

R&D Roadmap for Telecommunications

Jeff Jaffe

Executive Vice President, CTO - Novell

Formerly President Research and
Advanced Technologies, Bell Labs



Novell.

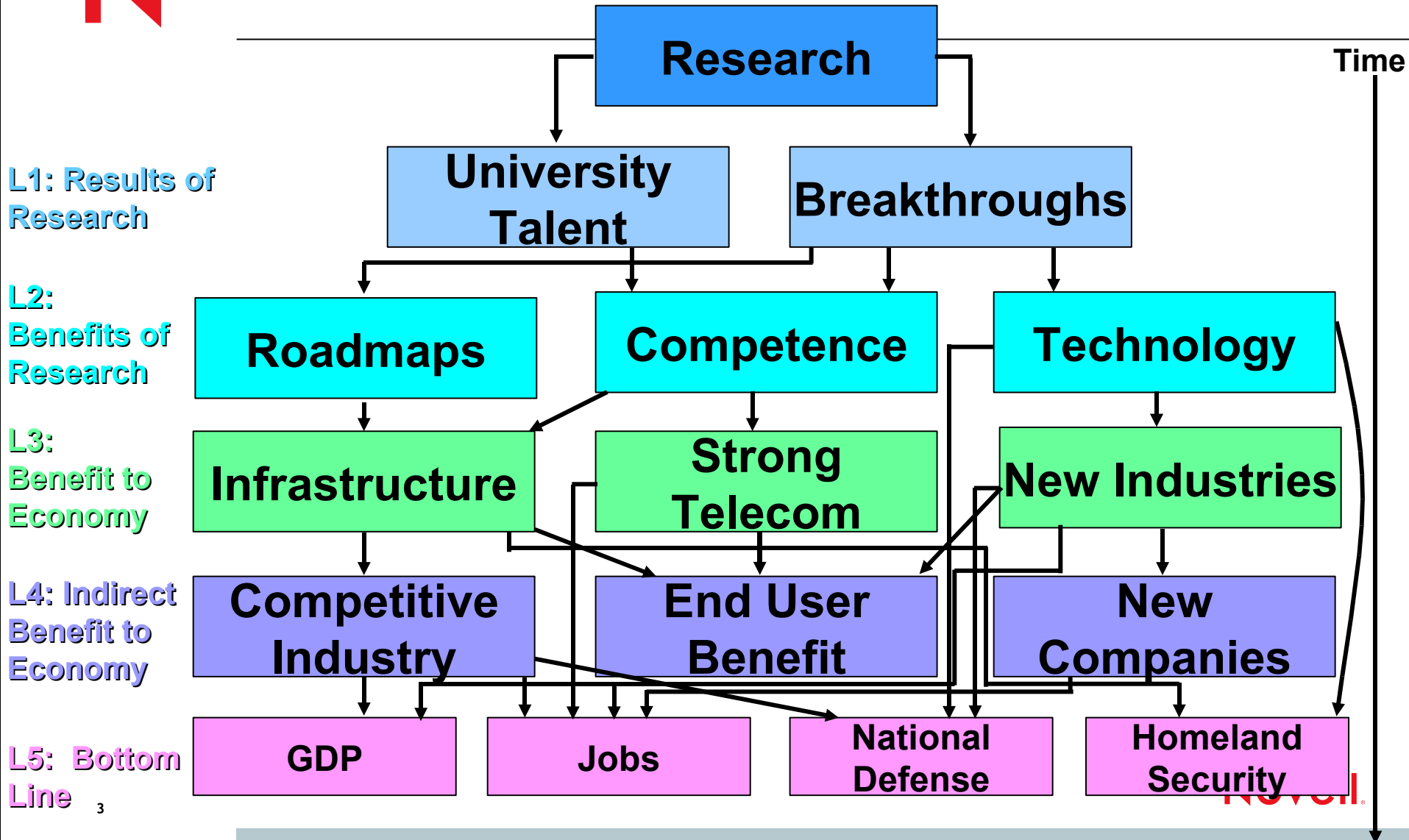


My journey

- R&D funding in telecommunications
- Secure, natural communications as a transformational technology
- Open Source as a transformational technology



Telecom Research ecosystem





TIA Research Agenda

- Interoperable wireless
- Broadband
- Homeland security
- Mobile Internet
- Network architecture
- Nanotechnology



Disruptive and Transformational Technologies

Disruptive Technologies

- Liquid Crystal Displays
- Lithium Ion Batteries
- Solid State Lighting
- Windows Operating System
- Ink Jet Printer
- Nuclear Reactors for Submarines

Transformational Technologies

- Automobile
- Airplane
- Computer
- Telephone
- Transistor
- Steel, Aluminum
- Electric Power
- **Nanotech**
- **Open Source**

N Secure, Natural Communications



I can at will have a rich communications experience anytime with anyone without dealing with distance or devices.



Distance disappears as a factor

Eliminate care and feeding of devices (batteries, docking stations, dialing conventions, mailboxes)



This is enabled by ubiquitous sensors, a wireless network, and much more

Novell.

N How Would I like to Communicate?

- I don't want to use devices: I simply want to talk
- I want to be able to communicate with the kids without shouting through the house
- Distance should disappear as a constraint – or even as a factor
- When I communicate with someone, I want to see what they see – and vice versa
- I shouldn't be involved in care and feeding: purchasing batteries, docking stations, dialing conventions, mailboxes
- Communication networks should not only help me remotely. I want to communicate clearly to another person in a noisy room.
- I want to whisper to the person standing across the street and have (s)he alone hear what I have to say
- When I want a group of people to communicate with, the network finds them
- I want to be able to see, hear, smell, taste, feel what is going on remotely. I want all my senses to be enabled.

N How Can We Do This?

Research in systems, networks, and mobility

- Mobile networks will have fundamentally new design points
- Natural human interfaces: speech recognition
- A services infrastructure provided by networks: IMS
 - More algorithms will be needed over time
- 3G, WiFi, VOIP, FTTH, adaptive antennas,....

Nanotechnology inspired devices:

- Sensors to sense everyone's speech
- Microphones, directionality, etc.
- Power sources so that batteries are not an issue
- Devices that can visualize exquisitely
- Lenses that adjust focus to help visualization

And we will need to apply security and privacy technologies as an overlay



Open Source as a Transformational Technology

- Transforms every industry
- Today's talk: how it transforms telecom
- Telecom Background
 - Convergence: telecom and I/T are coming together
 - Function is moving from hardware to software
 - Community model to rapidly develop software



Business Landscape

The Pressure is Enormous

Competition

- Commoditization - Good Enough
- Imports - China, Korea
- New Business Models

Disruptions

- Unforeseen Disturbance
- Linux/Open Source
- Internet, Y2K

Regulation

- Homeland Security Act
- Sarbanes-Oxley
- HIPPA



Customers

- Anywhere, Anytime Access
- More for Less, Less, Less
- Why Buy It Here?

Acquisitions

- Eliminate Competition
- Strengthen Offering
- Change Direction

Globalization

- Workforce
- Expanding Markets
- Border-mania

N So Where's the Disruption?



Is it Linux: either the kernel or distribution?
Real vs. Imaged Benefits: Control, Cost, Choice,
Community, Reliability, Support, Security



Is the real disruption really a new process -
open collaboration for development?



It appears that the disruption extends beyond
software. Consider:

WikiPedia - Open Content Encyclopedia



Open Source, How Did We Get Here?

Open Source: Any software whose code is available for users to look at, modify, reuse and redistribute freely

- It's Possible
- Legal Framework
- The Internet
- Computer Literacy
- Increased Demand
- Structured Bazaar
- Unmet Needs
- Working Business Models

N

Linux/Open Source for Telecom

Until Recently: Telecom product software has been mostly built from scratch

A significant transformation is happening in the way products are designed and built

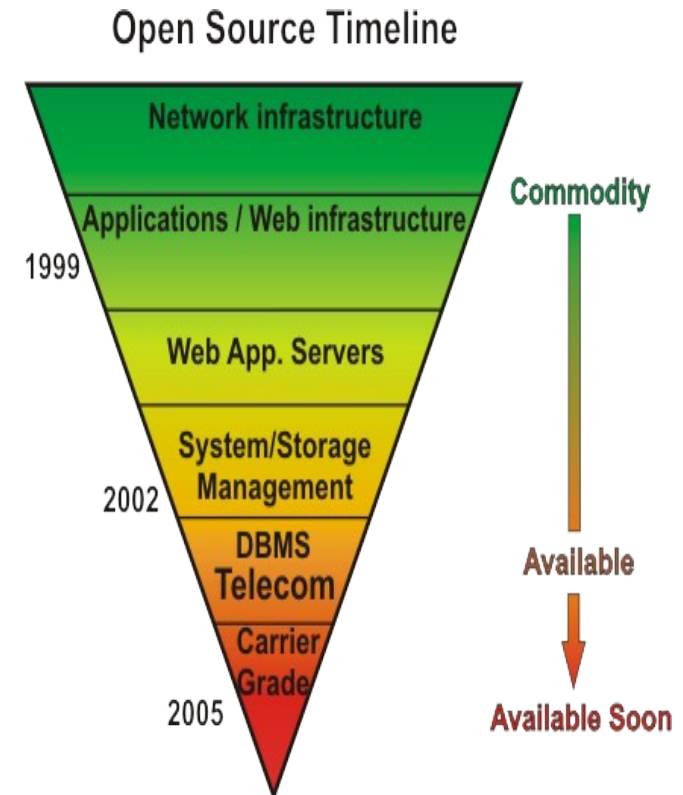
- Open source components
- Platform architectures

It has happened in other industries & will happen in stages

- Applications, OSS, systems

Effects

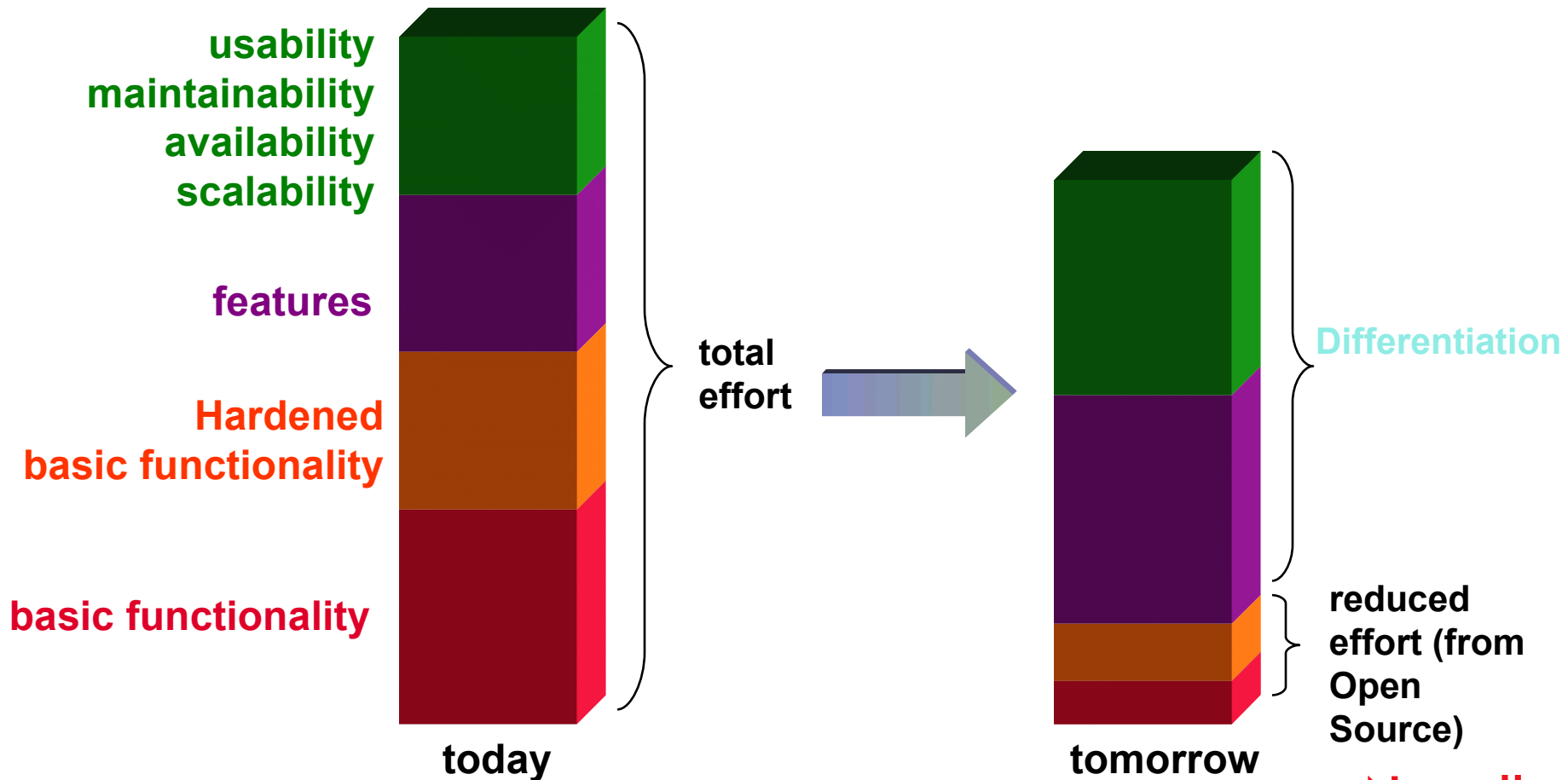
- Increased flexibility (buy vs.build), lower development costs, faster time-to-market



Novell.

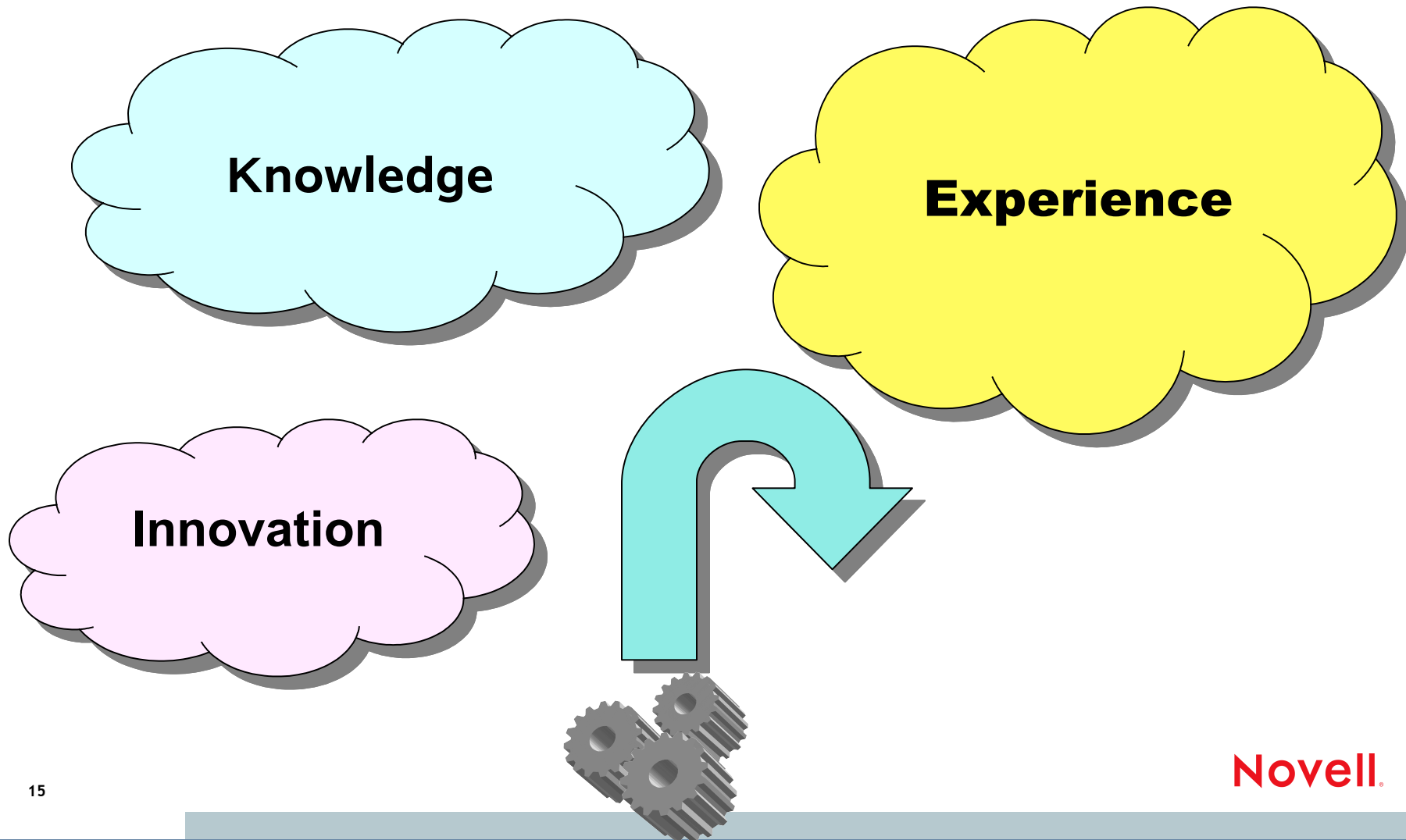


The Benefit of Successful Open Source Use



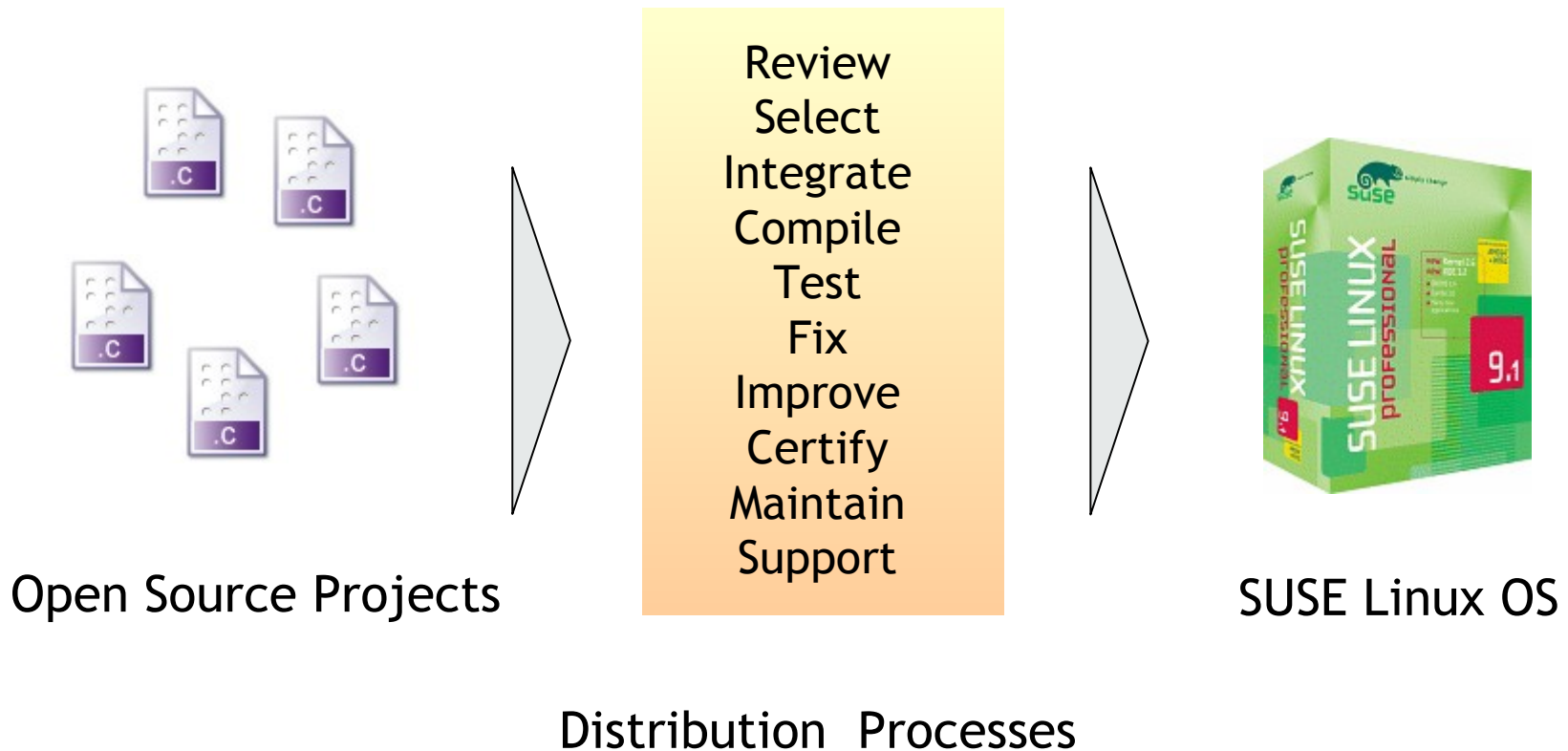
N

To Lead this Change





Linux Distribution Factory



N

Just as Linux has come to the Data Center it will come to Telecom



Data
Center

- Corporate Web Site
- Enterprise Resource Planning
- Customer Relationship Management
- Supply Chain Management

Open Source

Commercial

Application	e.g. Compiere	e.g. MySAP.com
Application Server	JBoss, JoNAS	WebSphere, WebLogic
Database	MySQL, Ingres, Postgres	Oracle, DB2
File System	EXT3,XFS,Reiser,GFS	OCFS2,PSFS
High Availability	Heartbeat	VCS, Matrix Server
Volume Management	EVMS	VxVm
Platform	Linux	Linux Novell.



Summary

Time to retool R&D in telecommunications

Nanotechnology affords a transformation in how we communicate

Open Source affords a transformation in how new communications systems are built

Novell®