

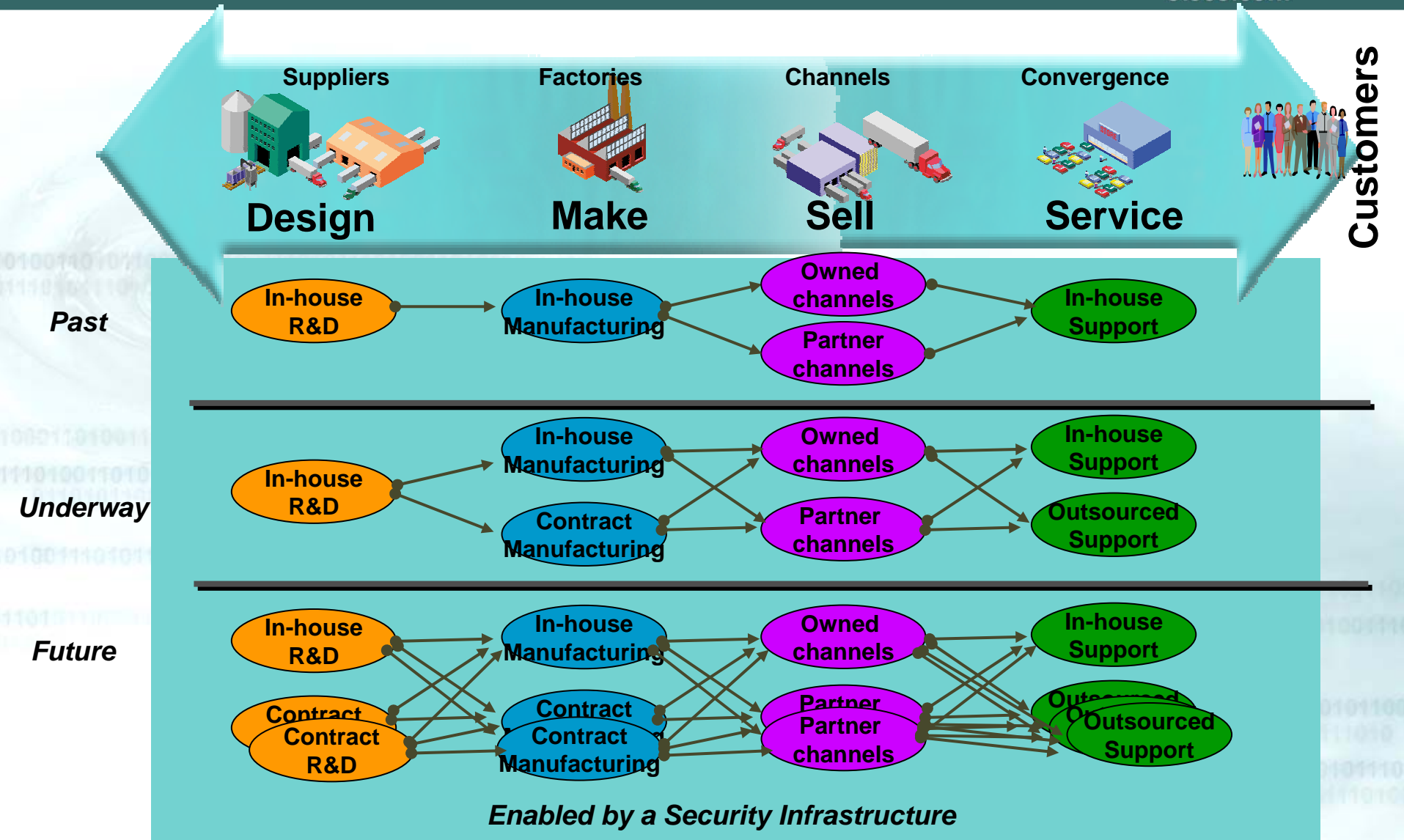
Virtualization is the optimal usage of resources across companies and geographies

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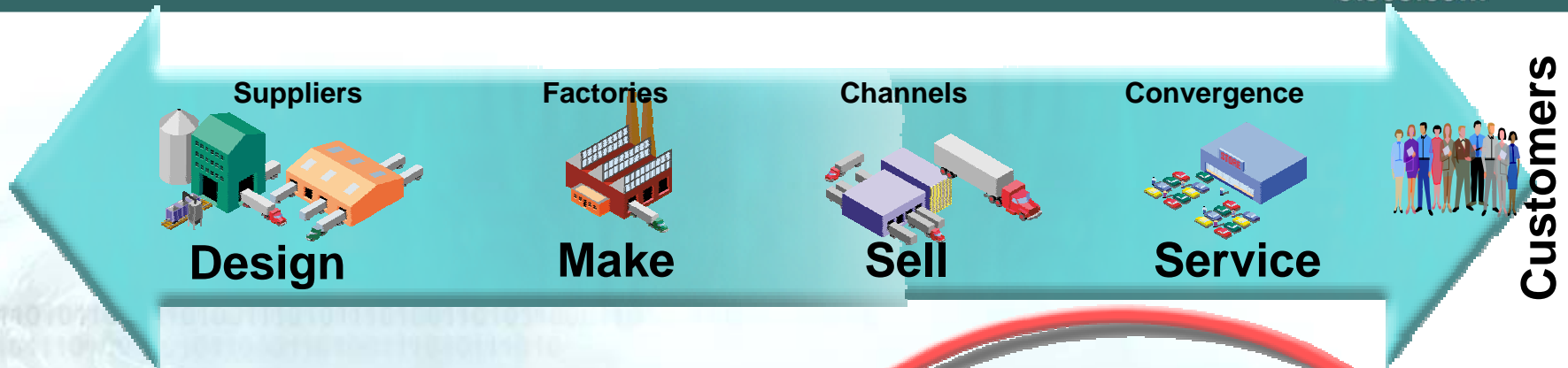
Virtualization: Complexity increases exponentially with proliferation across the entire value chain

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Leaders use the extended internet to accelerate and manage virtualization through the value chain

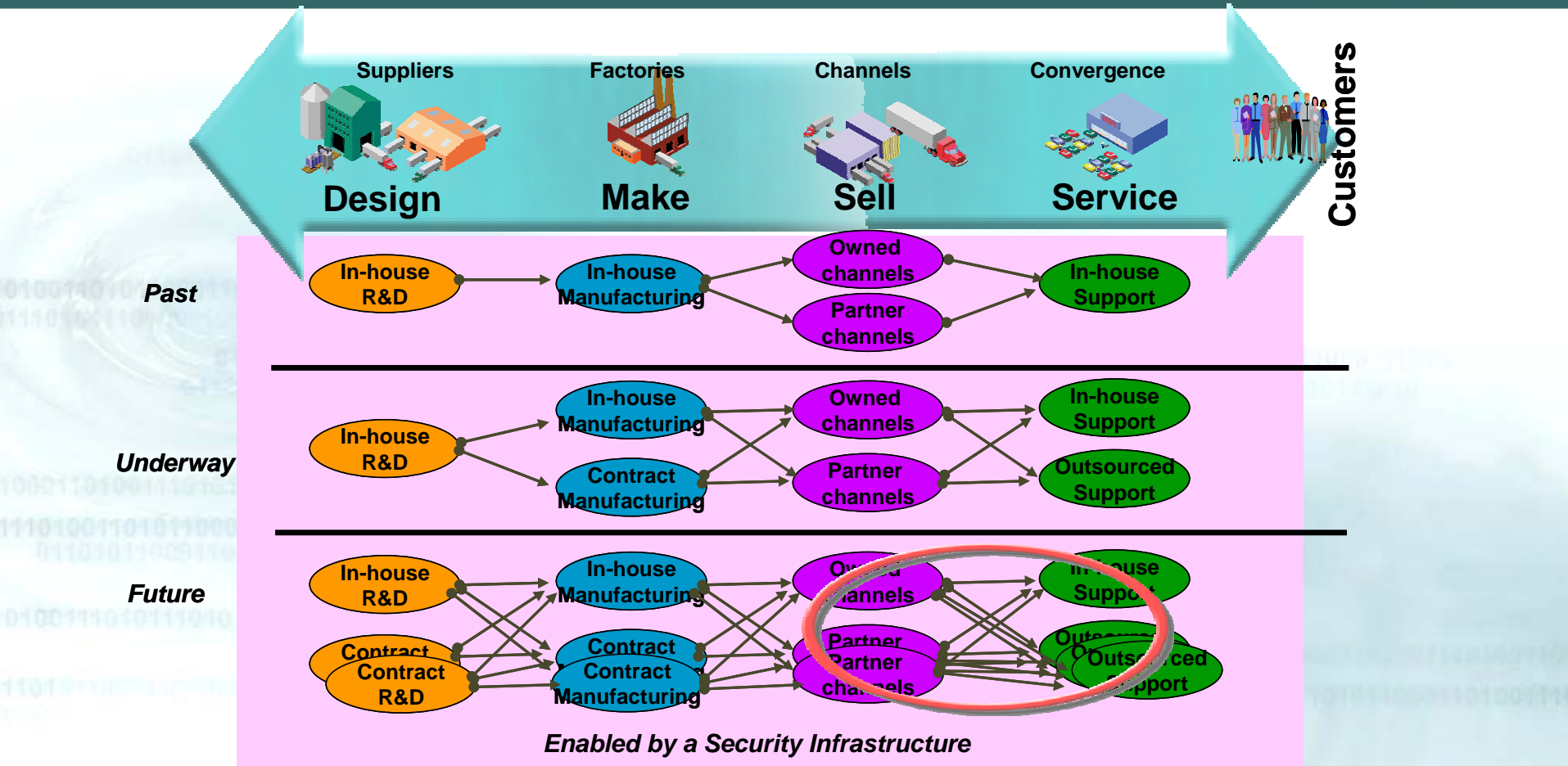
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- **Real-time design collaboration** between partners provides speed to market as a competitive advantage
- **Auto-test Supply chain optimization**
- **CIN (Customer Interaction Network) driven Customer Care** optimizing service delivery – between web and personnel
- **Net Workspace** delivers a new infrastructure that facilitates interaction for creative functions – R&D

Global high-tech companies focusing on customer communications to increase revenue and margins

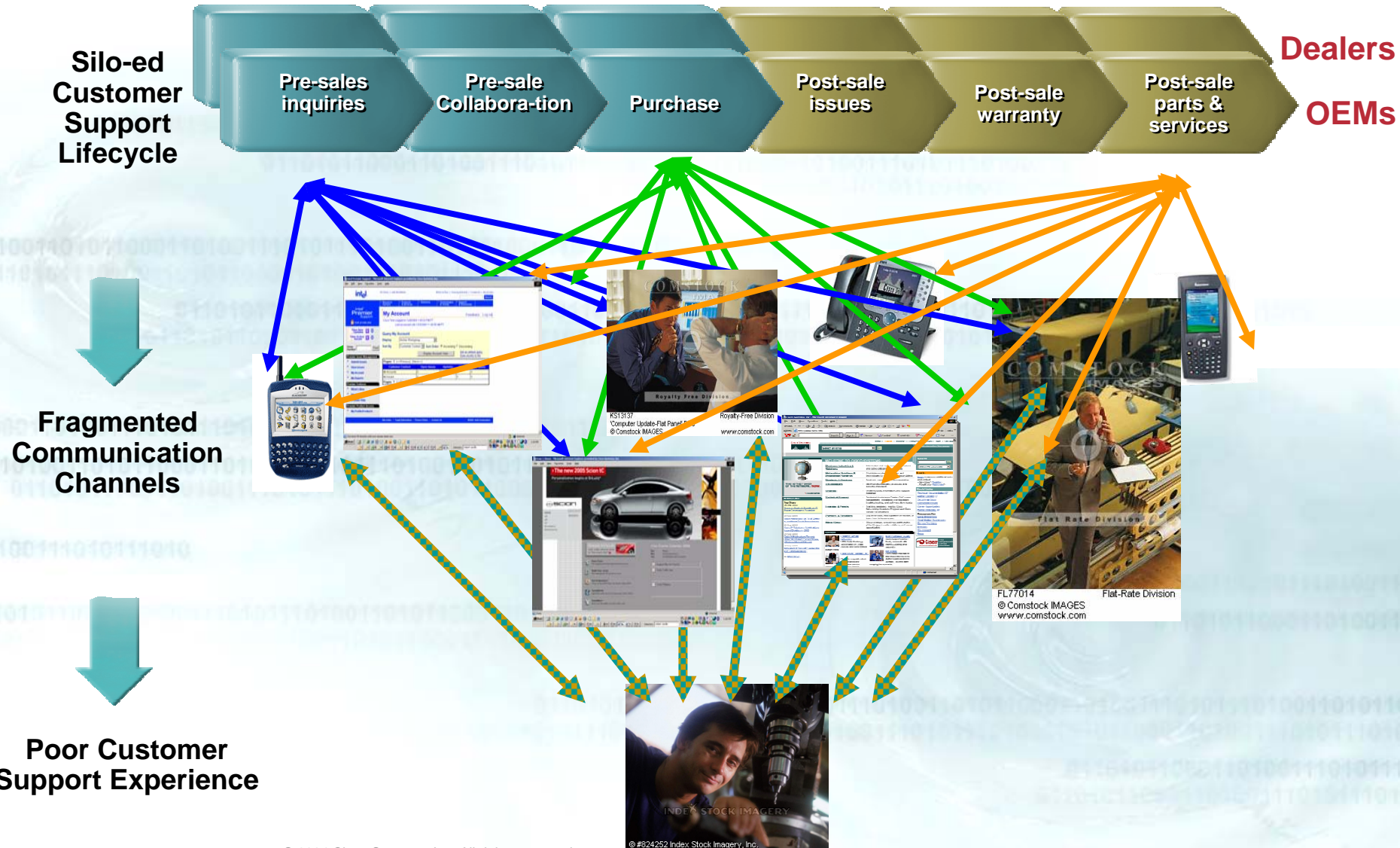
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This is potentially the largest opportunity area
for Korean enterprises

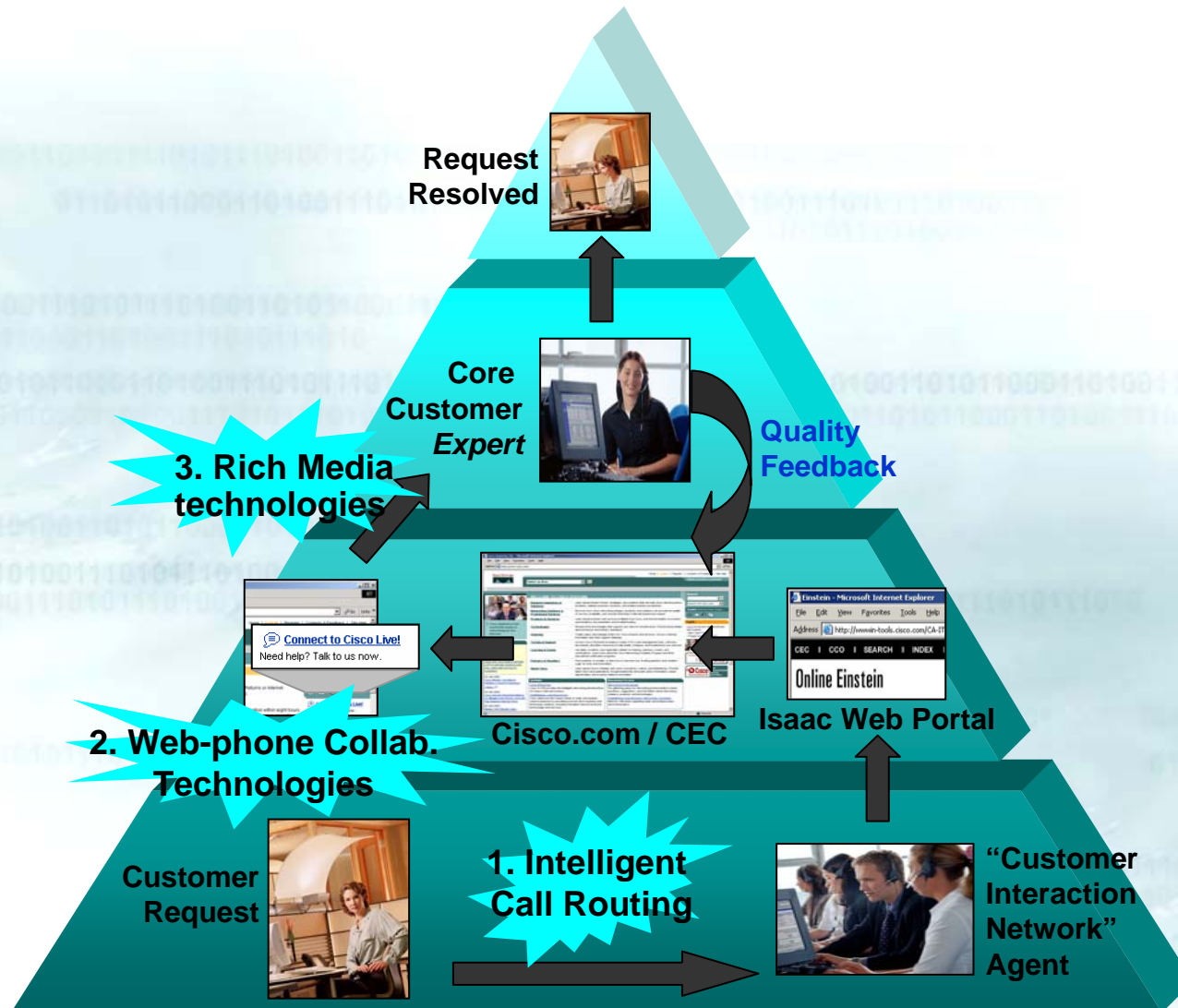
CIN helps address today's customer communication challenge – multiple and siloed

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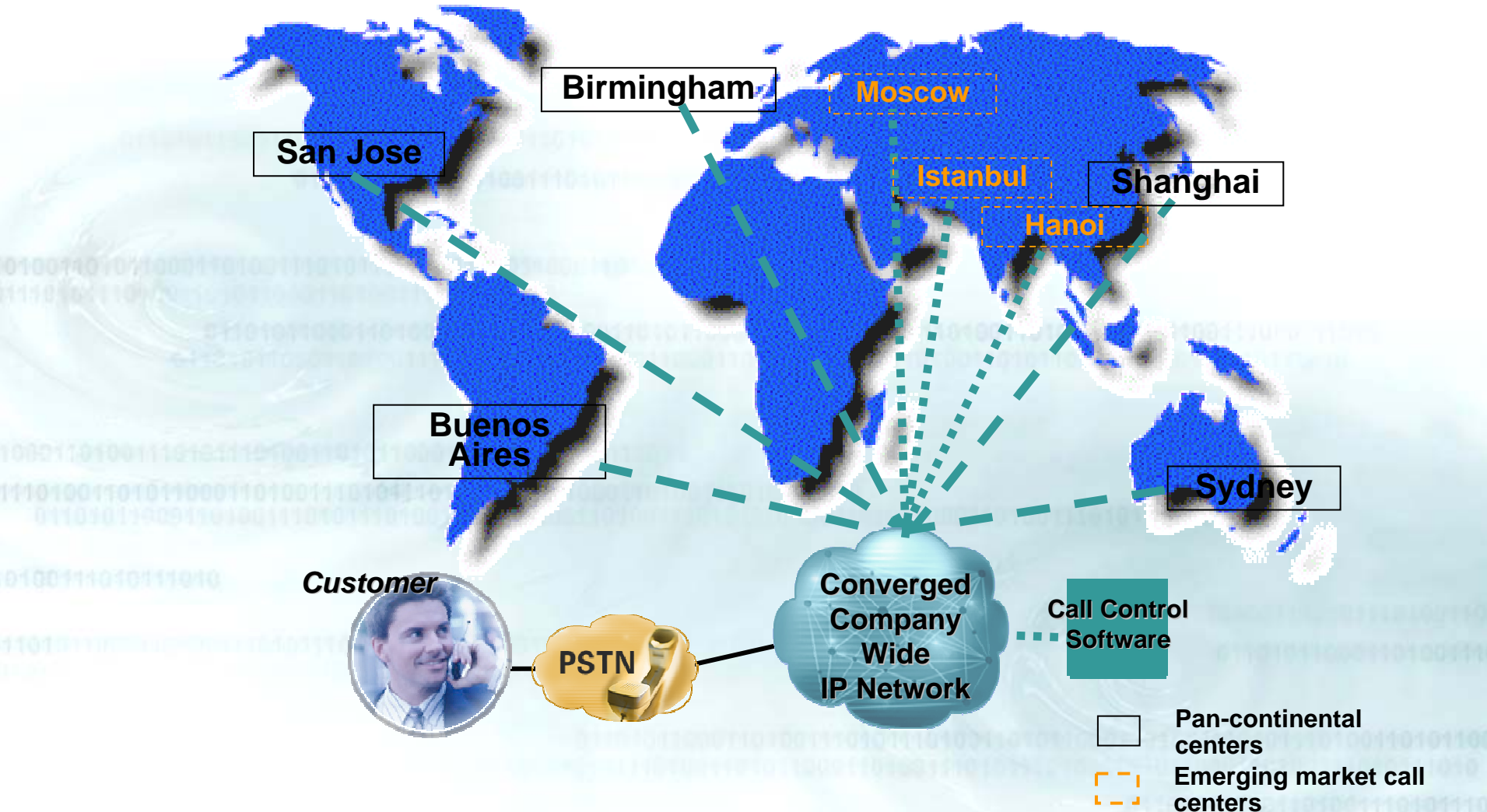
CIN (Customer Interaction Network) is enabled by the key IPC components

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Intelligent call routing enables contact center virtualization

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Note: Using a converged call center structure can yield 15% cost savings

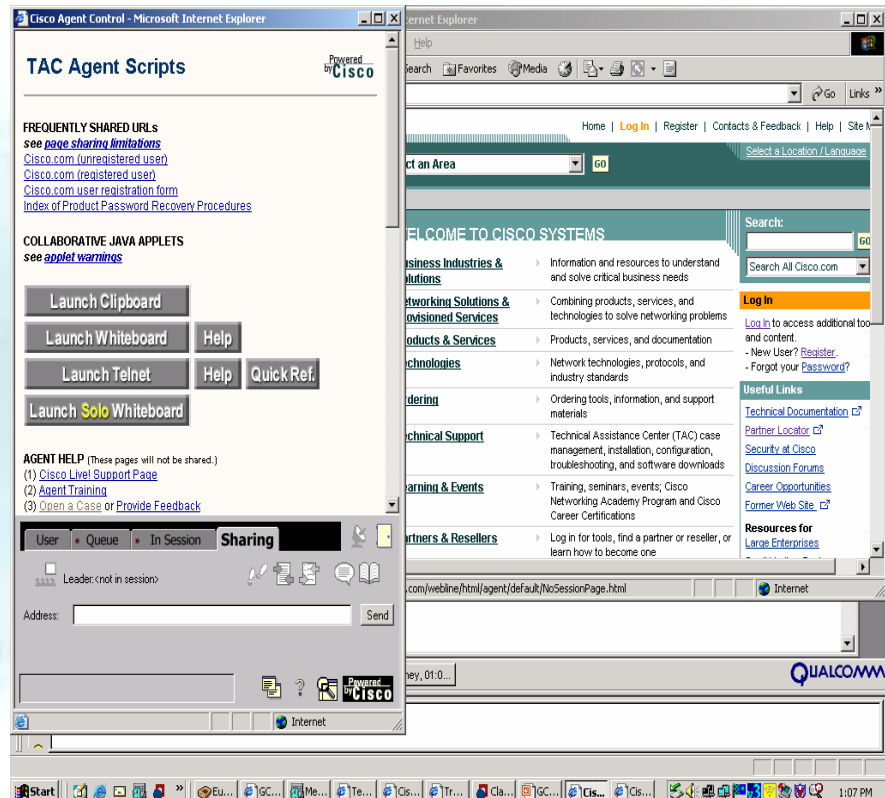
*Simplified diagram

Web/phone collab technologies drive customer satisfaction independent of call center locations

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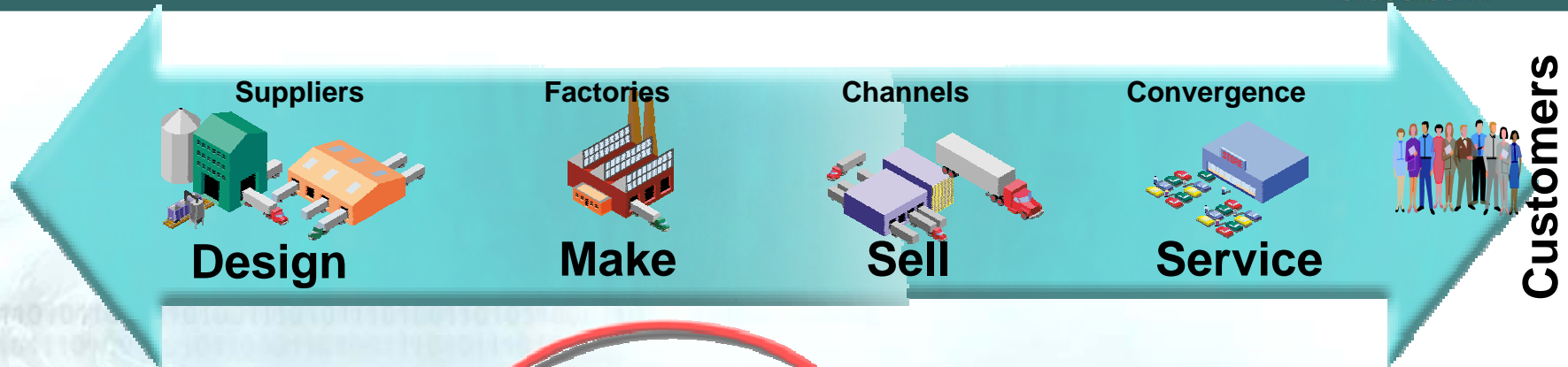
A very positive experience at Cisco

- Improved customer sat scores
 - 4.63 cases without Cisco Live
 - 4.76 cases with Cisco Live
- Increased time savings for the customer
 - Reduced average talk time by 32% (1 minute) with frontline Global Contact Center
- Decreased average hold time



Leaders using the extended internet to accelerate and manage virtualization in the supply chain

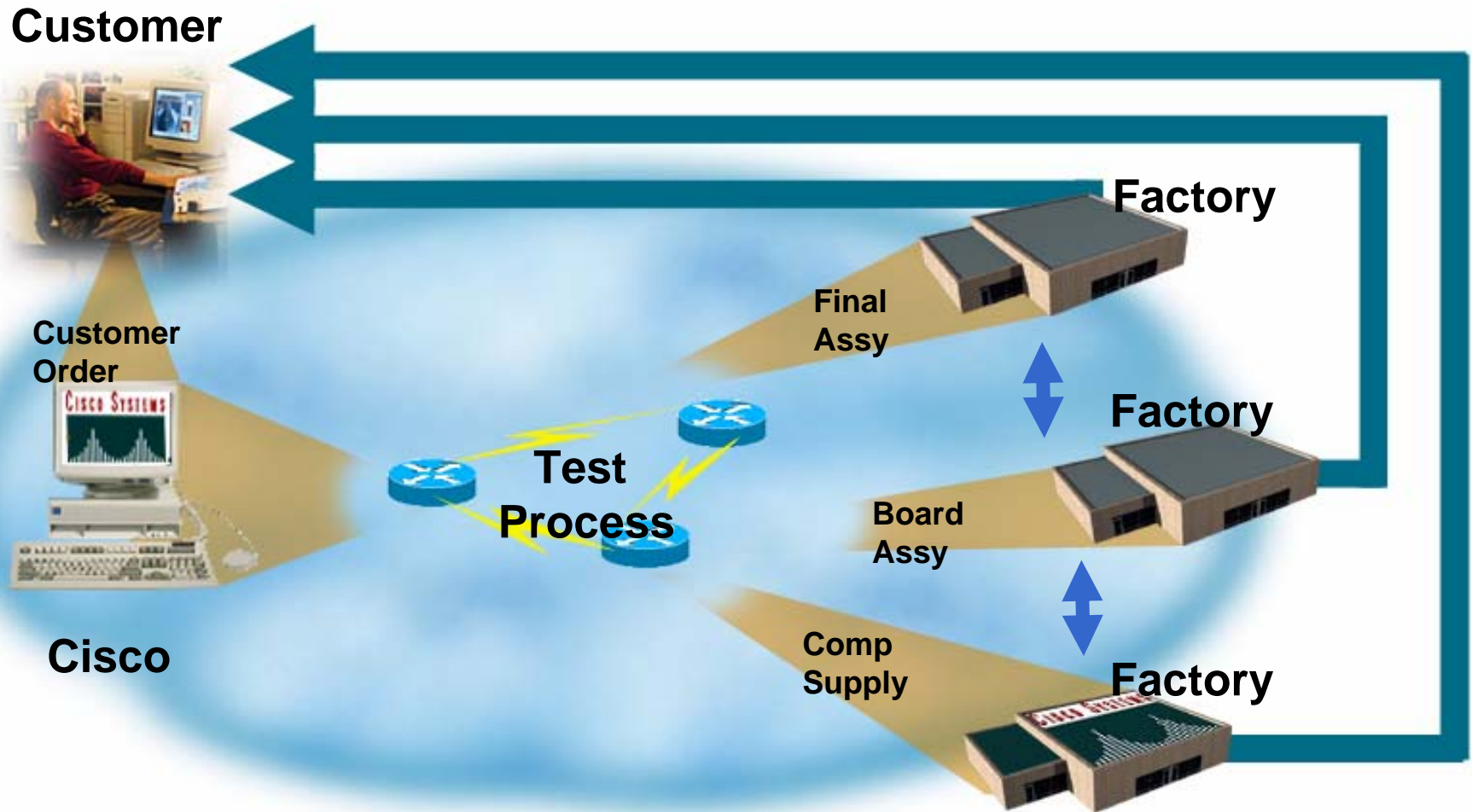
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- **Real-time design collaboration** between partners provides speed to market as a competitive advantage
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- **Net office** delivers a new infrastructure that facilitates interaction for creative functions – R&D

Auto-test enables a virtual supply chain by extending ethernet to the factory floor

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Leaders use the extended internet to accelerate and manage virtualization in design

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- **Real-time design collaboration** between partners provides speed to market as a competitive advantage
- **Auto-test** Supply chain optimization
- **CIN driven Customer Care** optimizing service delivery – between web and personnel
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Design Collaboration is the next wave of opportunity to drive time to market

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Collaboration Processes and Tools

Productivity & Cycle Time

Compartment

- Split design into discrete work modules
- Modules worked independently by distributed design teams
- Assemble, test & integrate all modules at milestones

Batch Integration

- Modules worked independently by design teams
- Assemble, test & integrate all modules together on nightly or weekly basis
- Design errors are fixed before design is allowed to continue

Follow-The-Sun

- Work modules are sequentially cycled across distributed design teams
- Module is worked by one design team, then handed off and worked by another design team in later time zone
- Design supervisors in contact across time zones to ensure work continuity

True Collaborative

- Real-time planning, development and review of design across distributed development chain
- Single instance, secure, configuration managed design database

Degree of Collaboration

BENEFITS to HP

- Increased R&D productivity ~25%
- Reduced change order cycle time ~50%
- Reduced # of change orders ~25%
- Increased part reuse
- Enabled new revenue streams and to maintain leadership position in a \$45B addressable market

True Collaborative “virtually co-locates” resources in real-time ... primarily via IPC

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OEM Engineer
(Korea)



- Wants to know what impact product design change will have on a supplier-designed component
- **Calls** the designer at the supplier company located in Europe

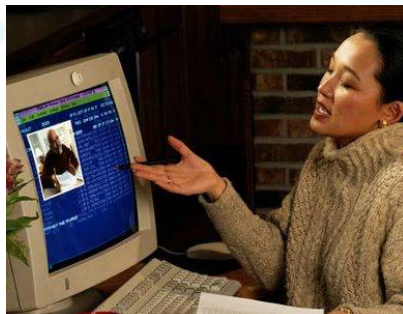


Supplier Designer
(Singapore)



- Has immediate **access** to same 3D design data, reviews the change
- Both engineer and designer work collaboratively on same design, making corrections, however concerned about manufacturability and material cost
- **Call** production engineer at component manufacturer in Singapore

Contract Manufacturer
(China)

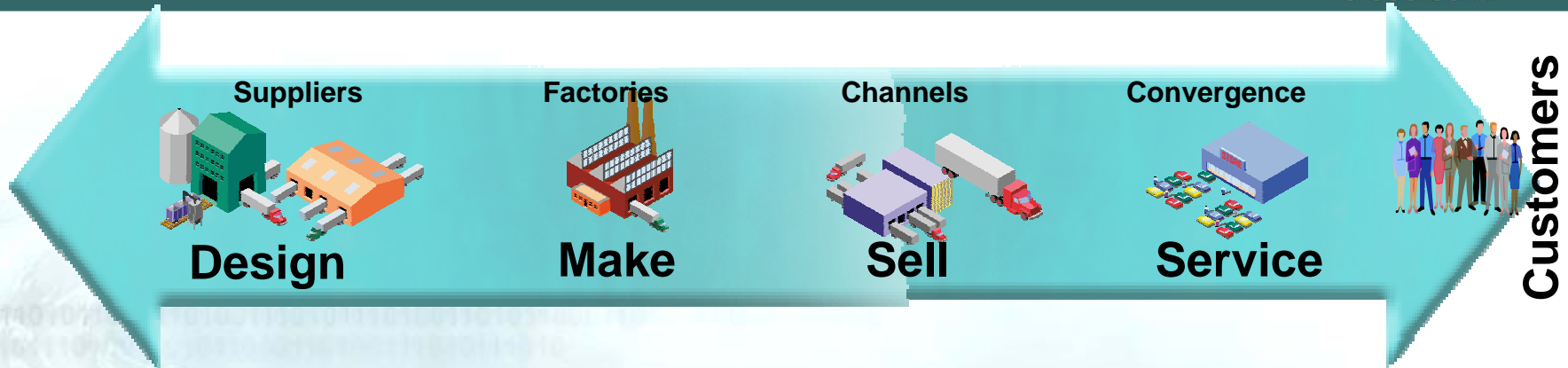


- Has **real-time access** to the 3D design, views the proposed change and suggests a minor alteration to minimize production cost
- Design change is made and all three partners **simultaneously review** and give final approval to the change



Virtualization: Using the extended internet to drive Net Workspace

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- **Real-time design collaboration** between partners provides speed to market as a competitive advantage
- **Auto-test** Supply chain optimization
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- **Net Workspace** delivers a new infrastructure that facilitates interaction for creative functions – R&D

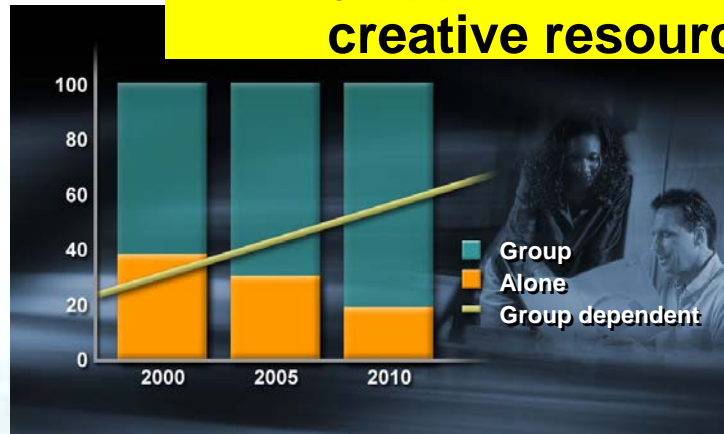
Net workspace : Virtualization creates needs for next generation office environments

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- **People**

- Distributed Global Workforce
- Collaboration And Teamwork
- Place And Face To Face Communication

Very applicable to R&D / creative resources

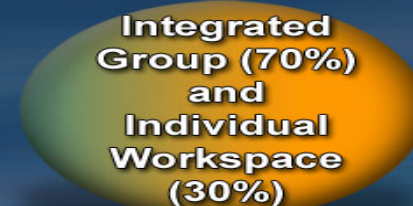


Space Demand Today



Large Reduction

Space Demand Future



Security: An essential ingredient of the extended internet enabled virtualized enterprise

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Traditional views of security need to be altered to include emerging technologies that create agile virtual enterprises



Security as an enabler of business processes

Darren Scott

Director – IBSG, Singapore

January 2005

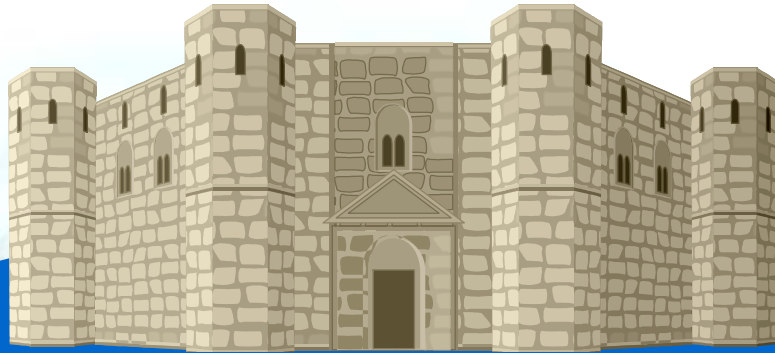
Ideas we will review today

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- **Multi-layered approach to security is essential in today's environment to facilitate business**
- **Real-time security is essential as the nature of threats has evolved**
- **New technologies to be systematically evaluated for their potential to address security needs (e.g., RFID as applied to security and not just supply chain)**
- **Foundation of security starts at the network and will continue to reside there**

Security models are continually evolving to address more complex needs: Castles to airports

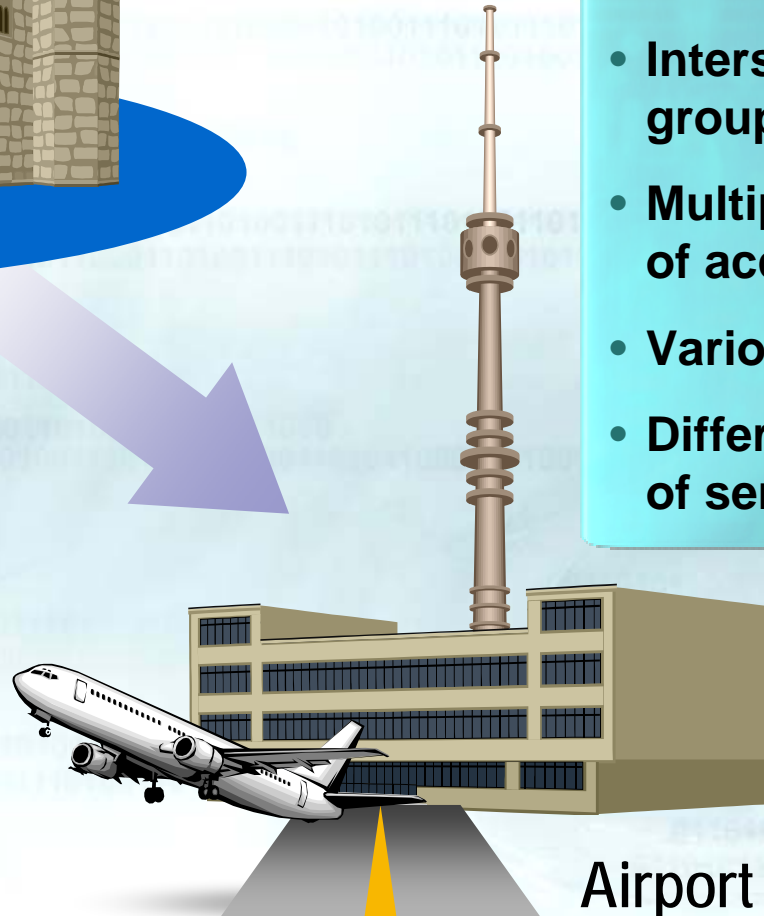
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Castle

- Single entry
- Either in or out—nothing in-between
- Once in, everyone goes everywhere

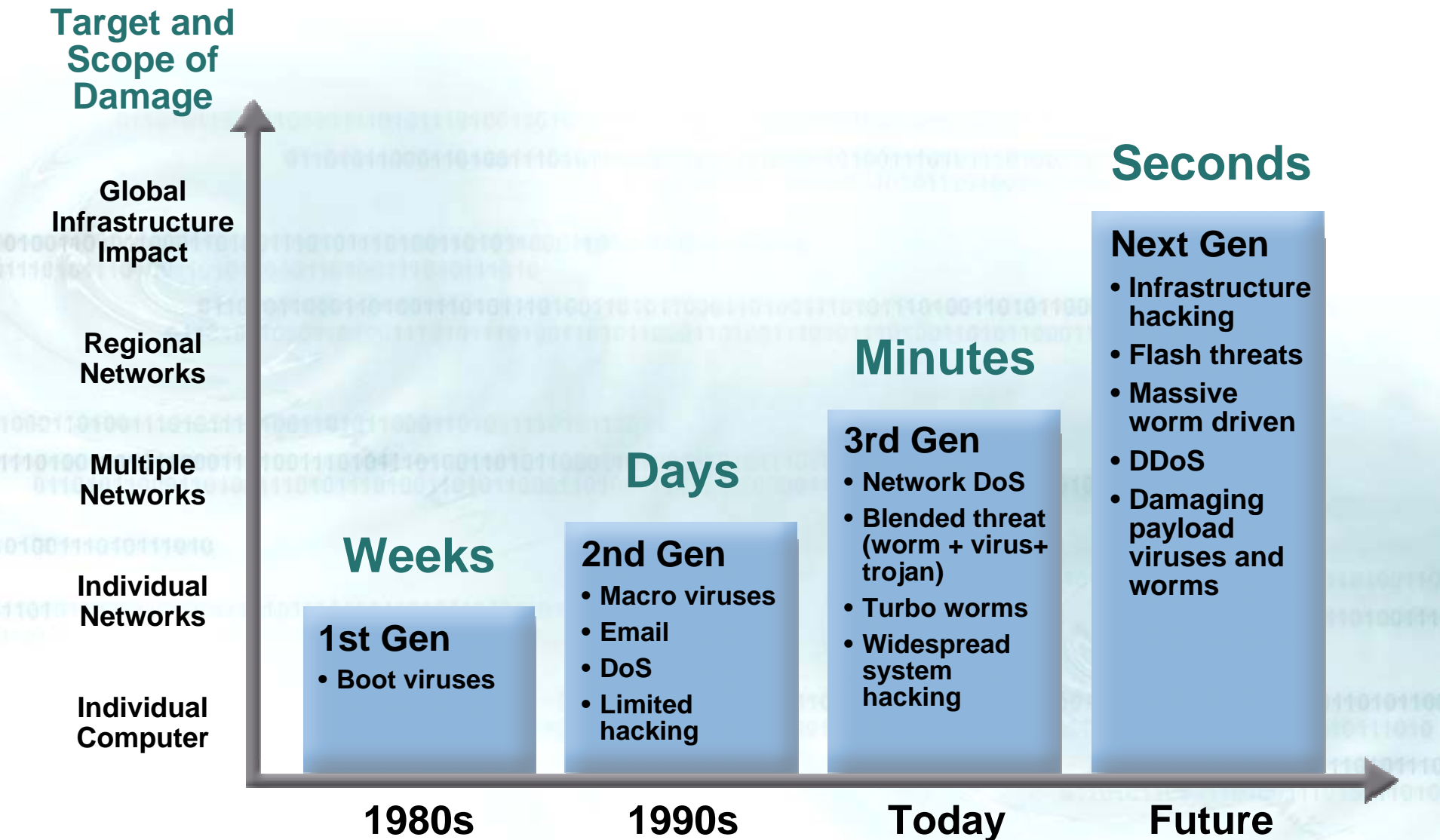
- Multiple entry points
- Intersecting user groups
- Multiple levels of access
- Various “zones”
- Differing quality of service



Airport

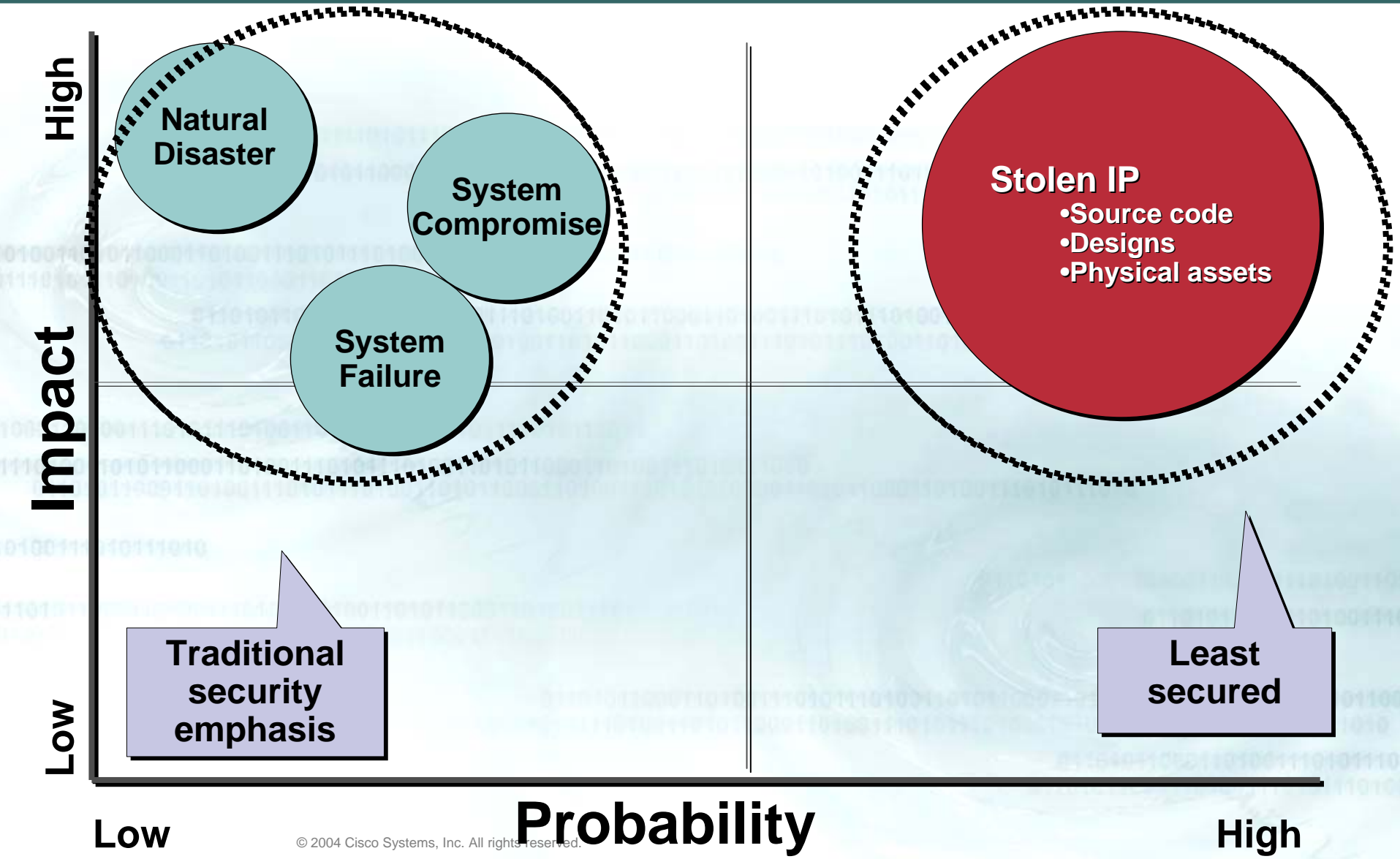
The new digital threats drive the need for “real-time” security: Code Red, NIMDA, Slammer (viruses, worms)

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Security should apply to the norm, and the exception

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Intellectual property protection is very important as it is the source of competitive differentiation

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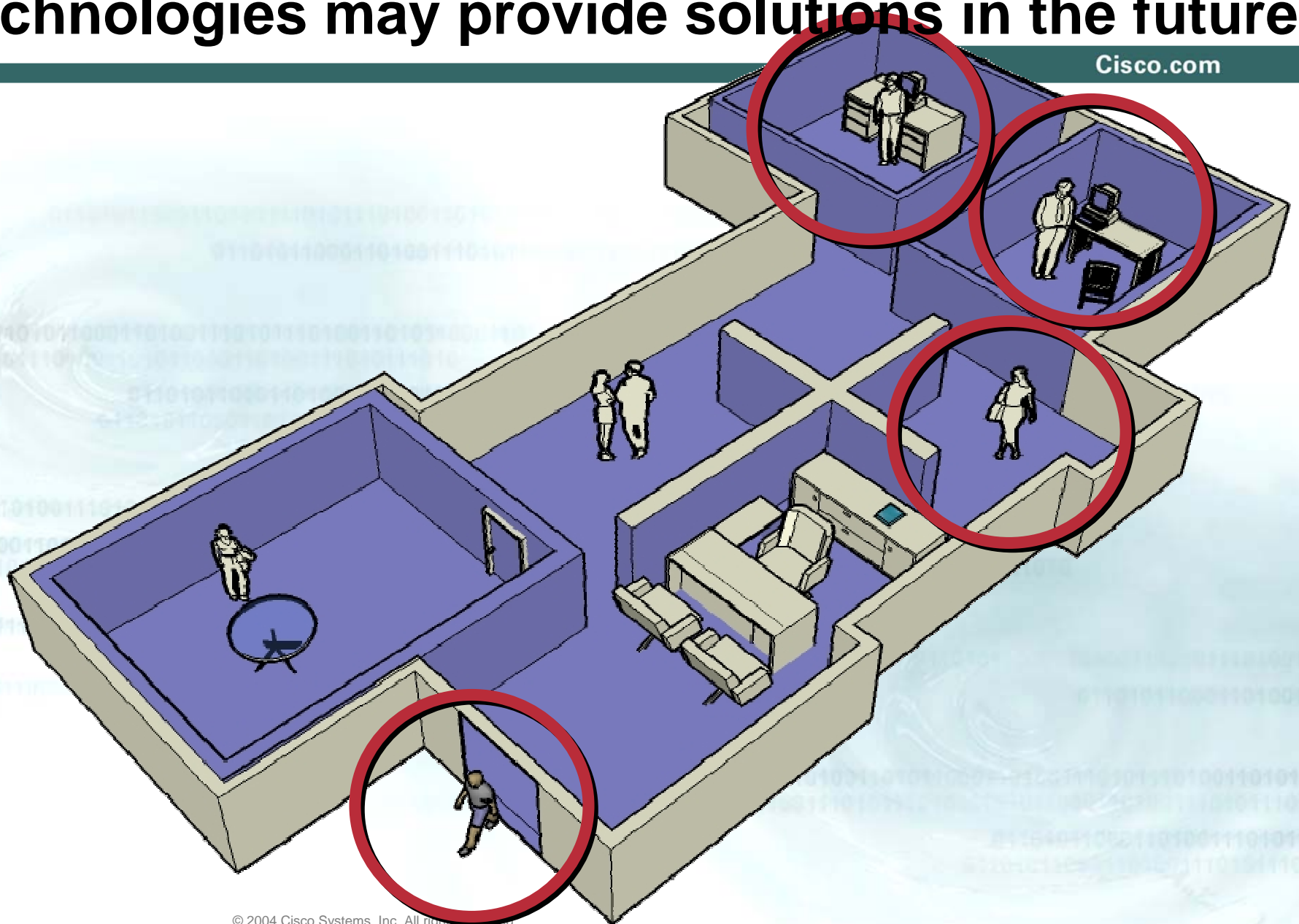
Steps companies must take to protect Intellectual Property

- “Isolate” people – either physically or virtually.
Prevent “looking over shoulder” syndrome.
- Ensure physical security over people, and assets.
- Provide increased network security.
- Protect any / all digital content (source code, designs, blueprints, etc)
- Protect physical content security, such as paper.

In environments where they have little or no control !

Opportunities for theft are everywhere, but new technologies may provide solutions in the future

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Stolen IP

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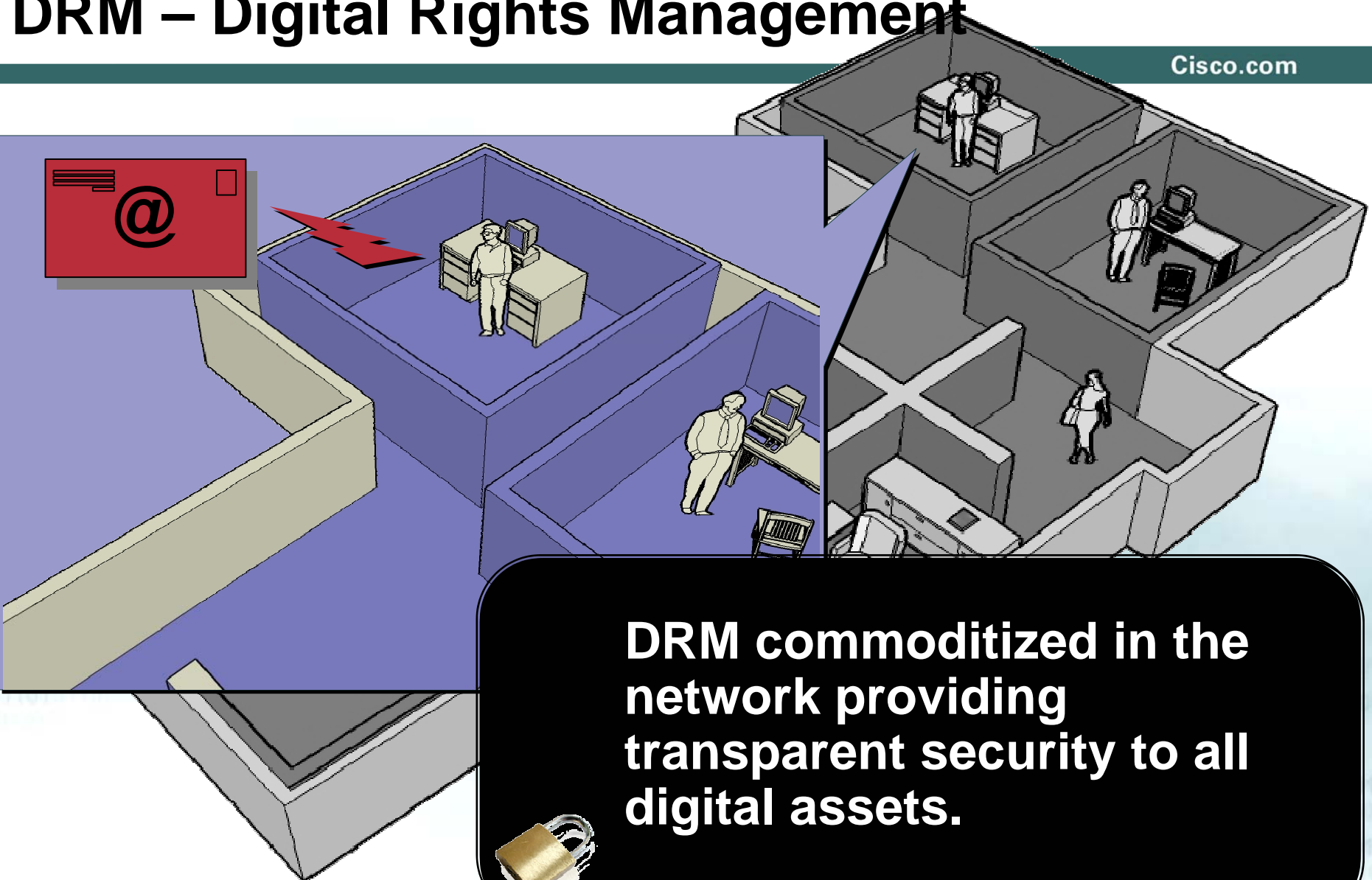


Chip-less RFID tags
Self “destructing” E-Paper



DRM – Digital Rights Management

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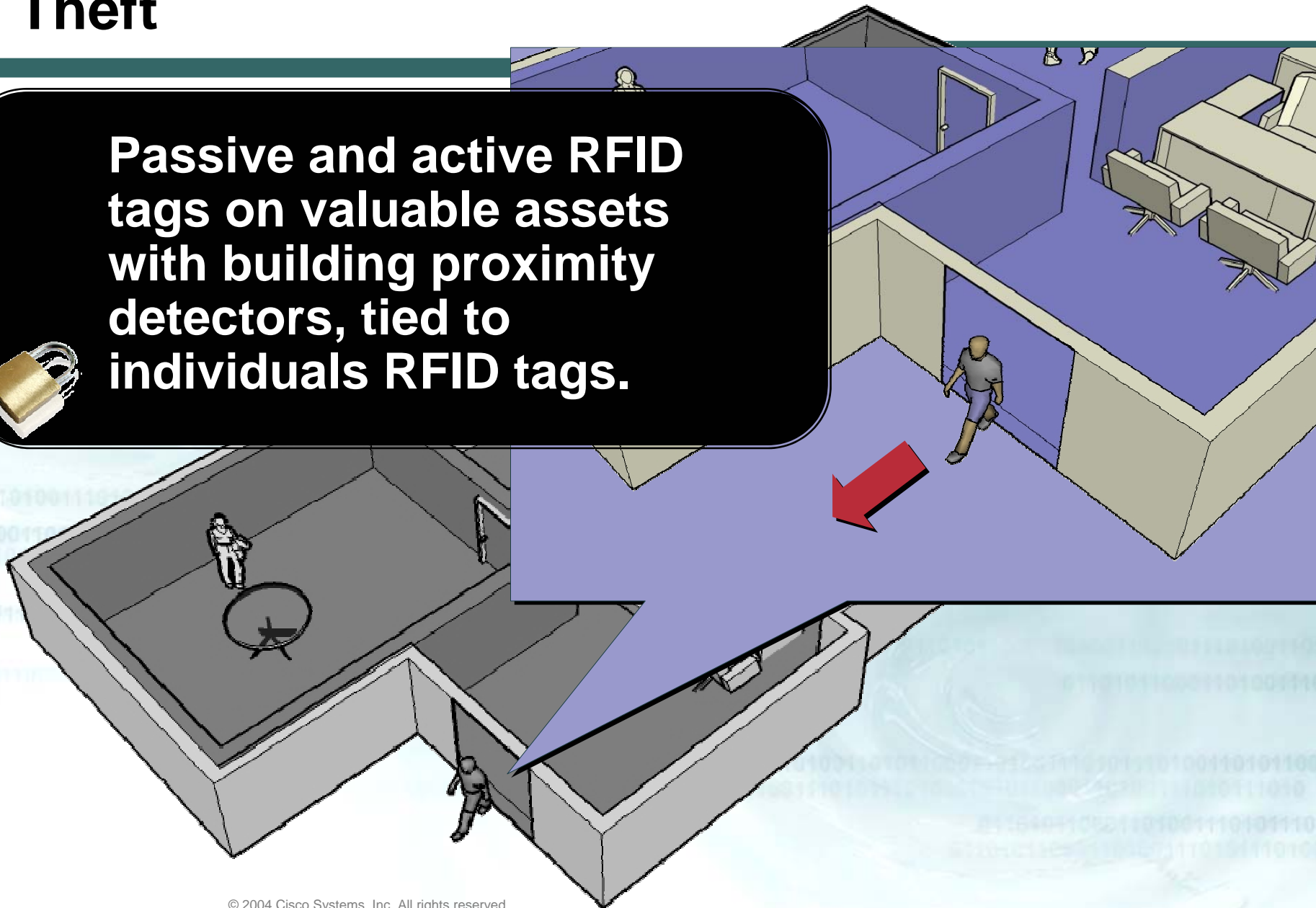


DRM commoditized in the network providing transparent security to all digital assets.



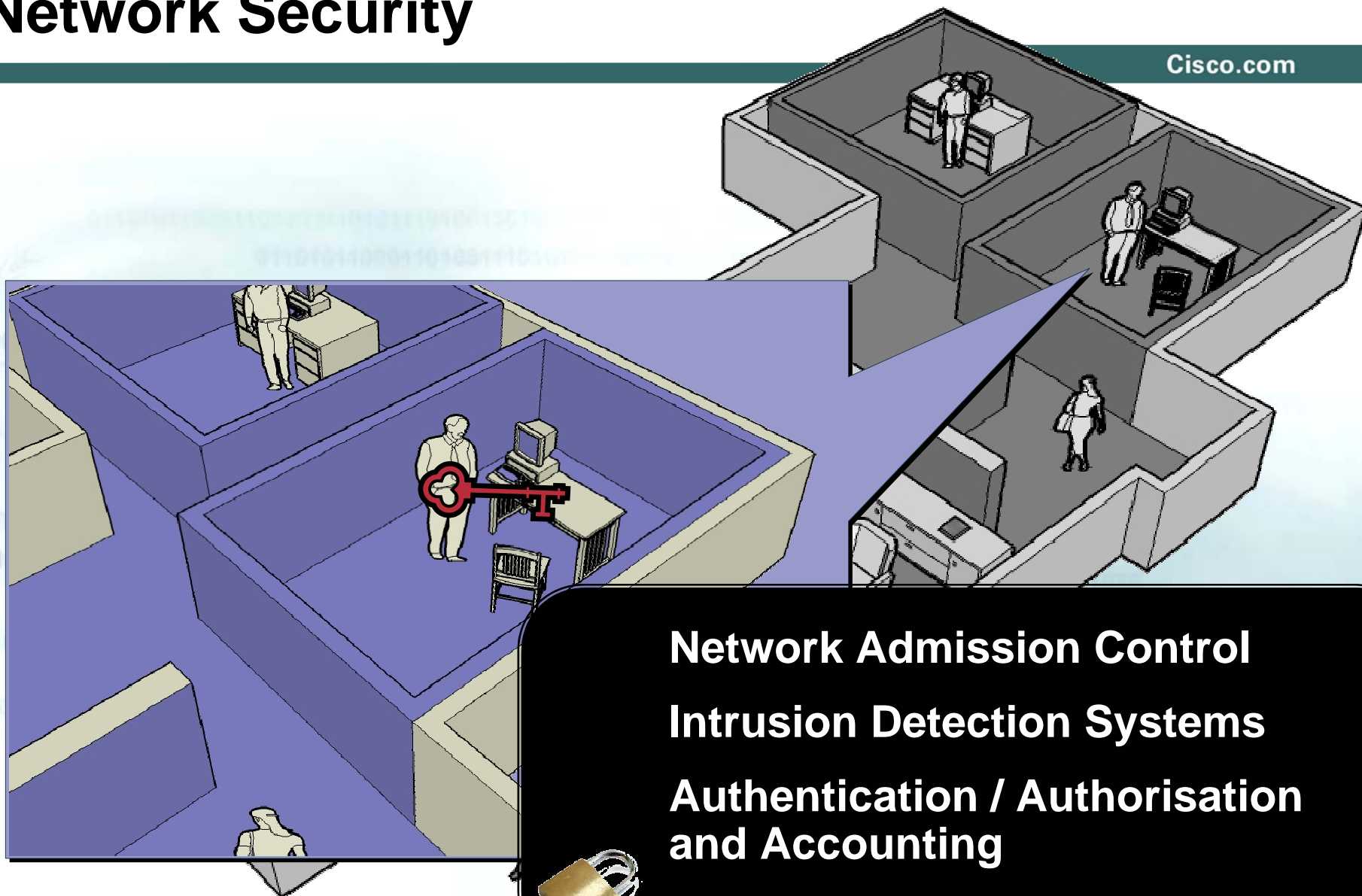
IP Theft

Passive and active RFID tags on valuable assets with building proximity detectors, tied to individuals RFID tags.



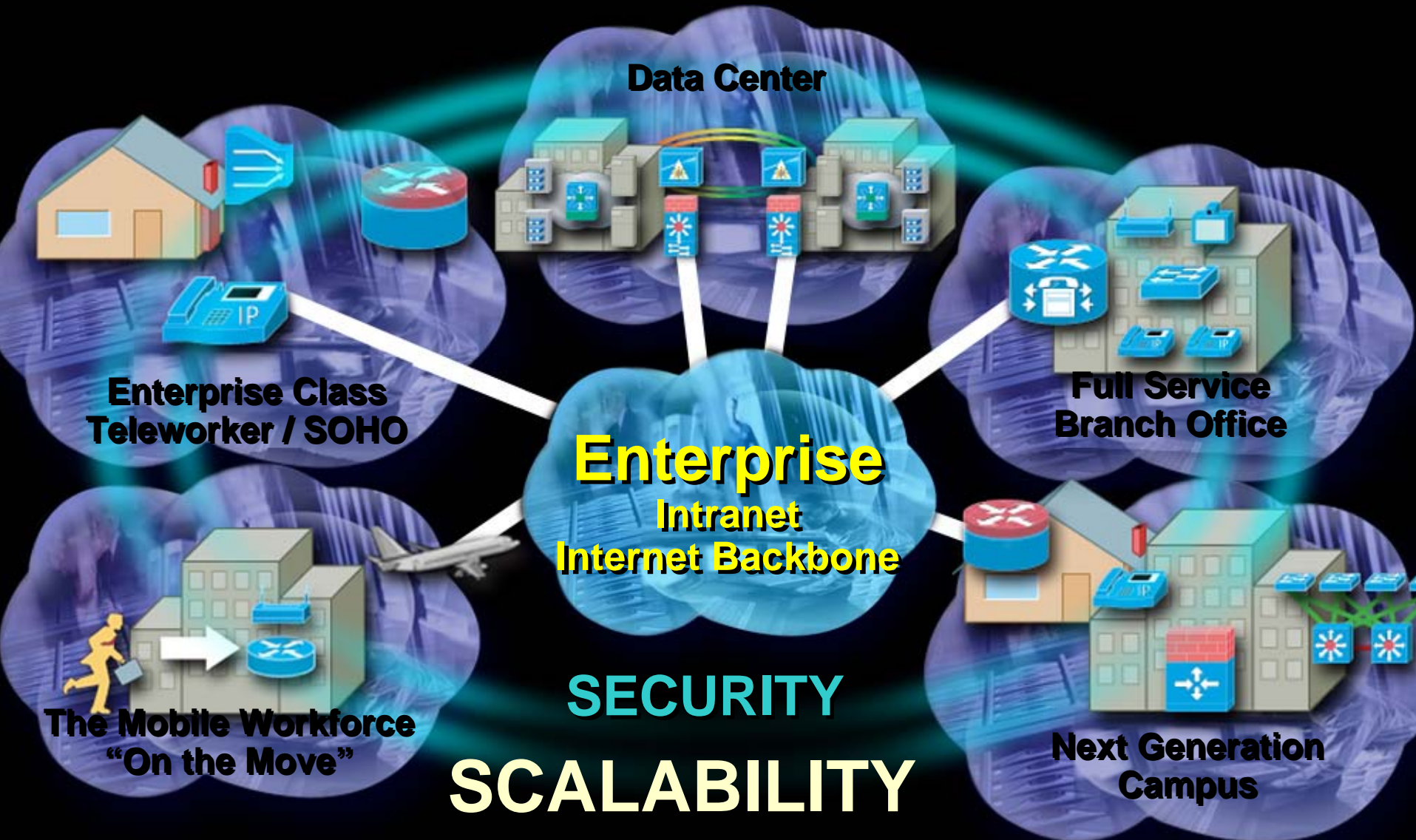
Network Security

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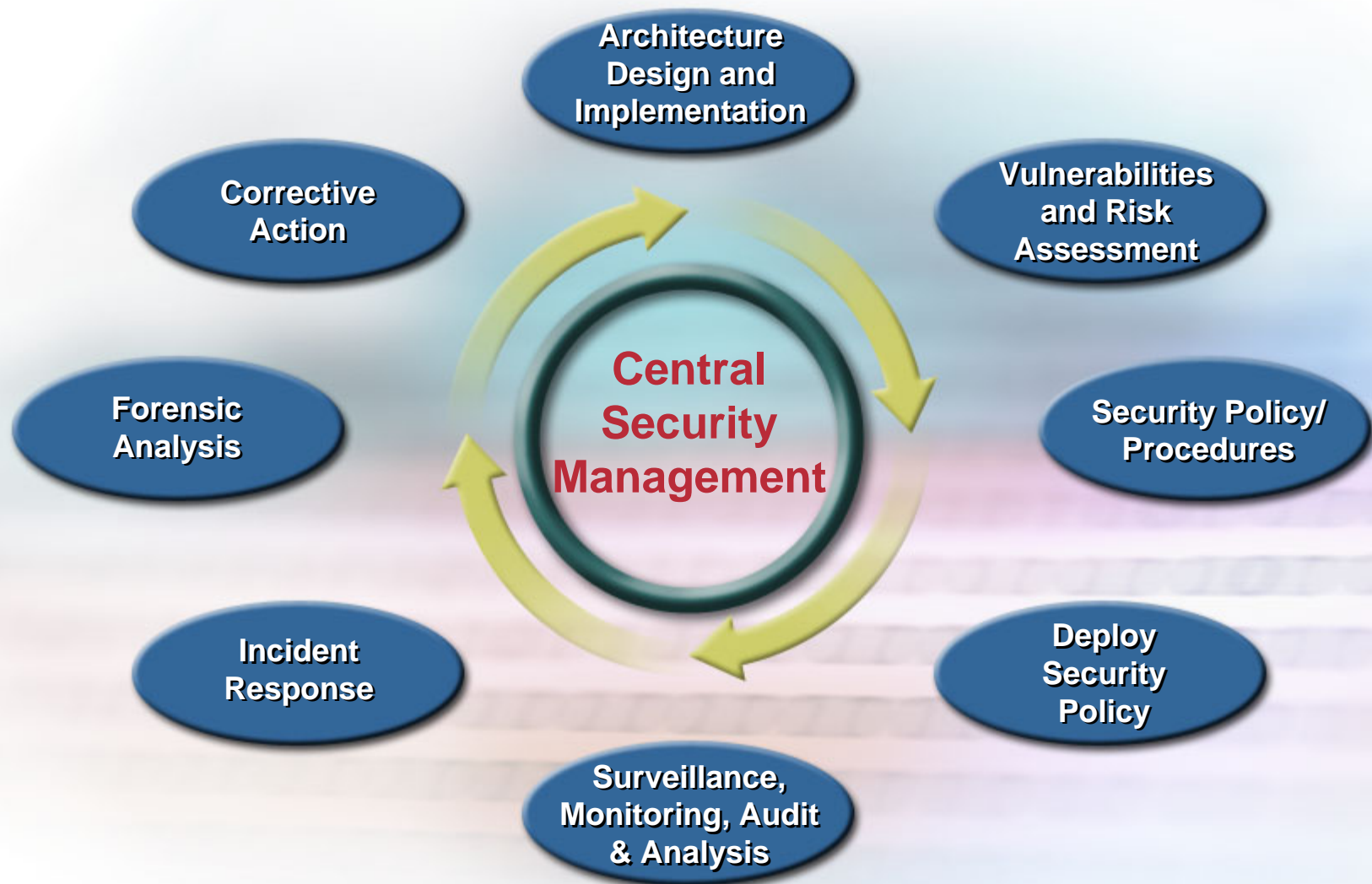
Infrastructure security in today's enterprise must include the extended enterprise & allow for growth

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Security is not a result, but a systematic process that must be set and managed centrally

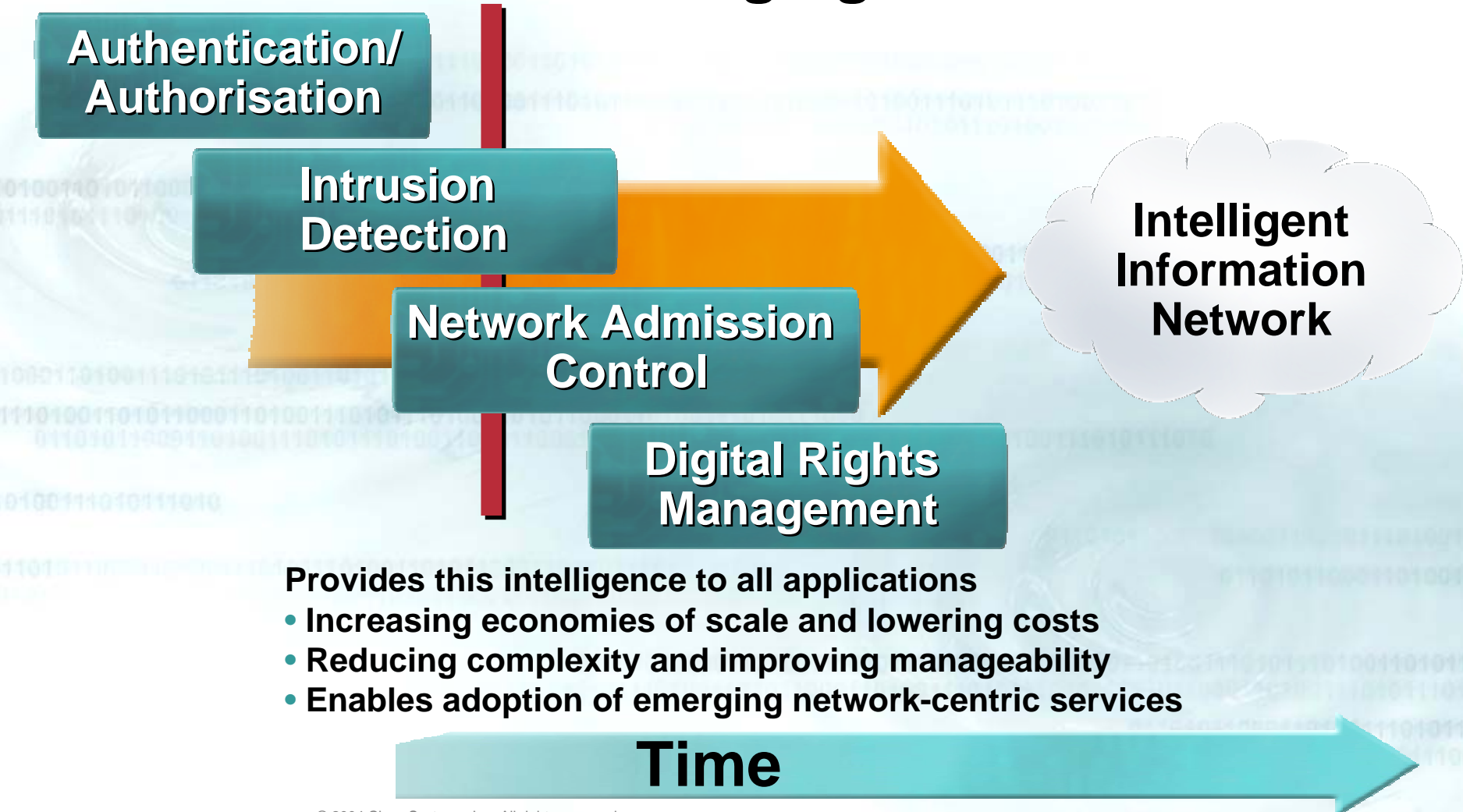
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The network sets the foundation for security and will play a larger role as it evolves intelligently

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Services converging into the network



There are concrete steps that you can take today to help you plan and manage security

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- **Revisit your security policy and ensure that it allows agility, that will help you respond rapidly to changing market and organizational needs**
- **Ensure your security implementation is multi-layered, with zones for different levels of participants – from employees to partners to customers – that facilitate business**
- **Real-time response mechanisms – e.g., behavior based vs. signature based – must be in place to minimize impact of attacks**
- **Set up a process to review new technologies that can provide innovative solutions to your security needs**
- **Start with the network and integrate other areas in to it – as access will always be via the network**



Making R&D More Productive with Net Workspace and Design Collaboration

John Saliling

Director

Internet Business Solutions Group (IBSG)

January 2005

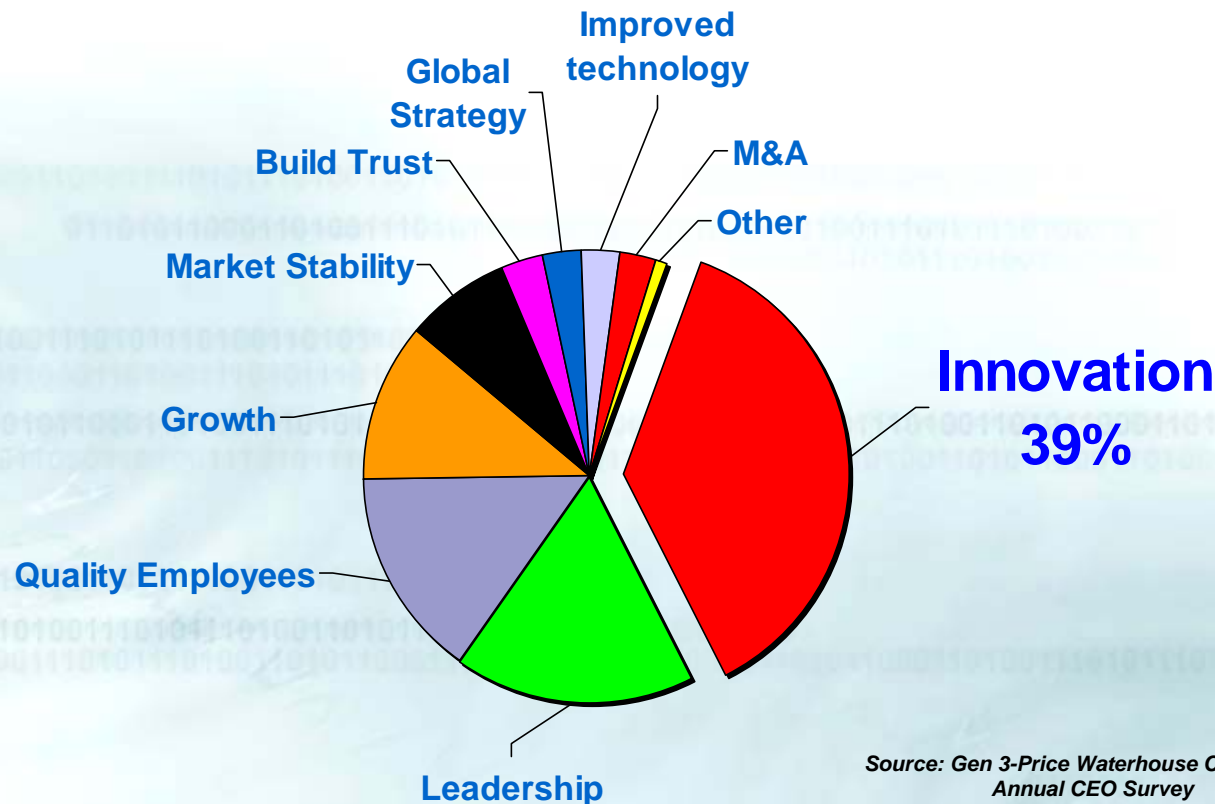
Agenda

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- **Increasing R&D and innovation is the top issue for technology companies**
- **Net Workspace and design collaboration:**
What is it and how can it help R & D productivity?
- **Examples of companies achieving benefits**

Accelerating innovation is the top issue for Global CEOs

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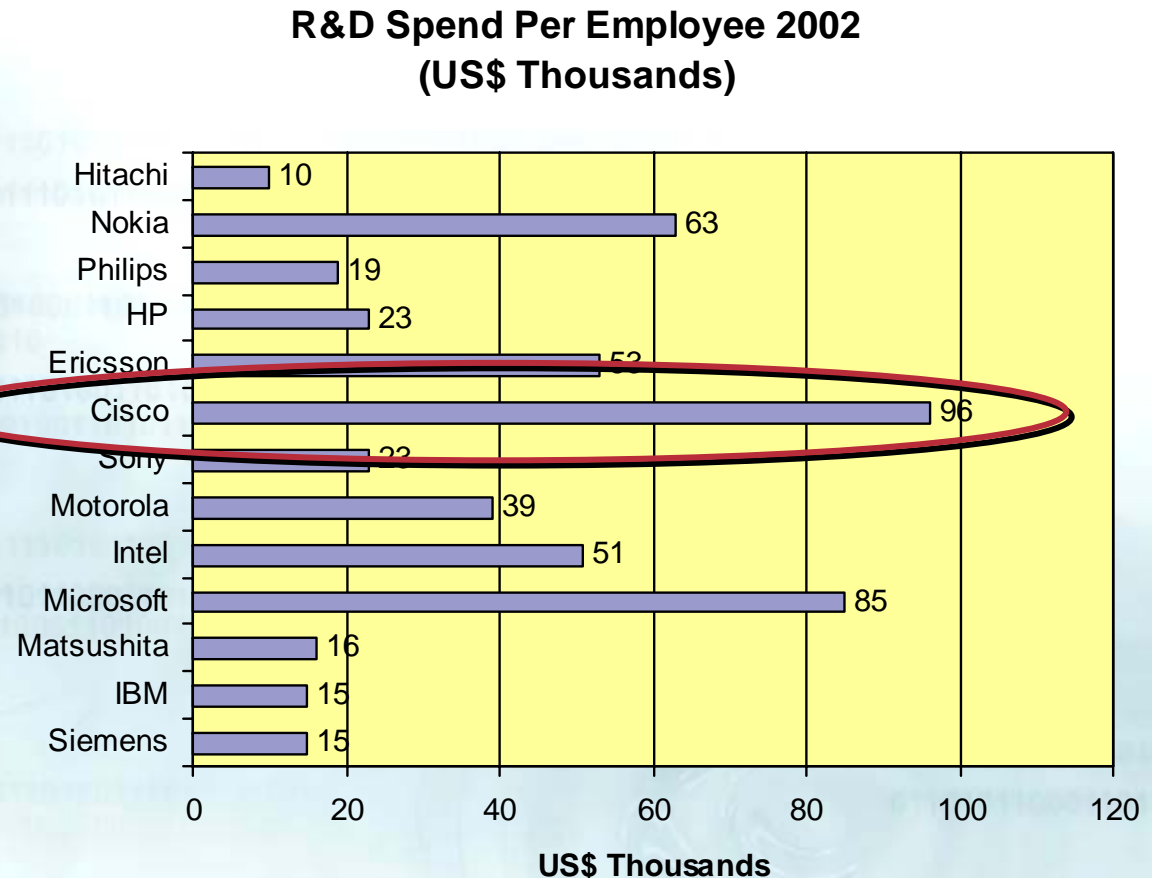
Source: Gen 3-Price Waterhouse Coopers 6th Annual CEO Survey

“Top 20% of firms in annual innovation poll by Fortune Magazine have achieved double the shareholder returns of their peers.”

For this reason, significant capital is allocated to address innovation by high tech companies

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R&D (US\$ Bil) 2002	% of Sales
3.1	4.6%
3.2	10.2%
3.2	9.6%
3.3	5.9%
3.4	20.1%
3.4	18.2%
3.7	5.9%
3.8	14.1%
4.0	15.1%
4.3	15.2%
4.6	7.4%
4.8	5.9%
6.2	6.9%



Source: IEEE Spectrum

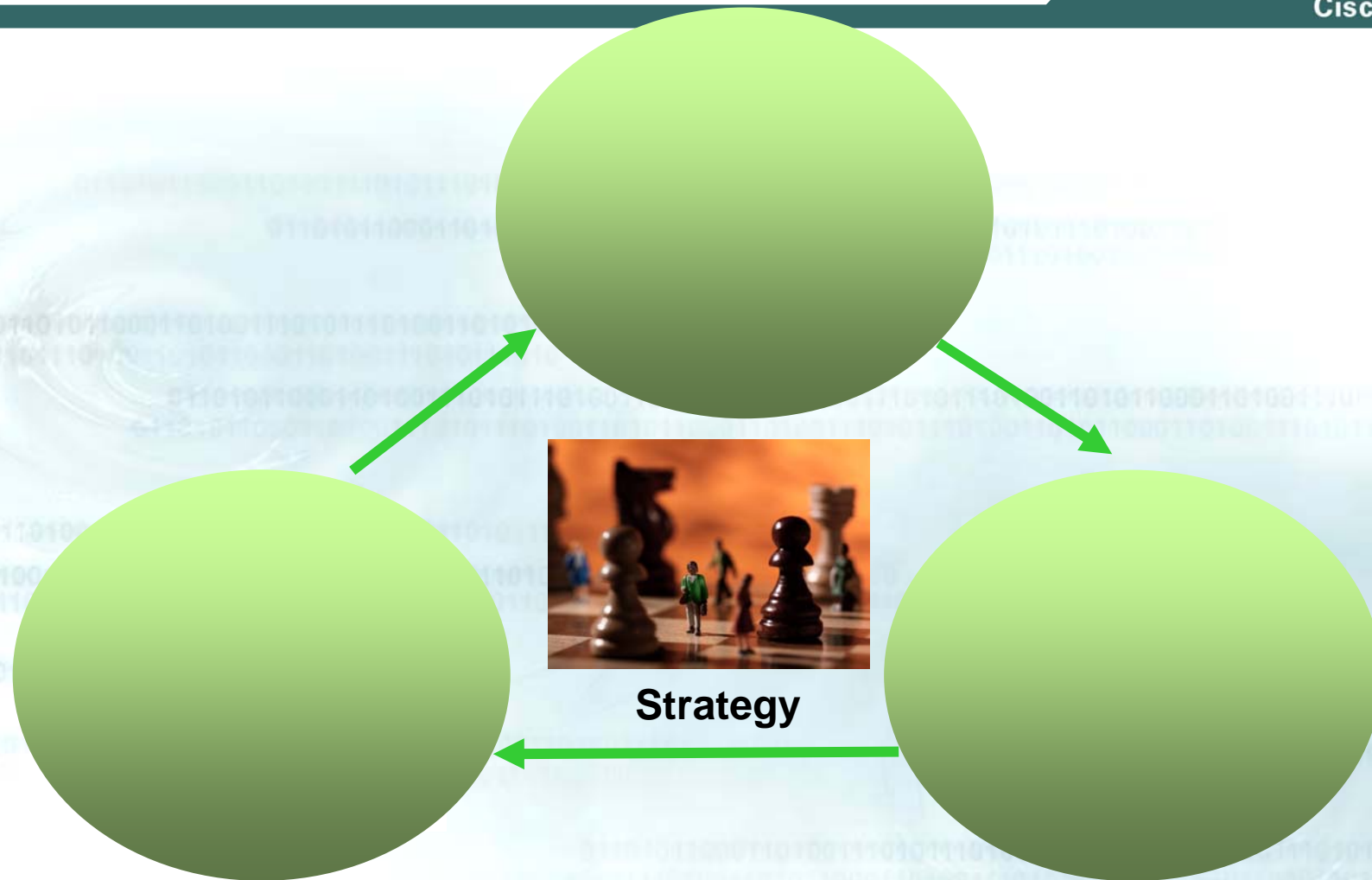


Leading R&D practitioners have cycle time reduction in new projects by 15%, and in existing projects by 55%

Source: BCG Systems, Inc. All rights reserved.

Successful innovation is supported by four key foundations...

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**Net Workspace & Design Collaboration
can be an Effective Enabler**

Proven technologies can support flexible, virtualized collaboration at the R&D hub, as well as innovation resources around the globe

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IP Telephony

Wireless

Security & Access

**Virtual Private
Networks**

**Building
Management Systems**



HP is an example of a company effectively leveraging virtualized, global design collaboration

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Case Study: Design Collaboration at HP



- Imaging & Printing Group (IPG)
- #1 in inkjet printers, laser printers, scanners, etc...
- \$20B revenue; \$4B annual R&D
- 23,000 products
- 160 countries
- Very short product refresh cycles

Solution

- “Windchill” global e-PDM system and “Collabnet”
- Bridged multiple design centers covering multiple regions and partners
- >1,500 users in 4 months after deployment
- Enabled virtual organizations across geographies to engage in co-development and share knowledge

Impact

- Increased R&D productivity ~25%
- Reduced change order cycle time ~50%
- Reduced # of change orders ~25%
- Increased part reuse
- Enabled new revenue streams and to maintain leadership position in a \$45B addressable market

Boeing was also one of the pioneers of virtualized collaboration with the 777

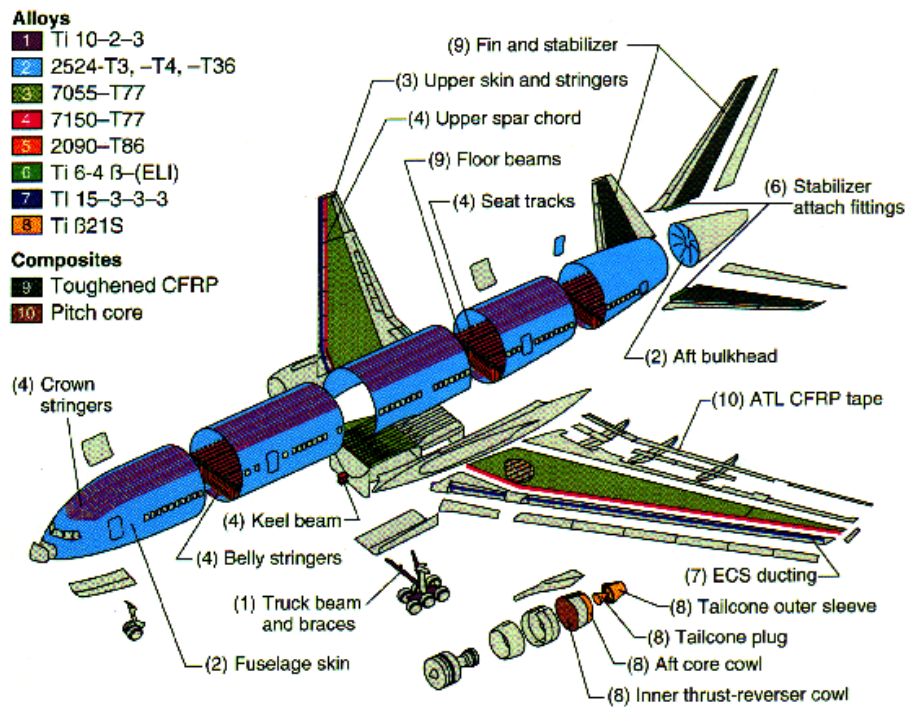
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Design Collaboration

- Design team from dozen countries to Everett, Washington
- Work together for 18 months
- Network of 1700 workstations

Results:

- Launch in 5 years (30-40% faster)
- 33% greater fuel efficiency
- 25% less cost



Quanta is implementing this new collaboration approach to address the CEO's key objectives

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- **Low Product Margin (~3%)**
- **High OpEx**
- **Attract and retain top talents**
- **Security issues (prone to virus/worm attacks)**
- **Growth, growth, growth!**

打造夢幻城堡 林百里 7000 研發大軍的奇謀

廣達容納 7000 名研發工程師的廣達研發中心，即將於今年底完工；在這座夢幻城堡中，林百里親自統率的研發大軍，正密謀發起台灣資訊產業的另一起革命性戰役。

過去 3 年來，凡是談到台灣科技產業的研發，廣達向來都是備受矚目的焦點。由知名建築師姚仁喜設計的廣達研發中心，即將在今年底正式完工，除了相關的各式科技實驗室以外，還包括 500 人的藝術表演中心、圖書館、博物館、名人堂、游泳池、雕塑公園等人文設計，整體建築投資達 50 億新台幣，預計可容納 7000 名研發工程師，樓板面積達 6.2 萬坪，無論在建築設計、編制規模上，都堪稱是台灣科技產業空前的規劃，現代舞大師林懷民的雲門舞集，更預定了音樂廳第一場表演。

從 2000 年就開始規劃的廣達研發中心，不僅是廣達從製造全力朝研發轉型的具體象徵，更是廣達未來 15 年內，持續成長最重要的依據。1988 年成立的廣達，過去 15 年來，從原本位於士林（1999 年遷入林口）不起眼的廠房，一路直衝全球筆記型電腦製造龍頭的故事，始終是國內外媒體的焦點。



近年來，林百里帶領台灣科技產業的明星 CEO，舉一動一靜都引起業界的討論，去年底成立的廣達研發中心，更將帶動台灣資訊產業的升級與發展。

Quanta R&D complex will help drive next level of innovation driven growth

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Quanta Computer

Established: May 2, 1988

Revenue: US\$ 9 Billion (employee of 18,000)

Products: Notebook PCs, Servers & Storages,
Mobile Phones, LCD TVs



R&D Engineers 7000 Floor Area 2.2 M sq/ft

Land Area 48,312 m² (14,614 Ping)

Investment US\$ 150M Completion May 2005

Net Workspace

- Fluid environment
- Eliminate the need for swing space
- Eliminated needs for Moves Adds and Changes
- Easy collaborative space reservation
- Mobility across all offices
- Reduced desk space needs with sharing

A range of companies are realizing significant R&D productivity benefits from the new virtualized approach

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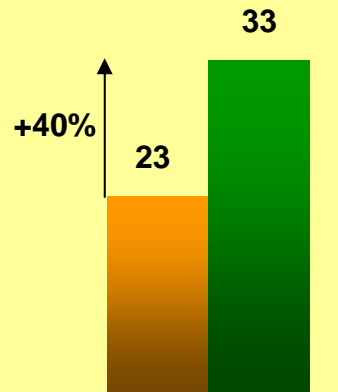
Before: fixed process based R&D Approach



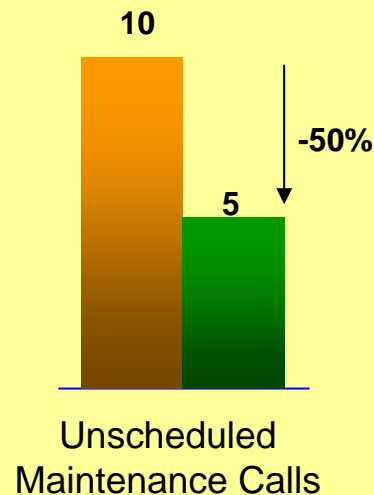
After: dynamic, information based R&D Approach

Medical Devices Company

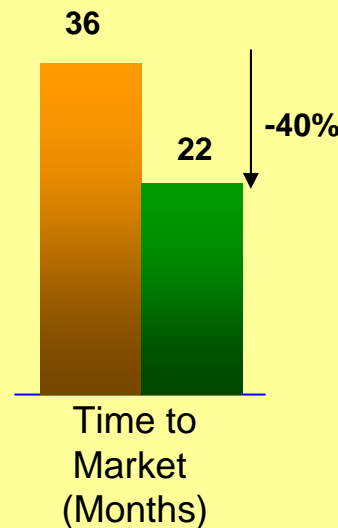
Market Share



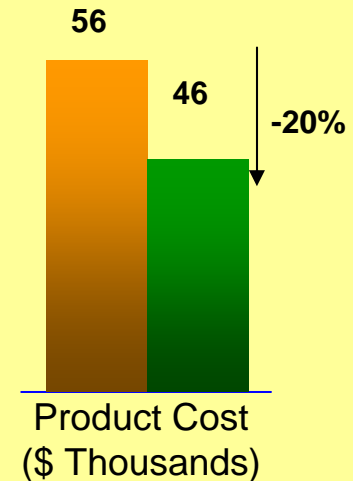
Quality



Time



Cost



Source: McKinsey

In addition to increases in productivity, we are also seeing significant lowering of real estate costs at Cisco

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Cisco Proof of Concept San Jose, CA

Opportunity

- Living lab to push advanced technologies and new ways of working
- Reduce real estate footprint

Results

- Reduce RE requirements by 37%
- Reduce furniture costs by 50%
- Reduce cabling costs by 60%
- Seats 140 people vs 80 people in the old cubicle environment



Guiding Principles for Implementing Net Workspace and Design collaboration

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- 1. Assess current workplace strategy: people, process, technology**
- 2. Define and communicate workplace vision and its impact to the business**
- 3. Secure cross-functional sponsorship (Engineering, Real Estate, IT, HR, FIN)**
- 4. Design for a change management strategy**
- 5. Define success measures and measure impact to the business – Value on Investment (VOI)**

Summary

- **Virtualization is changing the way enterprises design, make, sell and service their products**
- **Leading companies using emerging technologies to address customer communication challenges**
- **Next generation security is a key enabler of virtualization**
 - **Keep an eye on new technologies**
 - **Start at the infrastructure layer**
- **Effective Net Workspace and design collaboration can significantly impact R&D productivity**

