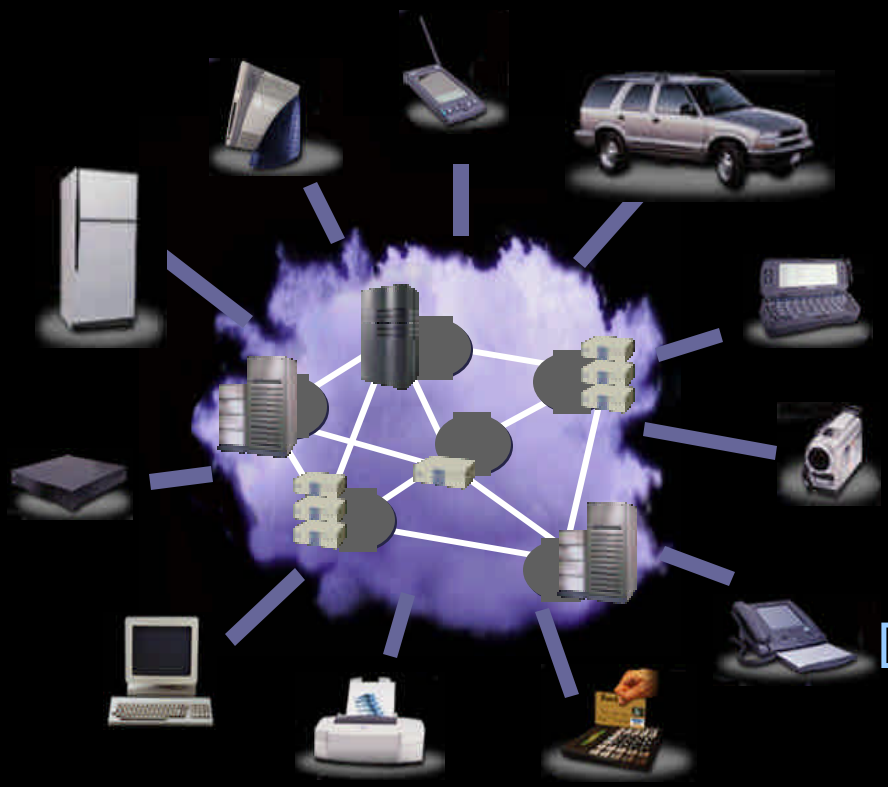
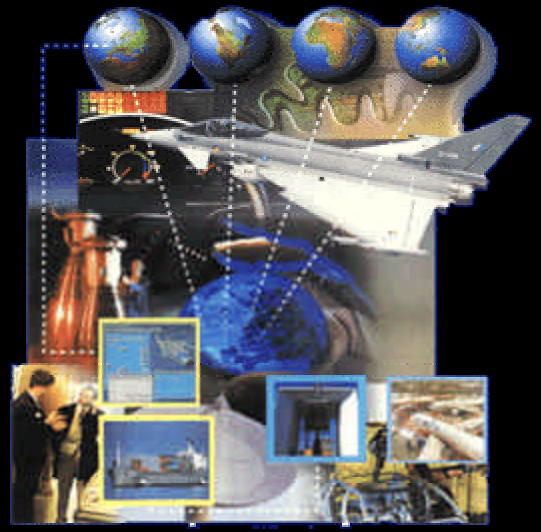
When Things Talk To Things: Services Serving Services





Dr.rer.nat. Hellmuth Broda
Chief Technologist Europe,
Middle East and Africa
Member, Sun Vision Council
Sun Microsystems Computers
Hellmuth.Broda@Swiss.Sun.COM

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Agenda

- Technology Trends
- The Six Webs
- Ten Predictions
- Jini technology supports service model
- How Jini works
- The service driven network

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The ClueTrain Manifesto 95 Theses

1. Markets are conversations
2. Markets consist of human beings, not demographic sectors [. . .]
6. The Internet is enabling conversations among human beings that were simply not possible in the era of mass media
7. Hyperlinks subvert hierarchy.

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95 Theses (cont.)

- 30. Brand loyalty is the corporate version of going steady, but the breakup is inevitable—and coming fast. Because they are networked, smart markets are able to renegotiate relationships with blinding speed.
- 31. Networked markets can change suppliers overnight. Networked knowledge workers can change employers over lunch. Your own "downsizing initiatives" taught us to ask the question: "Loyalty? What's that?"

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95 Theses (cont.)

76. We've got some ideas for you too: some new tools we need, some better service. Stuff we'd be willing to pay for. Got a minute?

77. You're too busy "doing business" to answer our email? Oh gosh, sorry, gee, we'll come back later. Maybe

83. We want you to take 50 million of us as seriously as you take one reporter from The Wall Street Journal.

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www.cluetrain.org

"...companies so lobotomized that they can't speak in a recognizably human voice build sites that smell like death."

—"Fear and Loathing on the Web“

The Industry Standard and CNN Interactive

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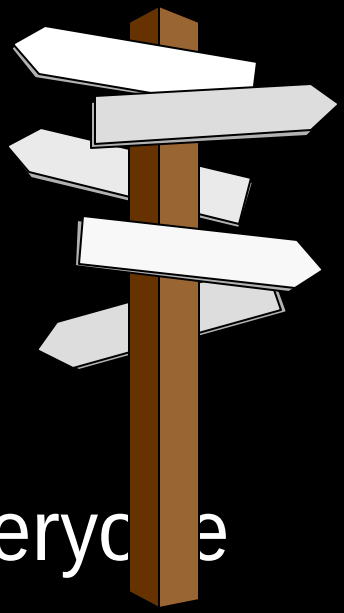
Coming Technology Breakthroughs



- Nanotechnology
- “Wet” Electronics
- Sensors
- Connectivity unlimited
- Electronic Commerce for everyone

☞ Emergence of combinations of technologies designed to create efficiencies (Factor 4)

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Critters On A Chip: Wet Electronics

- Robots controlled by eel brain
- Bacteria on chips detect pollutants (bioluminescence)
- Insects in sensors detect land mines, chemical weapons and narcotics
- Rodent brains help identify new medicines

Source: IHT 18.4.01

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Where Will Technology Lead Us?

- Software will run on all devices
- Software is distributed everywhere on the network
- Software is safe
- Software allows a new kind of computing device: US$100: 4 chips ⇨ 1 chip
- Data Communication will bypass voice traffic in 2001 (The Yankee Group 12/97)
- Eventually, “voice over IP” will become a free service

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A Technology Future

- C4S Convergence: Computers, Communication, Consumer Electronics, Content, Services
- By 2008 an average adult will daily consume
  - 2700 calories of food
  - 3 liters of fluid *(beer?)*
  - 30 GB of digital information

- Unlimited bandwidth: 6.4 Terabit/s (10^{12}) over a single sub-fiber (= all the TV programs of the world plus all voice communication)
- Soon bandwidth will exceed compute power!
  - Processors: 2 x in 18 months
  - Bandwidth: 2 x in 9 months

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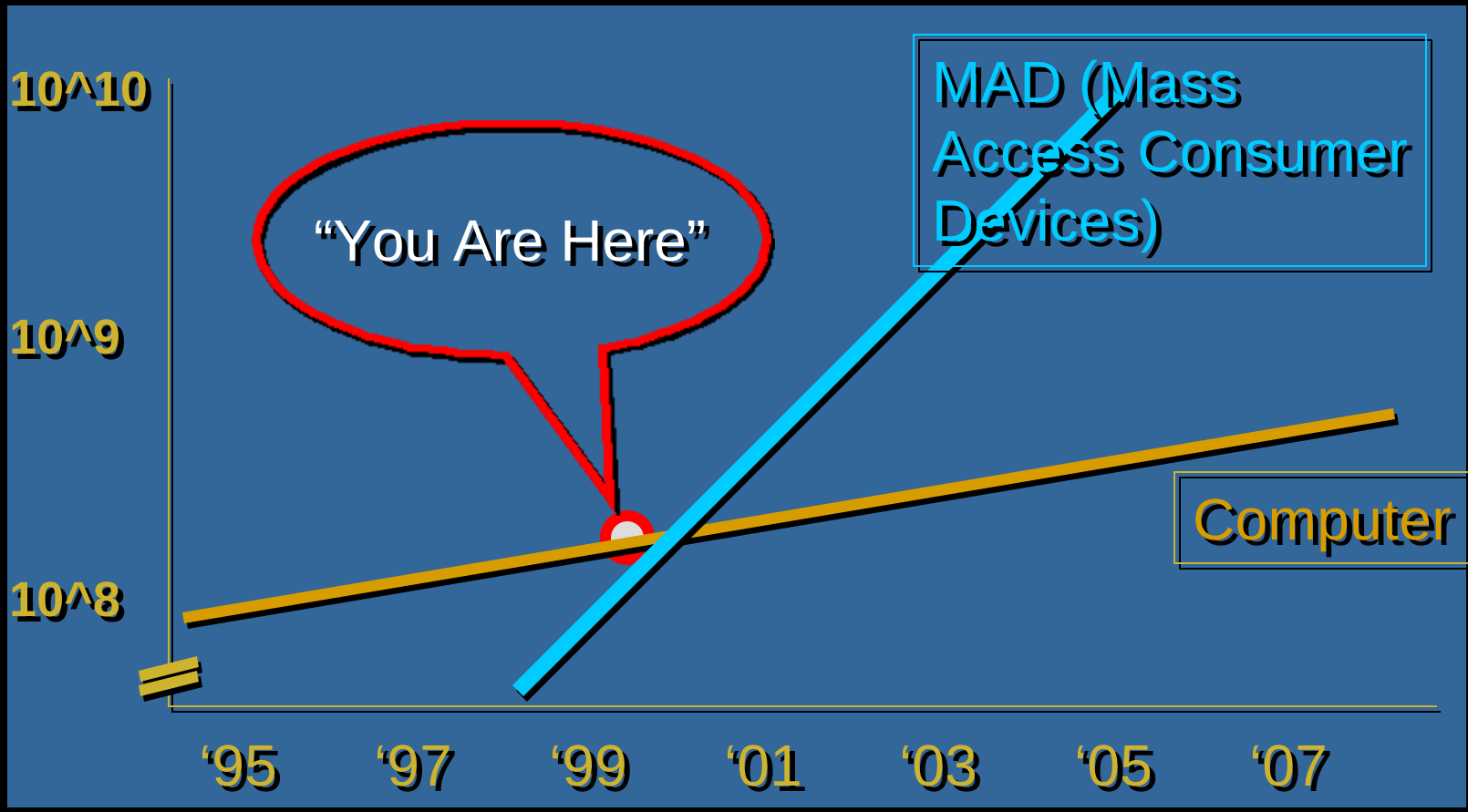
More Than Logarithmic Growth



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Three Bets

Internet

Network Services

Bandwidth

10/95

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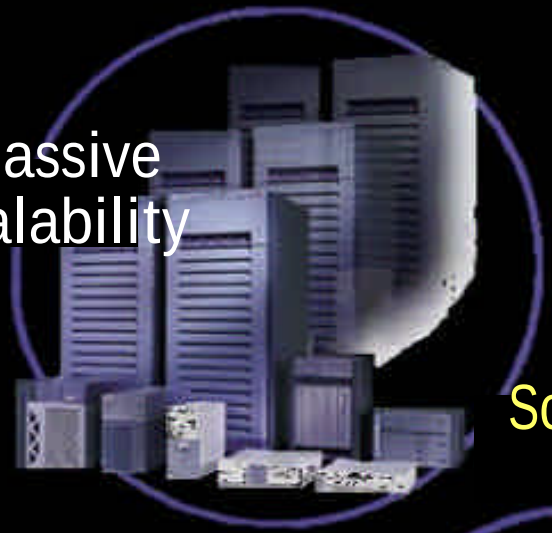
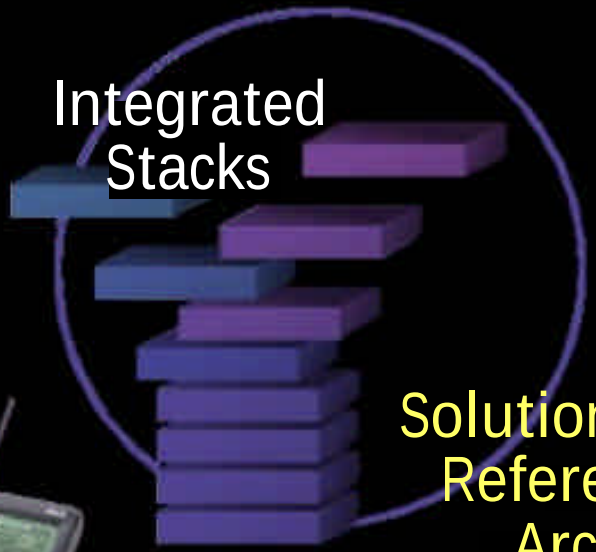
Sun's Big Bets (Investments)



Massive Scalability

Z-Axis Scalability



Integrated Stacks

Solution Sets, Reference Arch.

Continuous Real-time

SunTone, SunReady, SunUP

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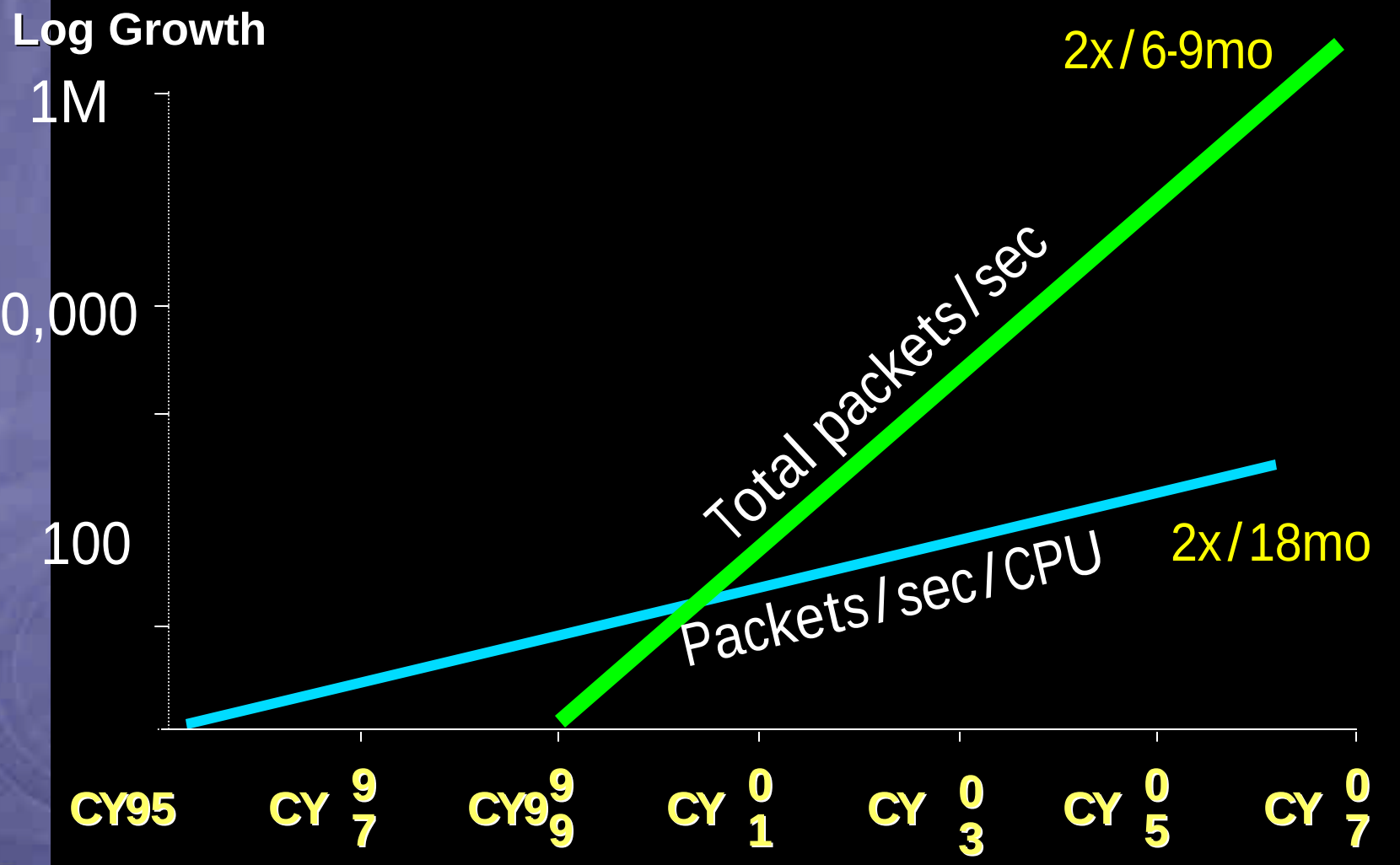
Where Sun put's the 10% Revenue in R&D

Gilder's *vs.* Moore's Law



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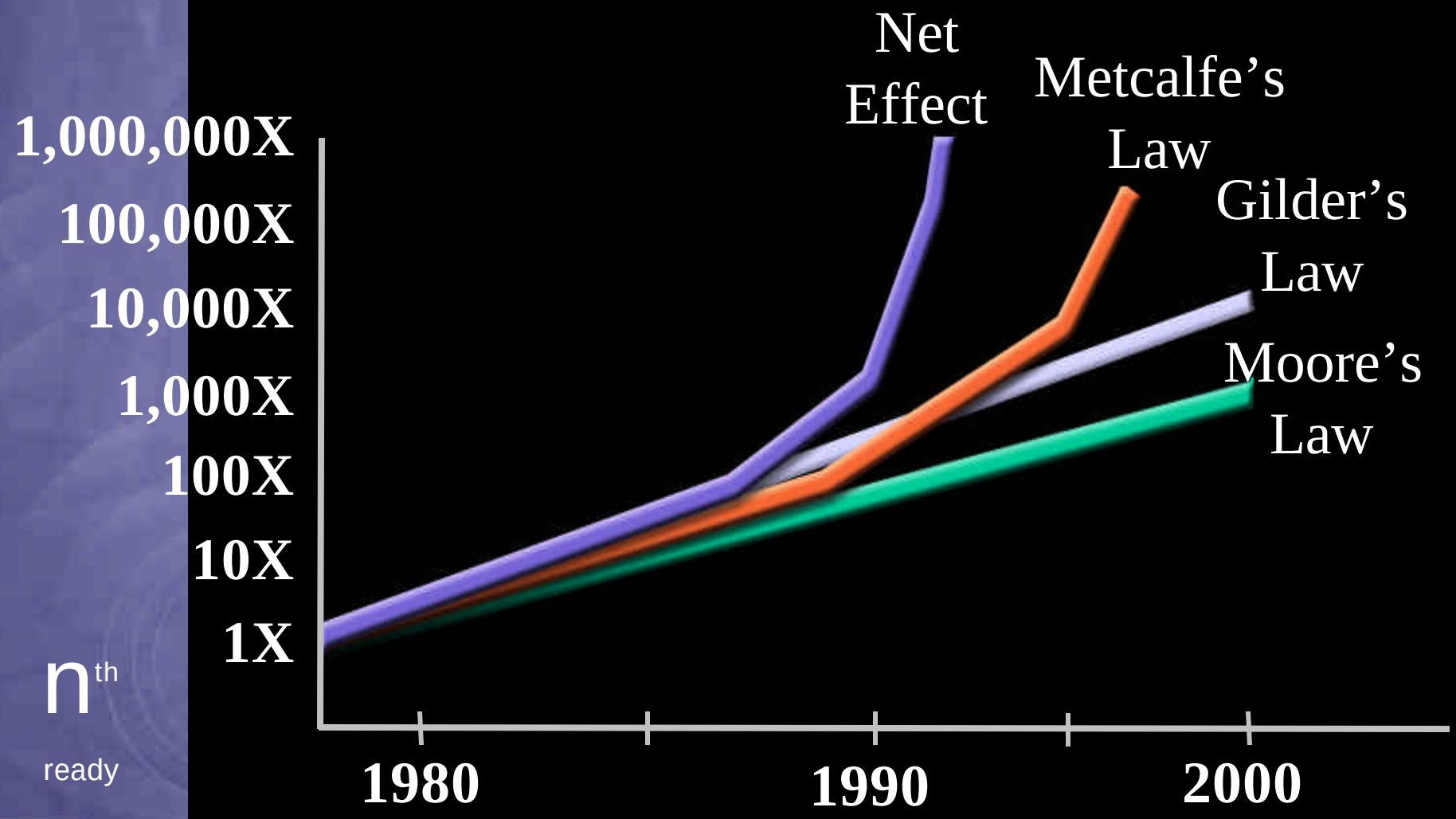
Net Effect (nth ready)

Users x Devices x Services x Data



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Continuous Service Availability

"The 87 hours of downtime for a 99% available site transacting $5 million a day in eCommerce represents $3.7 million in lost revenue --even assuming that only 20% of the transactions are actually lost. Revenue from eliminating this downtime would pay for the entire nonstop infrastructure."

--- Forrester Research, 1999

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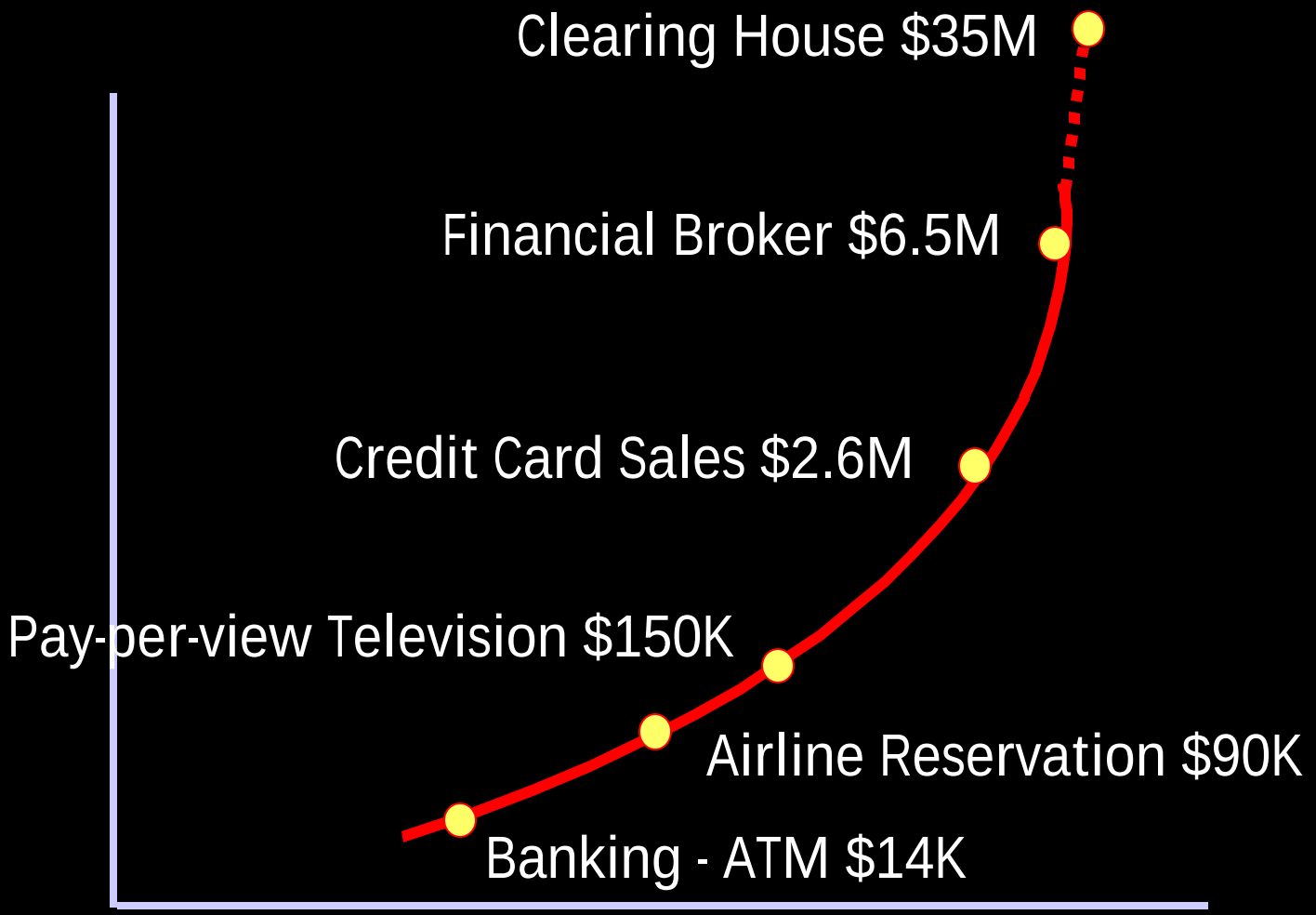
Average Cost Per Hour of Downtime



Source: IDC Data

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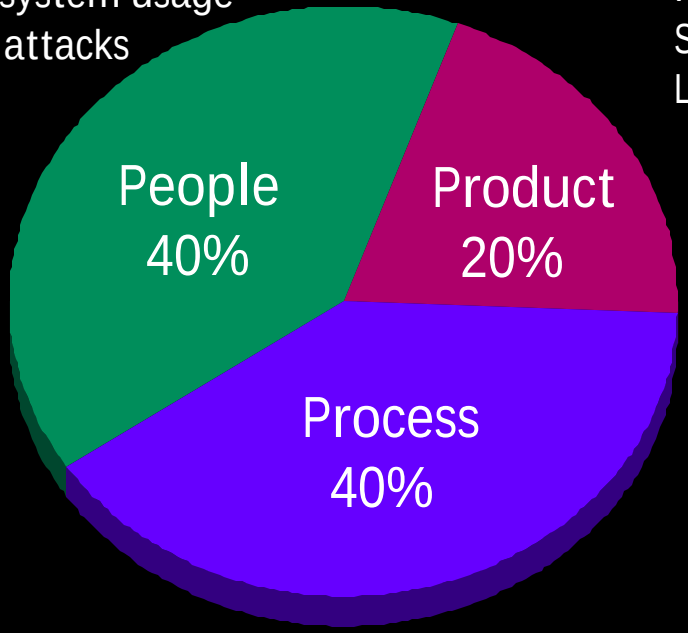
Causes of Service Outages

Sun assists companies in addressing the fundamental causes of system downtime

Operator error
Improper internal system usage
Deliberate system attacks

Hardware failure
Software error
Limited capacity



Weak system monitoring
Lack of standard systems management process
Inadequate configuration & testing procedures

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The Six Webs

1. Traditional web
2. Entertainment web
3. Pervasive computing web
4. Commerce web
5. Pocket comm-unication web
6. Voice activated web

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The Traditional Web

- Computer
- Keyboard
- Screen
- Modem
- Phone line
- LAN

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The Entertainment Web

- Sit on your couch
- Be entertained
- Ambient intelligence
- Follow-me system
- Story telling
- Video games
- Mobile music

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The Pervasive Computing Web

- Machines talking to machines
- Jini, federations of services
- Wired or wireless
- “Is it machine washable?
  --- hot cycle?”

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The eCommerce Web

- Business to business
- Business to consumer
- e-Market places
- Procurements
- Auctions
- Integrated Supply Chain

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Pocket Communicator Web

- Follows you around
- In your pocket
- Personal communicator
- my: position,
  profile,
  surrounding,
  context

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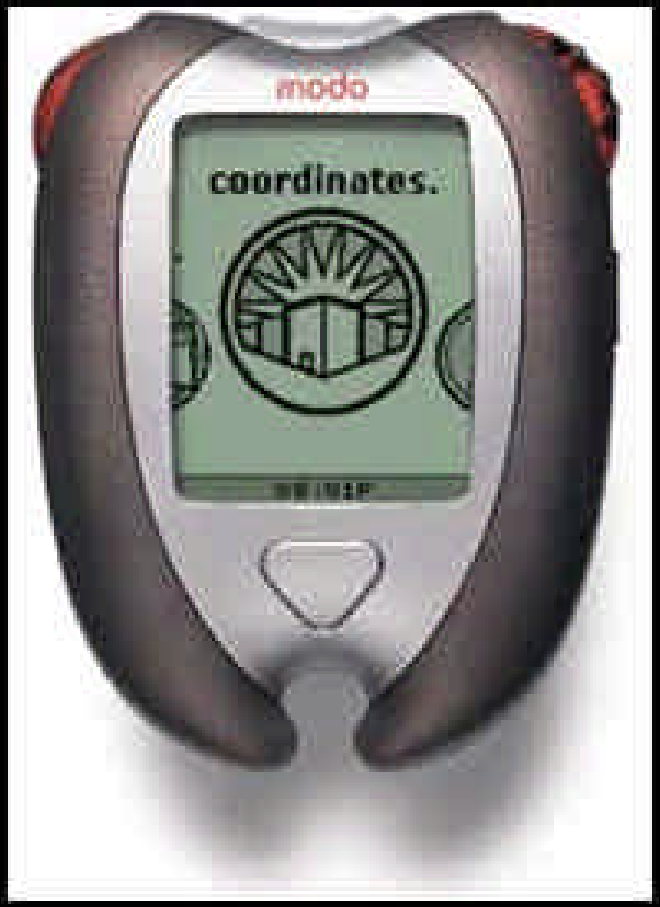
Proximity Services Surfacing



Modo's blitz marketing campaign pitches the device as a PDA for the hipper set

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The Voice Activated Web
(a.k.a. “Dick Tracey Web”)

- Voice activation
- Agents, bots
- Studs
- Always on
- Continuous real time

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10 Predictions about The Future

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Prediction 1

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Prediction 2

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Easy to Use

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Java Devices

Maytag
Best Buy
OSGI
Chrysler
GM
Ford
onstage
Telematics

DVB
CableLabs
DTVIA
ATT
GI / Moto
Liberate
SA

ESTSI
3GPP
Nokia
Ericsson
Motorola
DoCoMo
Samsung
Siemens
Palm

Nextel
NTT DoCoMo
Vodaphone
One2One
Sprint PCS
Telefonica
Omimitel
SmarTone

GSM SIM
Amex
Visa
Schlumberger
Oberther
Gemplus
Swisscom
Hong Kong Telecom
Telefonica
Tele Denmark Mobile
Telecel

Java 2 Micro Edition
Foundation Profile
Personal Profile
TV
Auto
Phone
MIDP
CDC
CLDC

Java Card

JVM
KVM
Card VM

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Prediction 3

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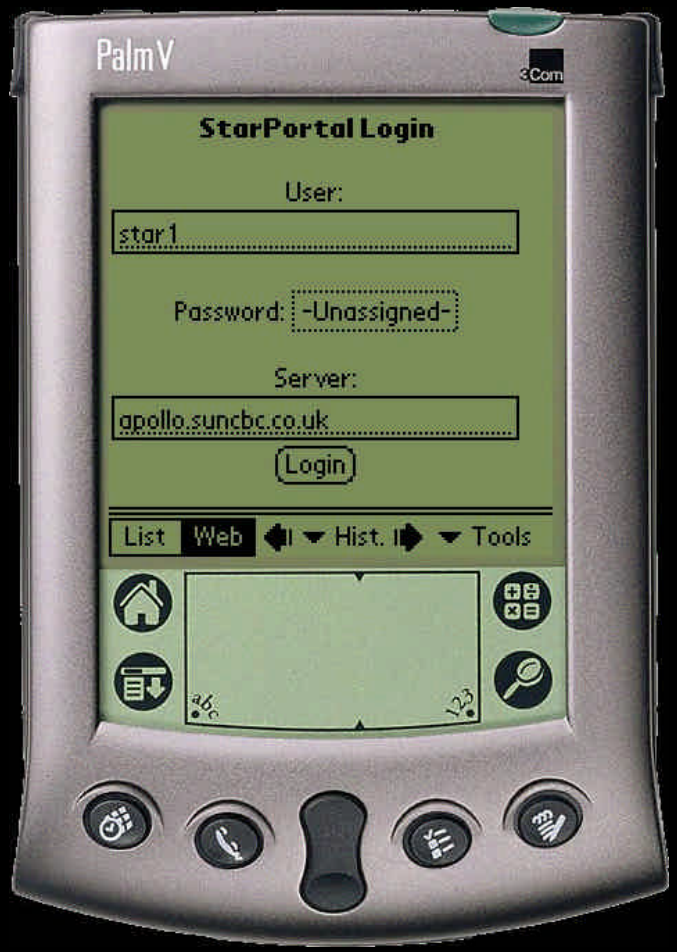
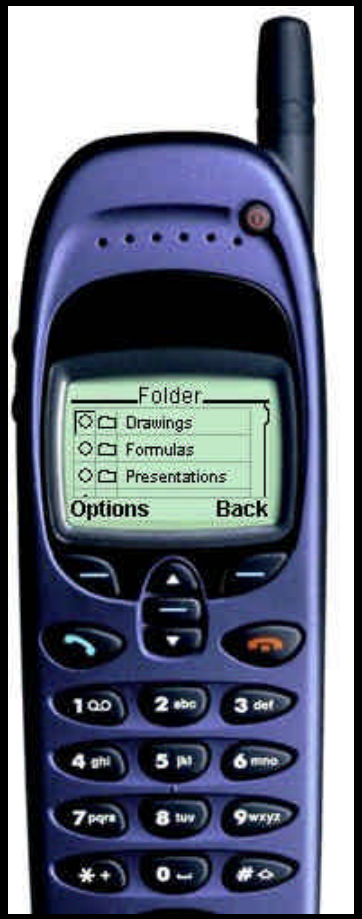
StarPortal

PalmPilot



Cellular phone



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Prediction 4

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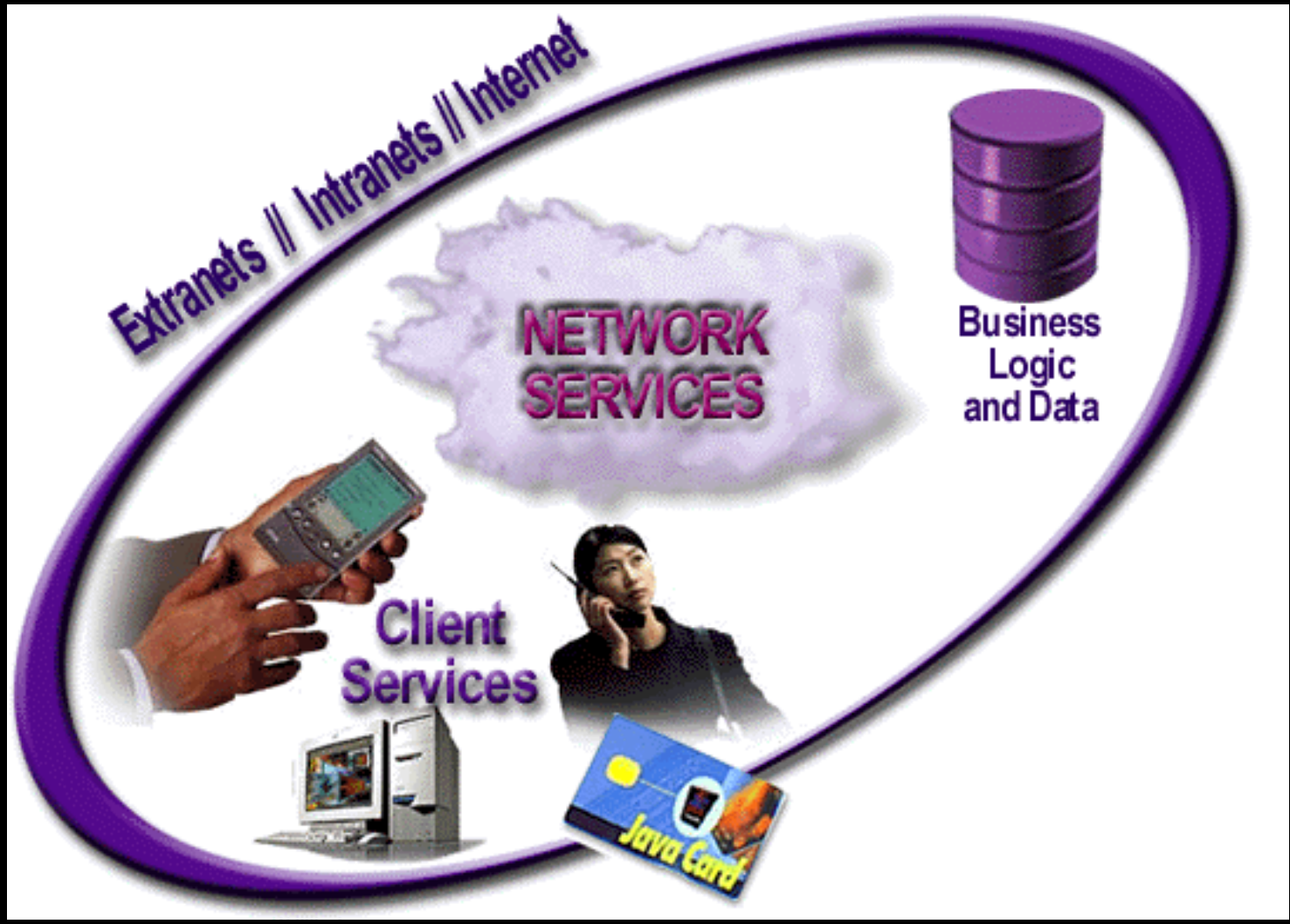
Prediction 5

Extranets and Intranets Converge



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Prediction 6

Software will be everywhere

Drive C: will be on the net

Applications will turn into services delivered through portals

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Prediction 7

The Unpredictability of Capacity required

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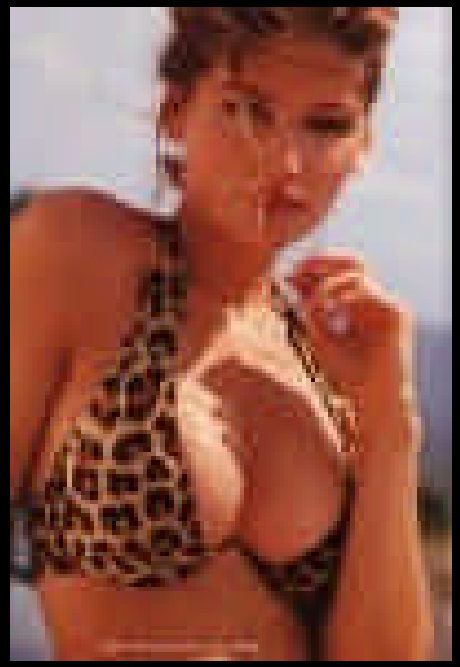
From 10 to 50‘000‘000 Hits in 90 Seconds . . .



Laetitia Casta in Victoria_Secrets-Online

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Prediction 8

Everything will be Mission Critical

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Prediction 9

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Prediction 10
The big transition

- From our product centric industry to a service centric industry
- Products (and content?) will metamorphose into services (Jini)
- Light bulb -> illumination lease

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The Quest For Connectivity

"Hello, Bob? It's your father again.
I have another question about my new computer.
Can I tape a movie from cable TV then fax it from
my VCR to my CD-ROM then E-mail it to my
brother's cellular phone so he can make a
copy on his neighbor's camcorder?"

Big Questions

- How rich does the set of network-supported services become?
- How can we interoperate without a PhD in networking?

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The Answer

Everything becomes a Network Service!

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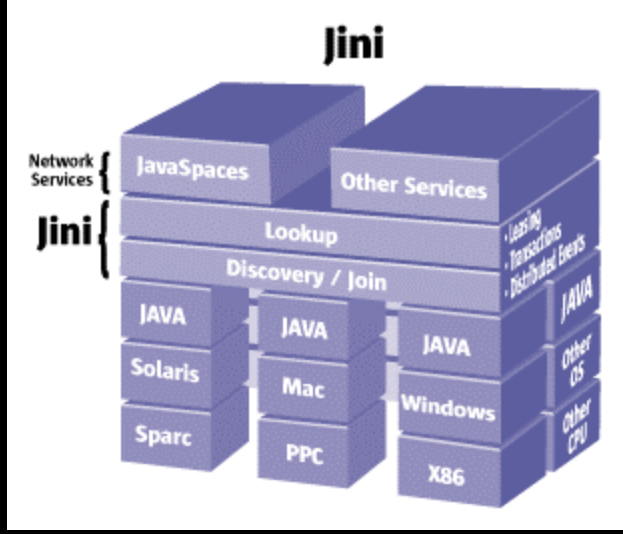
What is Jini?



- Software layer (48kB) to describe services to the net
- Runs on all Java Virtual Machines (JVM) on any device ("from mainframe to toaster")
- Only the Front-End of the service is transmitted---Distributed Computing
- Lease mechanism makes Jini resilient
- End of all Protocols as we know them

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The Problems Jini Solves

- Building reliable systems
  - From unreliable parts
  - Without global knowledge
- Scaling over space and time
- Dealing with the network
  - Moore's law is an area law
  - Gilder's law is a volume law

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The Jini Approach

- Mobile objects change the world
- Take the network seriously
  - Deutsch's Seven Fallacies
  - Transparency is harmful
- Object-oriented approaches work
  - Define with interfaces
  - Extend with polymorphism
  - Trust others to implement correctly

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Deutsch's Seven Fallacies

- The network is reliable and homogeneous
- The network is secure
- Latency is zero
- Bandwidth is infinite
- There is (exactly) one administrator
- Membership on the network is stable
- The network topology doesn't change

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The Jini Aesthetic

- Simplicity over all
  - Being simple is hard
  - It is worth the effort
- Take failure seriously
  - Exceptions are part of the interface
  - Dealing with failure is not a system issue

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What This Means

- Jini is a technology
  - Not a product
- Jini is an architecture
  - Not an implementation
- Jini is an approach to problems
  - Not an answer to (all) problems

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Goals of the Technology

- Reliable networks
  - Even with unreliable parts
- Scaling
  - Over space, size, and time
- Interfaces are more stable than
  - Implementations
  - Wire protocols
  - Hardware or software

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Services, not Computers

- Networks are made up of
  - Services, defined by their Interface
  - Clients, who use those services
- Interaction is between programs
  - Humans rarely in the loop
- Freedom from human intervention
  - We don't need to be involved
  - We don't want to be involved

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What to do

- Technology ithout services is worthless
- Think *services services services*
- Encourage industry to „go services“
- Governments can join the „Digital Nations“ project of MIT/Harvard

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Service Driven Network

Solaris™ is .com grade platform

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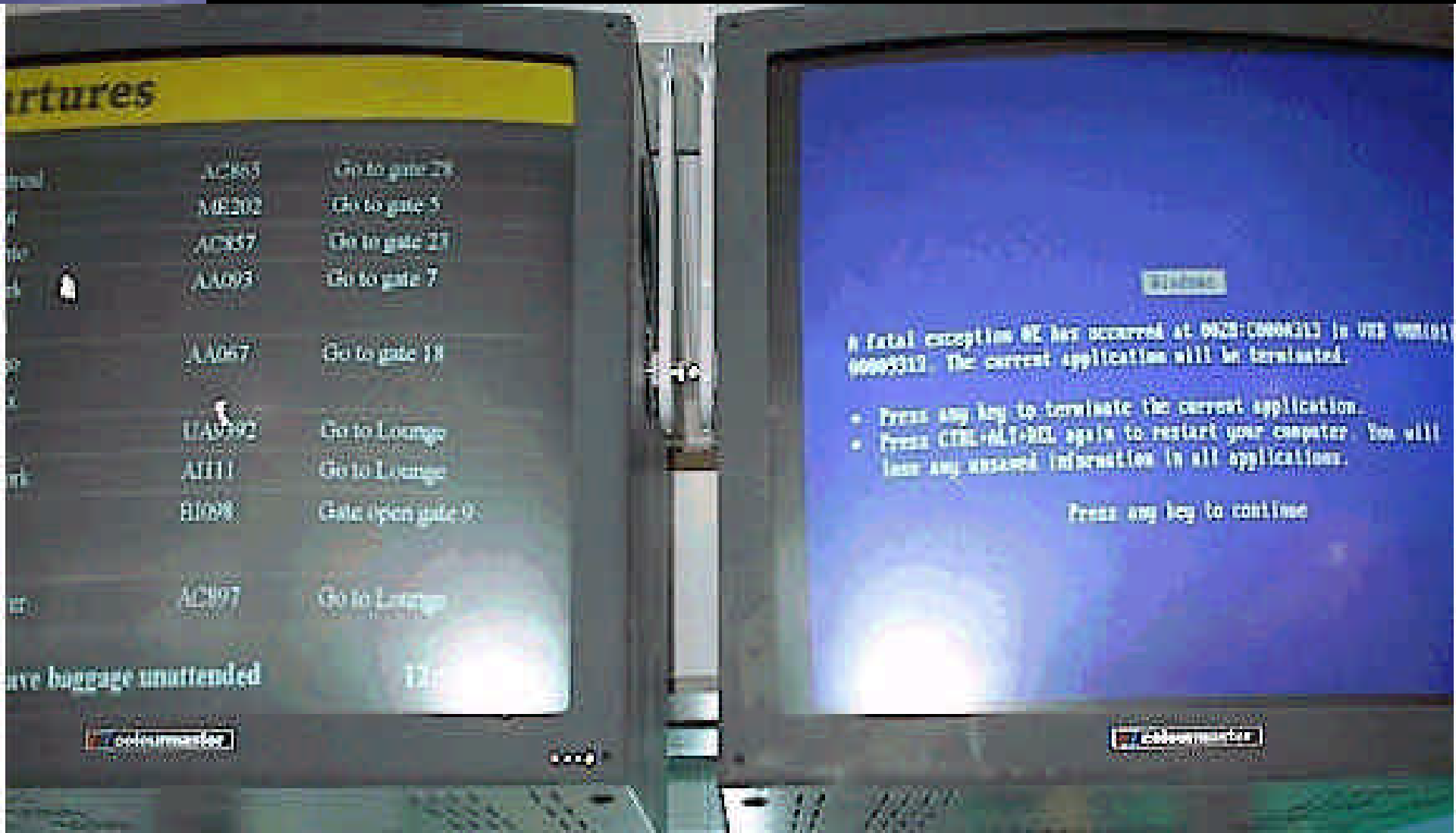
May The Force (of Solaris) Be With You . . .



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