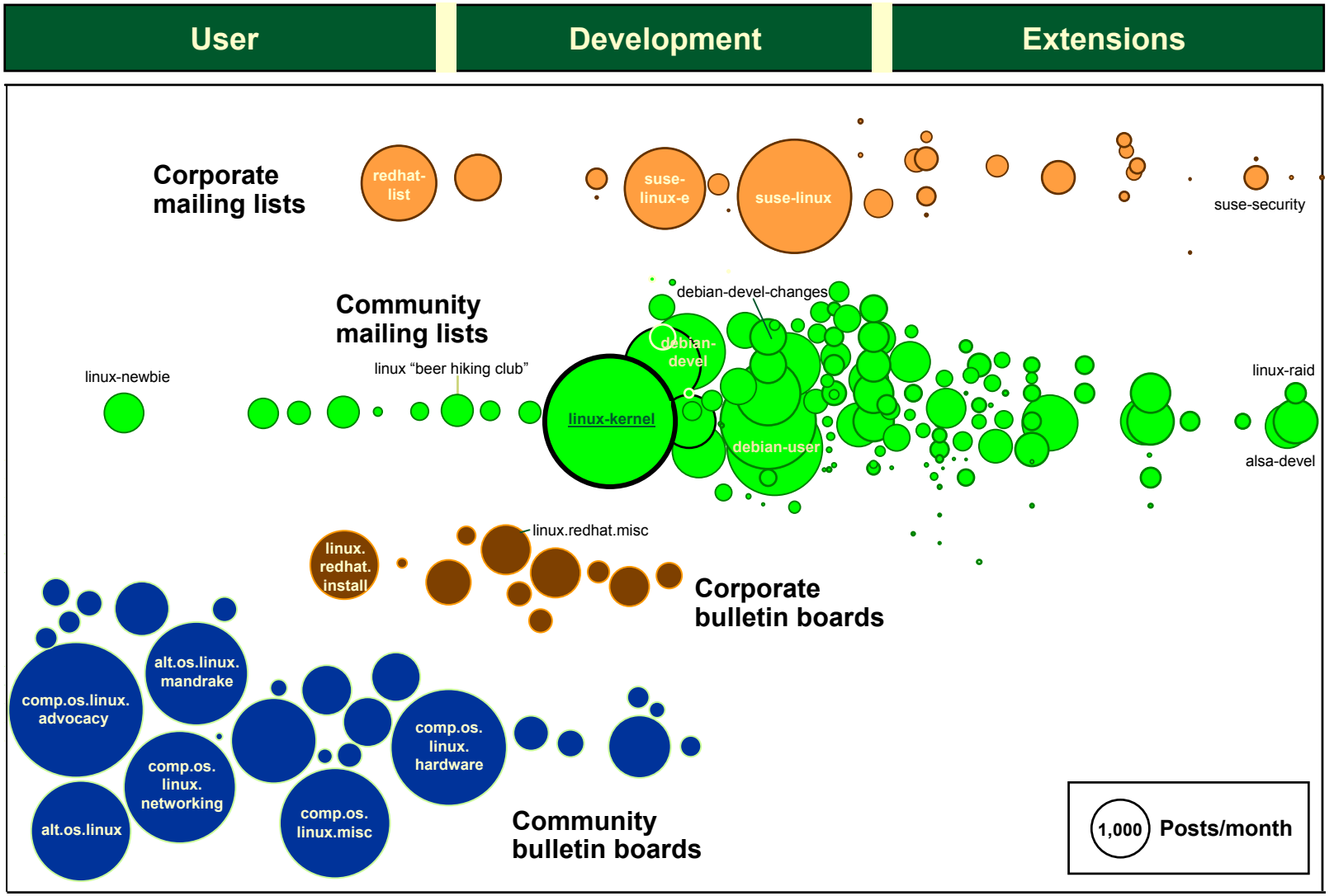
NETWORK ANALYSIS AND BUSINESS: WHY BCG CARES

Boston College

16 March 2004

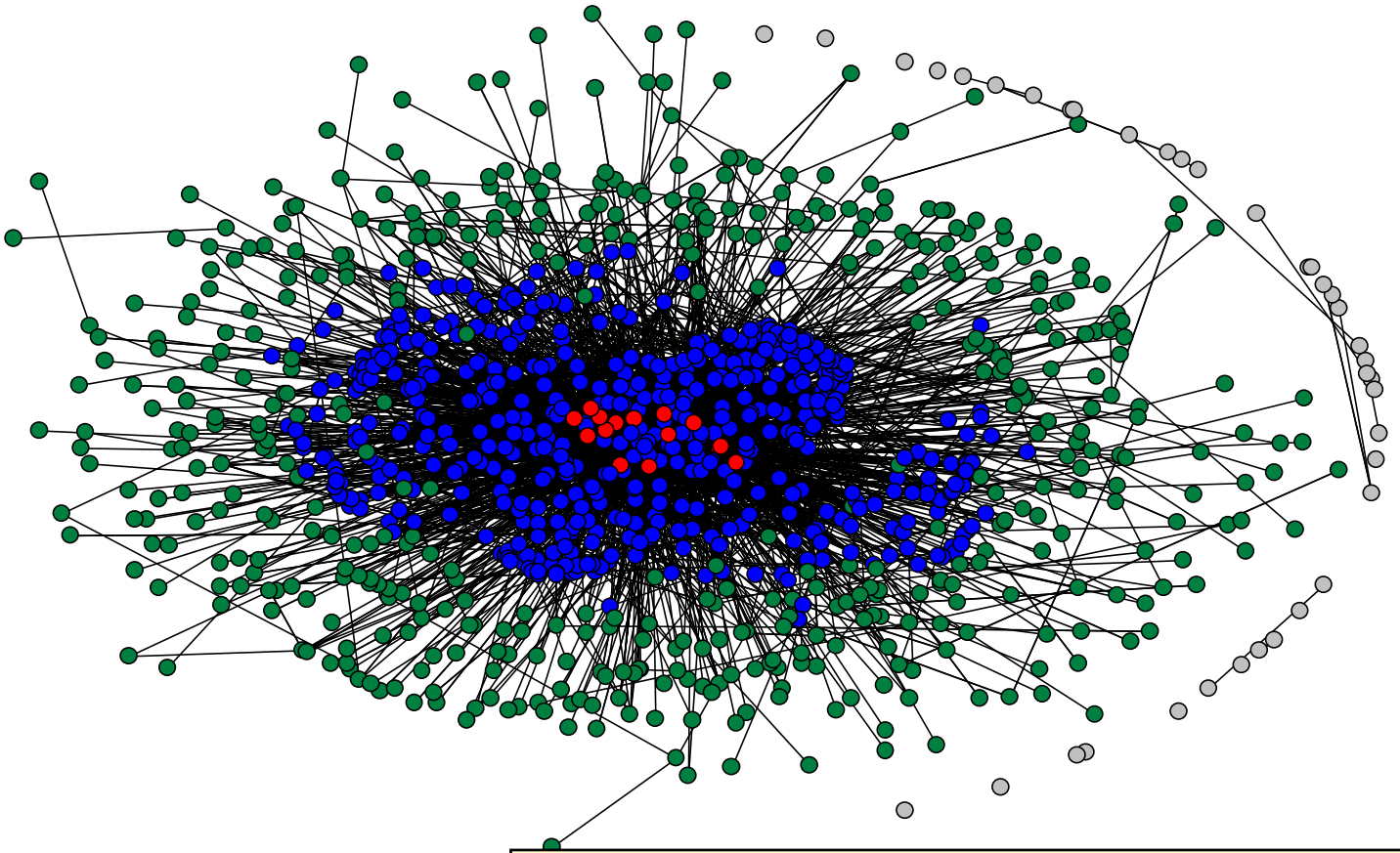
THE BOSTON CONSULTING GROUP

LINUX ENTERPRISE COORDINATED BY EMAIL



Note: Number of messages posted in June 2000 on 147 relevant bulletin boards and mailing lists (duplicate postings removed)
Source: deja.com; geocrawlers.com; BCG analysis

THE LINUX KERNEL MAILING LIST: IT'S ALIVE!!!



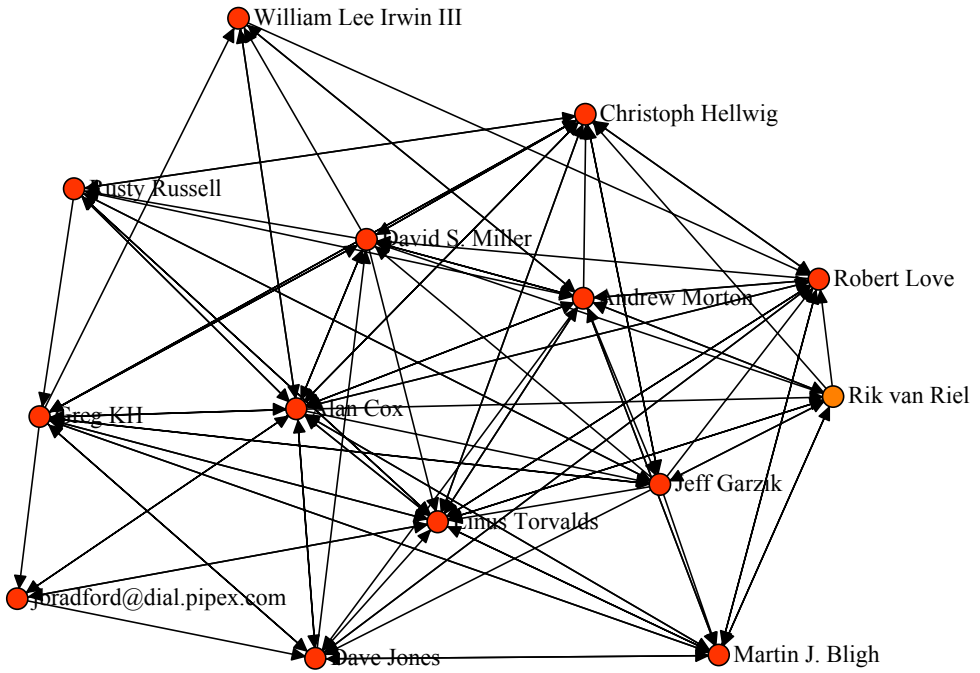
- Active Participants
- One step reach to AP's
- Two step plus reach to AP's
- Other components

Self-organizing "ecosystem"

- Core players "swarmed" by the periphery
- Many interests at play simultaneously

Source: Linux kernel mailing list October 2002, BCG analysis

ACTIVE PARTICIPANTS ARE HIGHLY CONNECTED



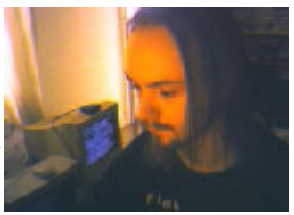
Density: 70%

Transitivity: 76%

Source: Linux kernel mailing list, October 2002; BCG analysis

COMPANIES WITH LINUX INTERESTS EMPLOY ACTIVE PLAYERS

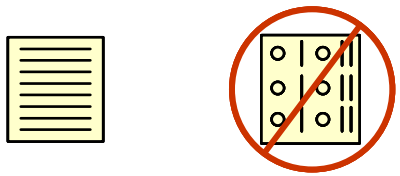
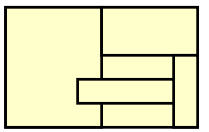
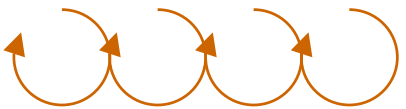
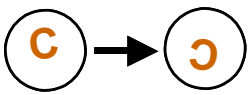
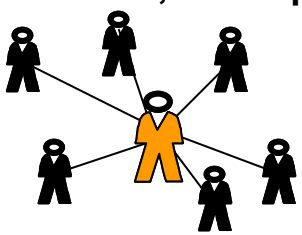
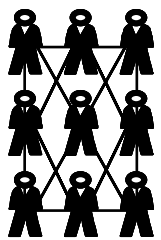
Name	Ego Network Size	Nationality	Employer
Alan Cox	169	British	Red Hat
Andrew Morton	91	Australian	Moxi Inc.
Linus Torvalds	75	Finnish	Transmeta Inc.
Dave Jones	72	British	SuSE
Jeff Garzik	71	-	Mandrake
David S. Miller	68	US	Sun Micros.
Greg KH	63	US	WireX
Christoph Hellwig	51	German	SCO/Caldera
Rusty Russell	48	Australian	IBM (Ozlabs)
William Lee Irwin III	46	US	IBM (LTC)
Rik van Riel	42	Dutch	Conectiva
Martin J. Bligh	41	British	IBM
Robert Love	40	US	Student
John Bradford	36	-	Freelance cons.



Commercializing Linux
Software
Hardware

Source: Linux kernel archive, Factiva. Lwn,net/Articles, BCG analysis

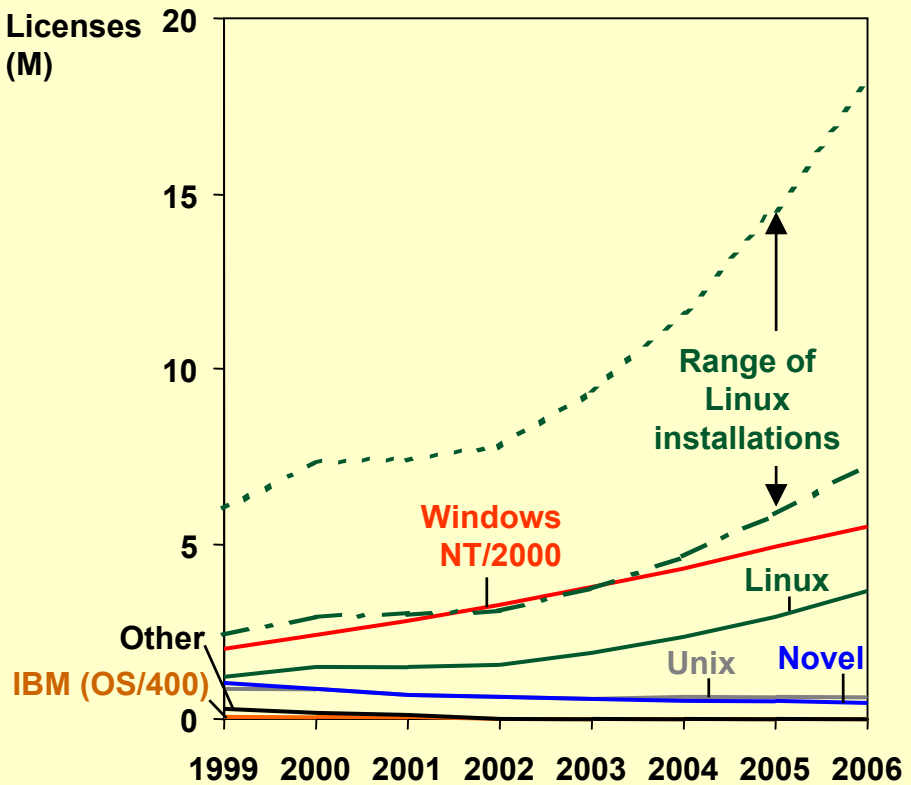
TOWARD NETWORK PRINCIPLES: HOW OPEN SOURCE DOES IT

"Rules of the Game"	Motivating Participants	Development paradigm
		
Code should be open "Free speech, not free beer"	Good ideas come from solving a problem or scratching an itch	Modularize code
		
"Copyleft"	"3 community obligations: to give, to receive, to reciprocate"	"Release early, release often"
		
"Viral copyright"	Peer leadership - vision, engagement, code	Teams know where to find what they need

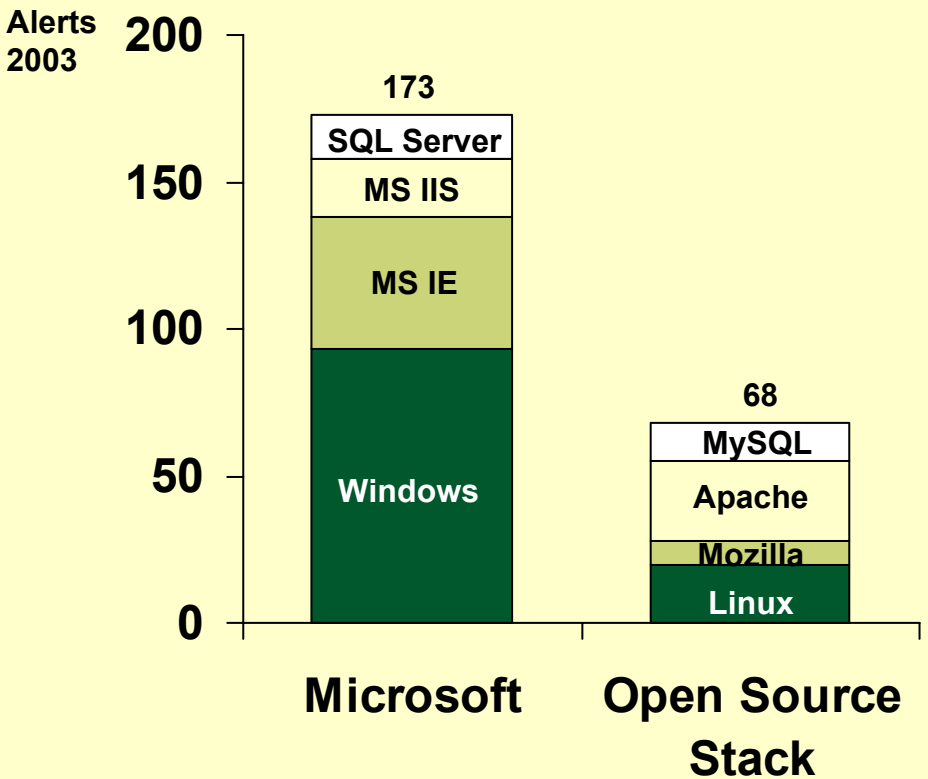
LINUX IS A CRITICAL CHALLENGE TO MICROSOFT

Security Is an Advantage for the Open Source OS

Revenue producing licenses



Public security vulnerability for server stack



ON THE MORNING OF DECEMBER 2, 2003, MARTIN POOL RECEIVES TWO EMAILS WITHIN AN HOUR OF ONE ANOTHER

To: mbp@samba.org, tridge@samba.org
Subject: rsync server compromised, possible vulnerability
From: Andrea Barisani <lcars@infis.univ.trieste.it>
Date: Tue, 2 Dec 2003 23:52:33 +0100

Hi, I'm contacting you about a possible security vulnerability in rsync. Please keep this information confidential. A detailed report will be released to the public once I've exaatcly found what happened. These are some extract of the report I've written. Also see the attachment please. I would appreciate any help in finding out what happended. Bye and thanks

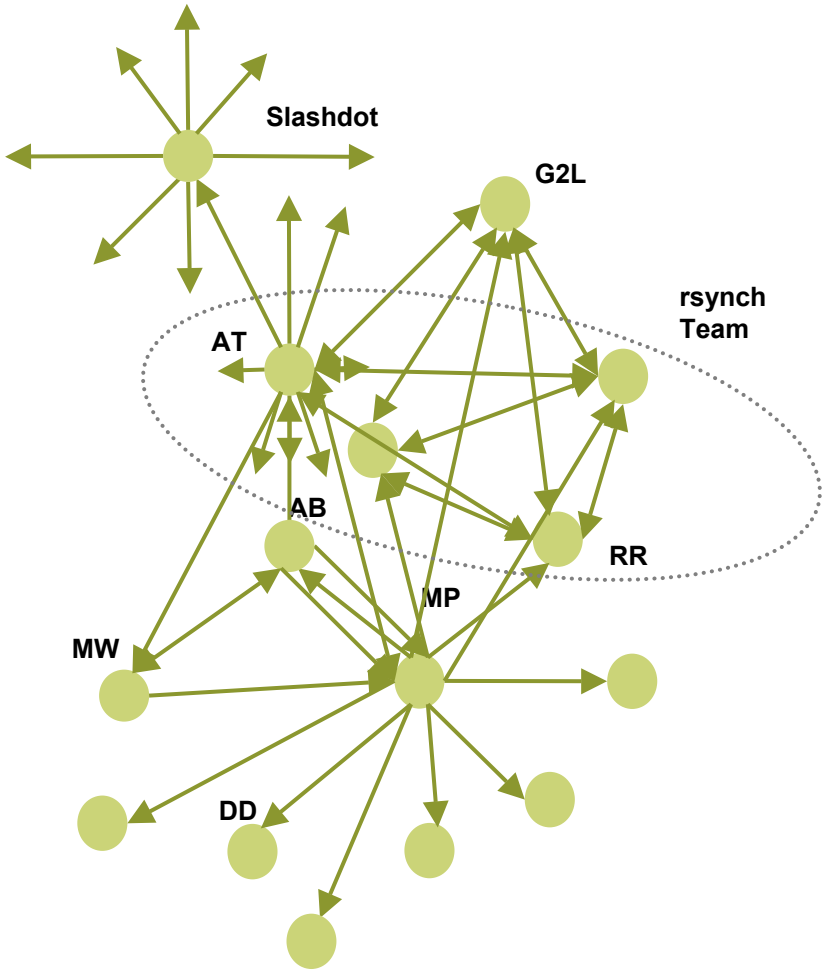
---

Today around 03:43 UTC my server (140.105.134.1) was compromised. These are the known facts, the analysis was made by me (lcars) using forensic data from the disks, IDS logs and integrity checking.....

- The box was found tomorrow freezed for no apparent reason, it seems that shortly after the compromise something wrong happened, it was not a proper shutdown. This could be consistent with a kernel exploit....
- The server is a Gentoo box with all latest updates except for the kernel which at the time of the compromise was 2.4.21-ac4.
- The attack vector was definetly rsync....

To: Martin Pool <mbp@samba.org>
Subject: Rsync...
From: "Michael H. Warfield" <mhw@wittsend.com>
Date: Tue, 2 Dec 2003 18:42:13 -0500
Cc: mhw@wittsend.com

Martin, Are you the current maintainer of record for rsync. Tridge suggested I get in touch with you. Not positive, but there may be a problem we need to touch base on.
Mike



Security breach reported by sysadmin AB to MP and others. In parallel, security specialist MW emails MP about same issue. MP does 4 hours of homework

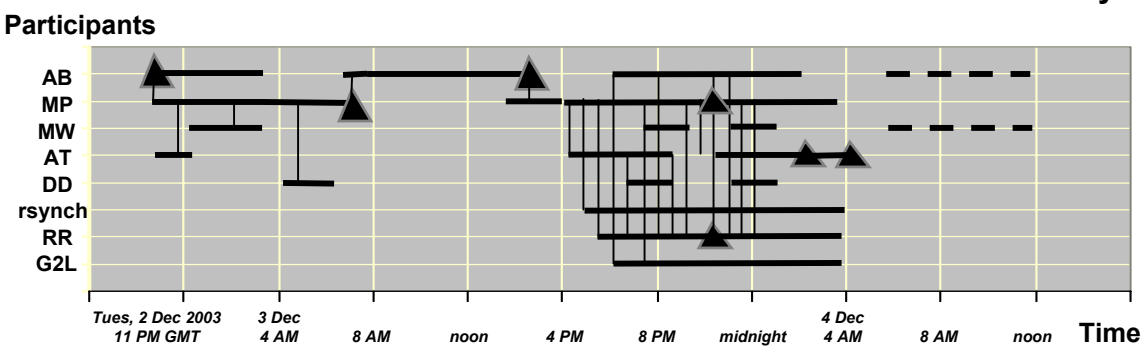
Security beaches are recognized as threat by entire Linux network, but any one breach must be kept confidential within a trusted team until under control

MP studies available data, consults with security expert DD, and engages with AB by phone

On three hours of sleep, AB digs into 8 hour forensic investigation, hands to MP

MP pulls in rsync team including AT, RR, plus Gentoo Linux and other security specialists. MP and RR write patch and has it vetted by others

In parallel, BT writes technical announcement to WW Linux community and has it vetted by team; only social recognition edits suggested



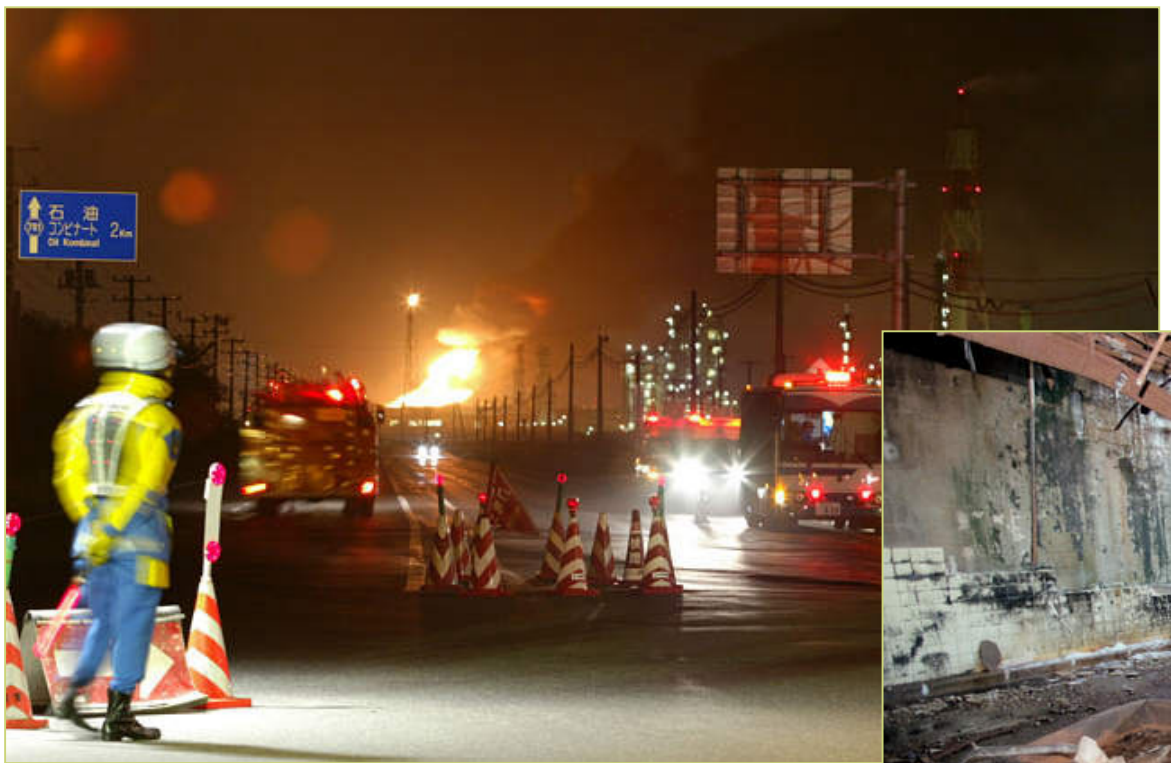
WW announcement out to vendor community, Slashdot, and other lists; discussion about outreach to users

Work on “honey pot” started by AB and MW

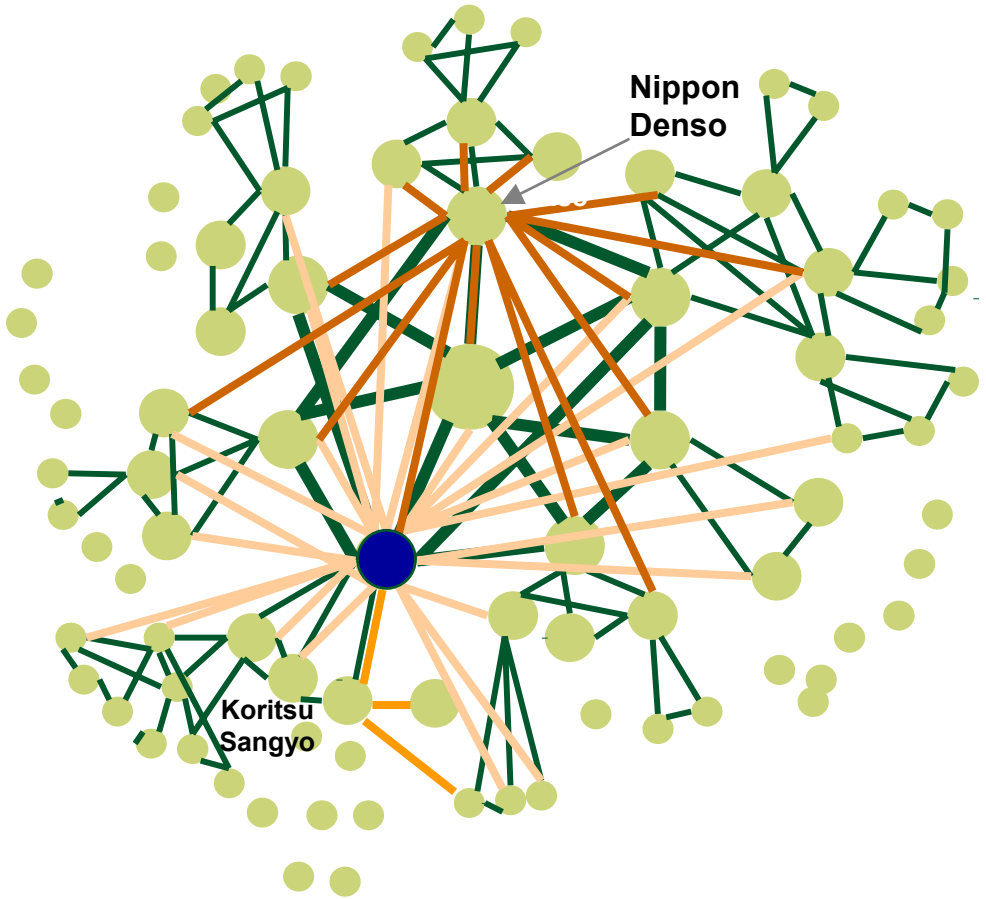
NETWORK BUILT A HONEY POT BEFORE THEY WERE FINISHED

FIRE AT THE KARIYA #1 PLANT OF AISIN SEIKI

4:18 AM February 1, 1997



Source: SMR



Fire at Kariya #1 Plant – Toyota's sole source of P-valves (for brakes)

Entire TPS faces shutdown within 72 hours

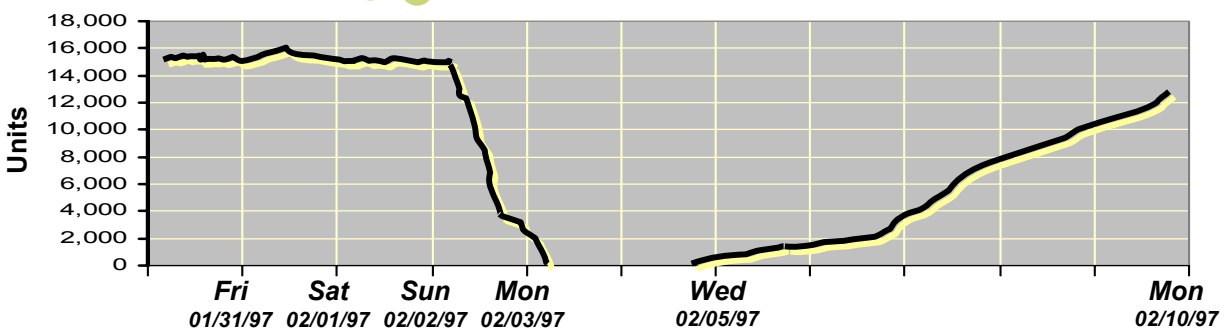
Aisin, Toyota and other Tier One Suppliers collaborate on an emergency production plan

Tier 2 suppliers team up, under leadership of their Tier 1's

Aisin distributes blueprints, raw material, undamaged drills, and assigns staff

22 of 30 plants closed; TPS self organizes to save system, e.g.

- **Nippon Denso volunteers as the logistics manager**
- **Toyota turned to its R&D prototype department**
- **Koritsu Sangyo, a tiny Tier 2 supplier to Aisin, was first to deliver P-valves**

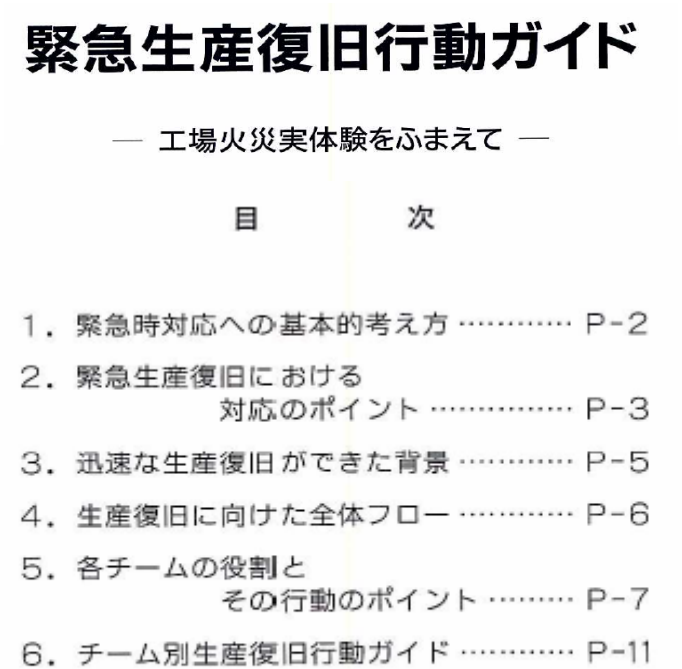


First 1000 'P' valves shipped to Toyota

Daily output of 13,000 vehicles; 62 firms manufacturing "P" valves

Source: SMR, WSJ

AISIN SEIKI CONCLUDES EPISODE BY DOCUMENTING WHAT TPS HAD LEARNED



緊急生産復旧行動ガイド

― 工場火災実体験をふまえて ―

目　　次

1．緊急時対応への基本的考え方 …… P-2
2．緊急生産復旧における対応のポイント …… P-3
3．迅速な生産復旧ができた背景 …… P-5
4．生産復旧に向けた全体フロー …… P-6
5．各チームの役割とその行動のポイント …… P-7
6．チーム別生産復旧行動ガイド …… P-11

Procedural Guide for the Emergency Resumption of Production

— *Reflecting First-Hand Experience of a Factory Fire* —

Aisin Seiki Co., Ltd.

Contents

1.	**Thoughts About the Emergency Response**	**p. 2**
2.	**Topics Regarding the Response to Emergency Production Resumption**	**p. 3**
3.	**Background to the Swift Resumption of Production**	**p. 5**
4.	**Master Workflow for Production Resumption**	**p. 6**
5.	**Each Team's Role and Points about the Procedures**	**p. 7**
6.	**Procedural Guide for Production Resumption by Individual Team**	**p. 11**

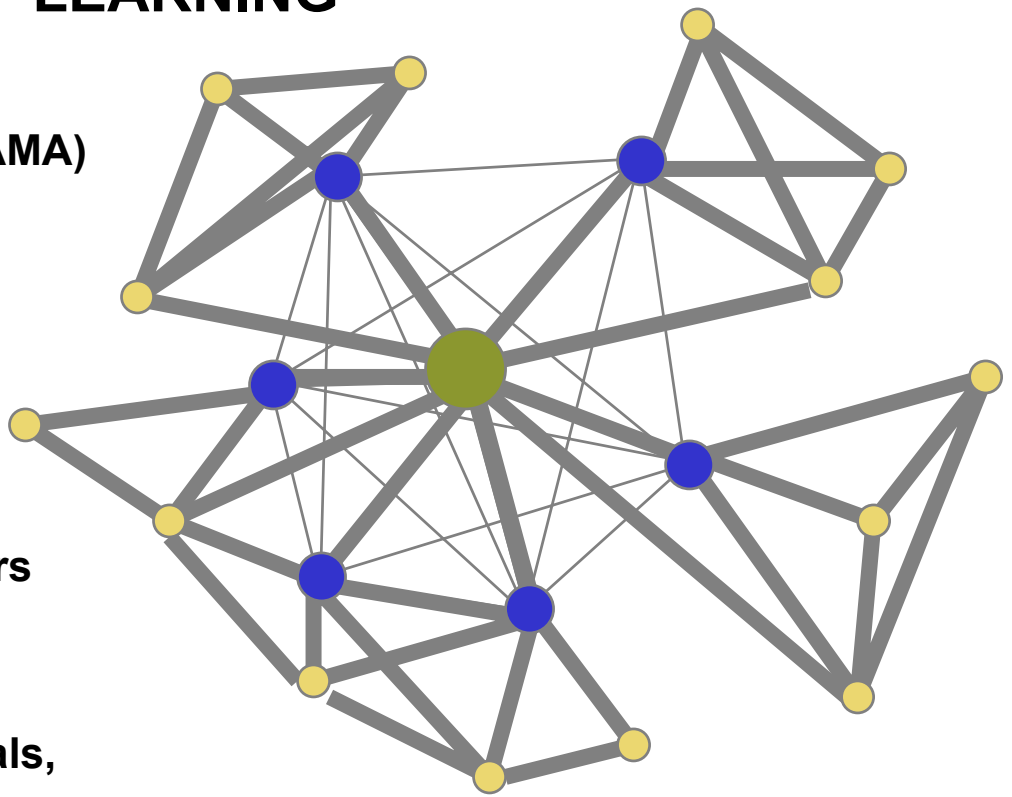
Source: Toyota

TOYOTA BUILDS ITS SUPPLY CHAIN TO ENHANCE NETWORK LEARNING

Phase 1: Supplier associations for Tier 1 suppliers (kyohokai, BAMA)

Phase 2: Toyota consults for free to Tier 1 suppliers (OMCD, TSSC)

Phase 3: Nested networks and learning groups spanning Tier 1 and 2 suppliers (jishyuken, PDA); interfirm employee transfers (shukko)



Across the chain, Toyota builds

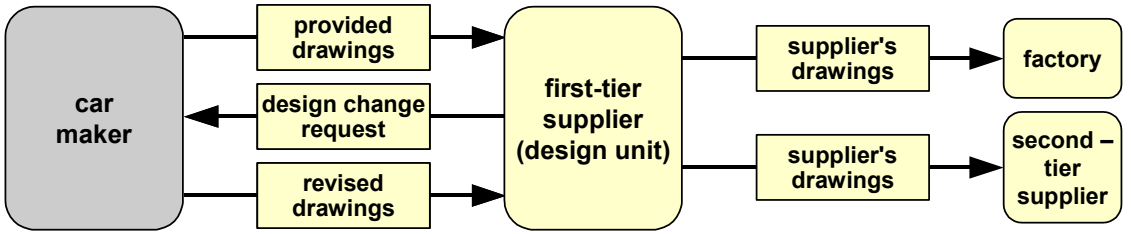
- **Affiliation, loyalty, shared goals, mutual dependence**
- **Open knowledge-sharing based on a common 'semantic'**
- **Teaming norms**
- **Trust that all will be treated fairly**
- **Dense collaboration networks**

Common principles used in Japan and North America

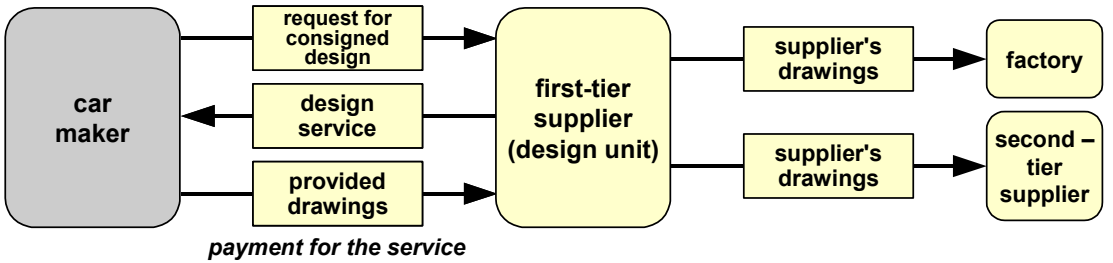
Source: Dyer and Nobeoka "Creating and managing high-performance knowledge-sharing network: the Toyota case" SMJ, 2000

LONG TERM TRENDS IN PARTS SOURCING SYSTEMS EMPHASIZES INCREASING TRUST IN SUPPLIERS

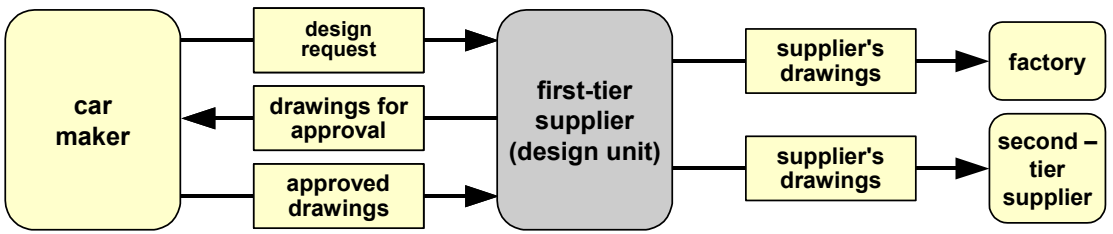
Detail-controlled parts (Provided drawings)



Black box parts (Consigned drawings)



Black box parts (Approved drawings)



Owner of the drawings

Source: Fujimoto *The Evolution of a Manufacturing System at Toyota*

TPS SUPPLIERS SELF-ORGANIZE ON MAJOR INITIATIVES

Supplier Network Restructures Over Time

Toyota Encouraging Supplier Consolidation, Collaboration

Recent projects

- Interior parts and seats (in discussion, August 2003)
- Brake products: ADVICS (July 2001)
- Plastic fuel tanks: FTS (Feb 2002)
- Electronic power steering (Nov 2002)
- Map databases: Toyota Mapmaster (1998)

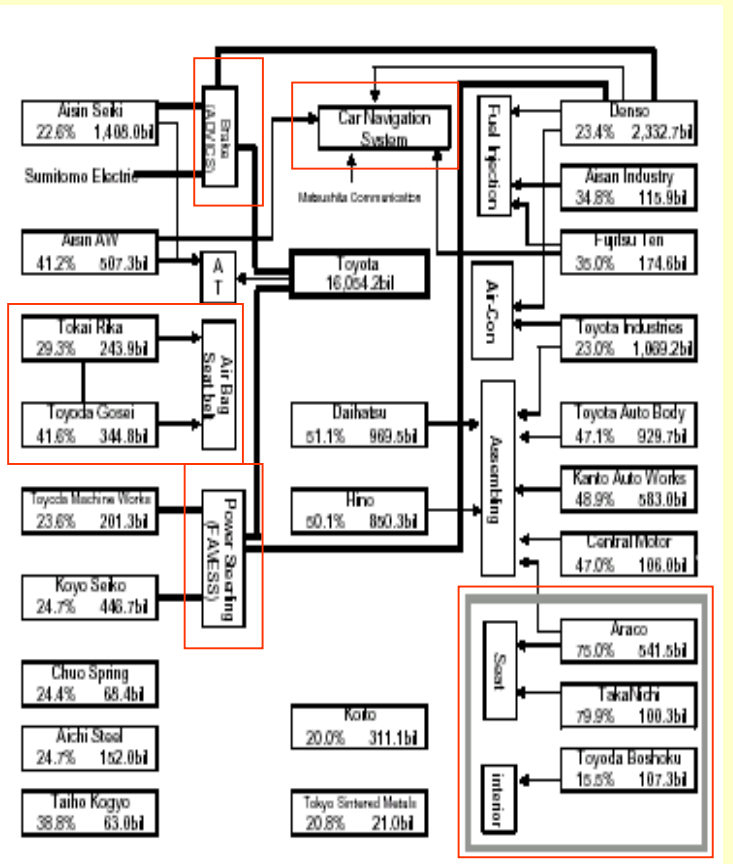
Development/production collaboration

- Safety systems (airbags, seatbelts)
- Engine parts (throttle bodies, injectors)
- Pistons

Production, business transfer and consolidation

- A/C compressors
- Anti-vibration rubber

Toyota's Tier One Supplier Network Increasingly Interconnected



In negotiation August 2003

Note: This network map is partial representation of existing TPS collaborations

Source: Morgan Stanley, August 21, 2003

Recent changes