

***Implications and Recommendations for
Service-Oriented Architectures (SOAs)***

**The New Global
Information Economy**



**Tim Bass
SilkRoad, Inc.**

ICCRTS 16 June 2005

Acknowledgement



Bass, T. and Donahue, W., *The New Global Information Economy - Implications and Recommendations for Service-Oriented Architectures (SOAs)*, 10th International Command and Control Research and Technology Symposium: The Future of C2, 16 June 2005.

Co-author: Lt. Gen (Retired) William Donahue.

Emerging Concepts

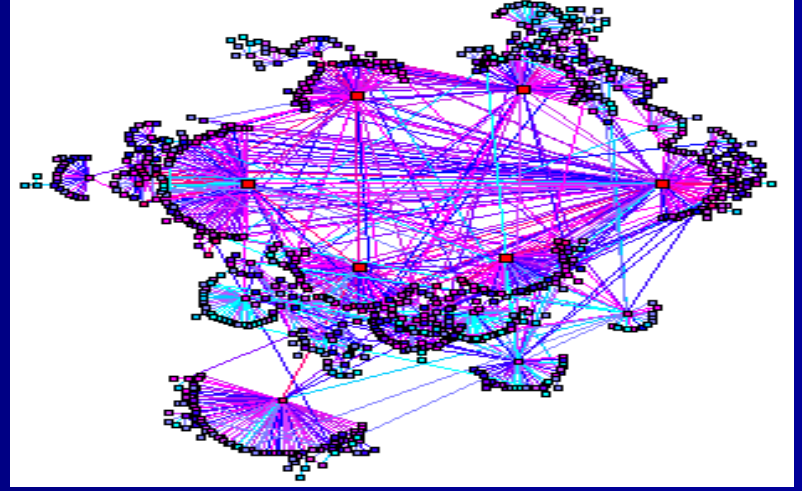
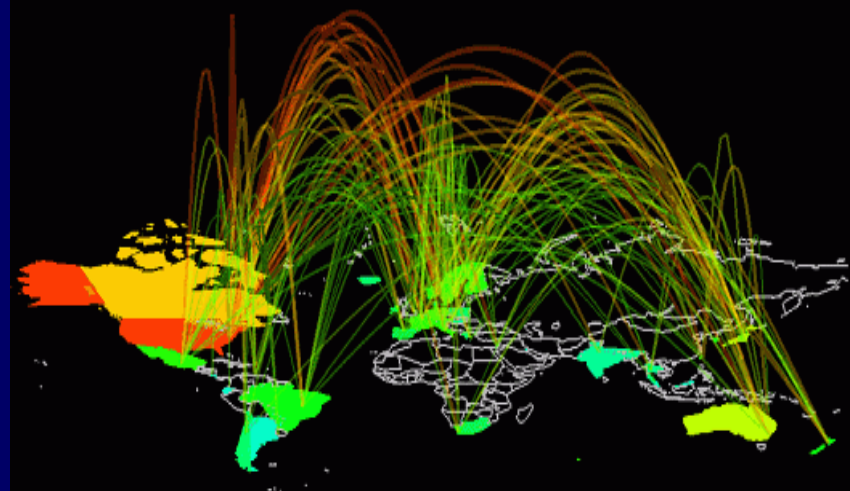
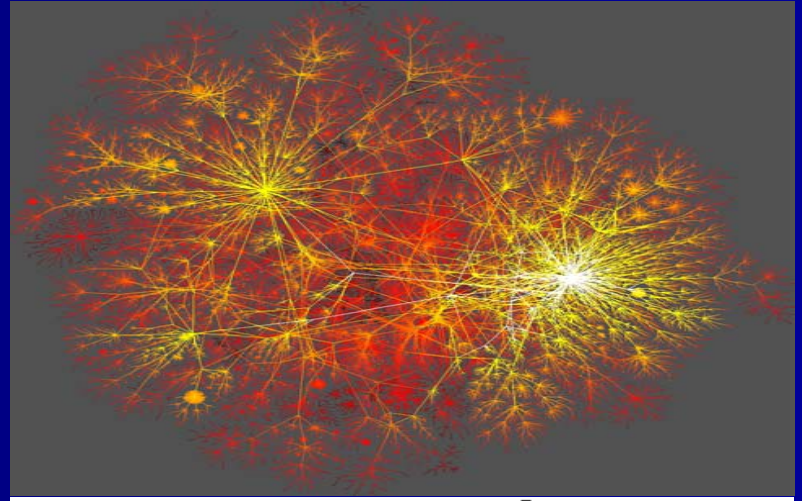
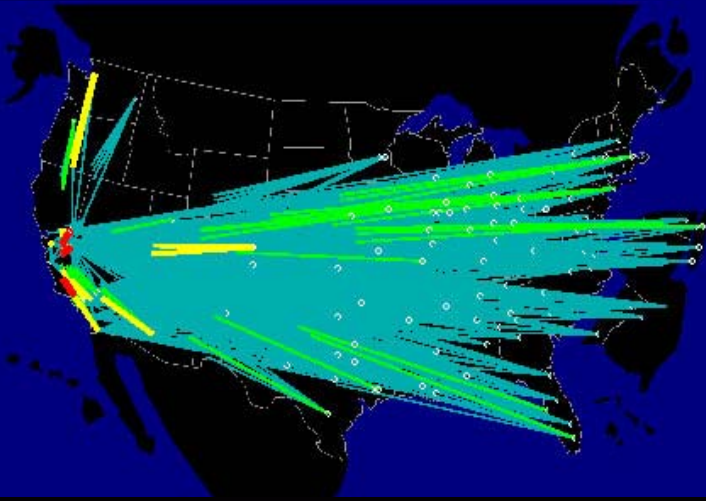


- Information networks are complex systems and the complexity is accelerating.
- The dynamics of complex internets are dominated by the notion of self-organization and emergent behavior at the "edge."
- Net-centric concepts are rapidly evolving to information-centric, peer-to-peer, digital information sharing and digital rights management.
- Information-centric means a transformation from industrial-age economics to information-age economics.

Net-Centric Edge Issues

- **Unpredictable:** ROI is inherently unpredictable.
- **Interdependent:** Critical information assets are controlled by myriad cooperating edge organizations.
- **Inadequate:** Enterprise capital planning and control (CPIC) lifecycles are orders of magnitude longer than “edge” lifecycles and mission requirements.
- **Emergent:** The Enterprise evolves to a boundless self-organizing information ecosystem. Edge organizational requirements dominate the centralized command organizational requirements.

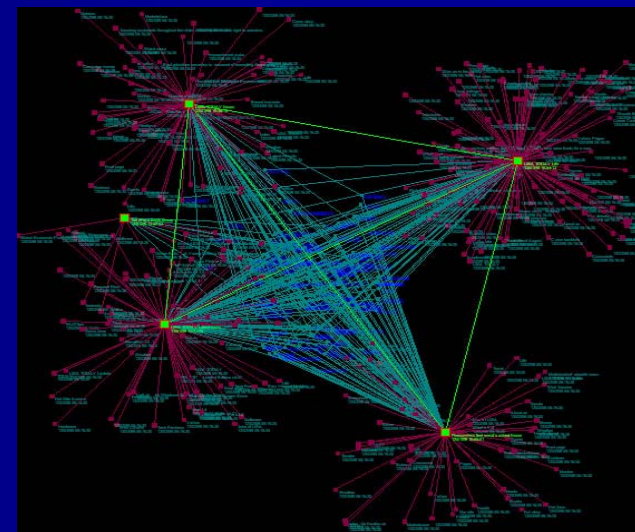
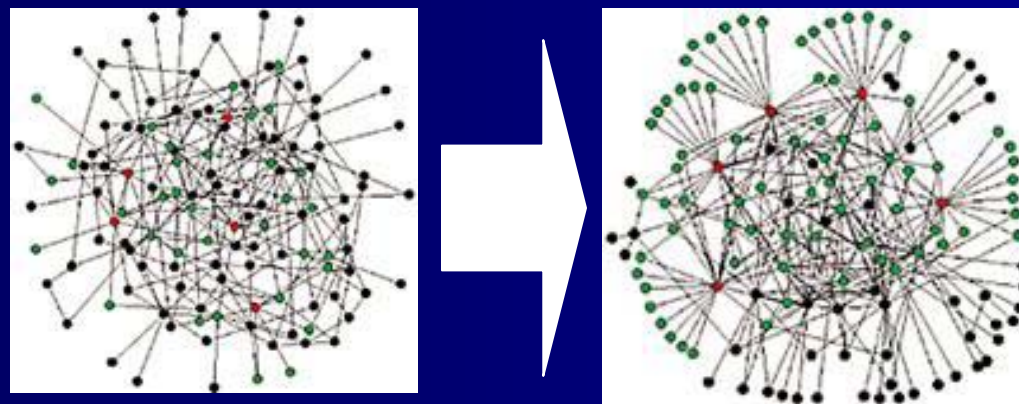
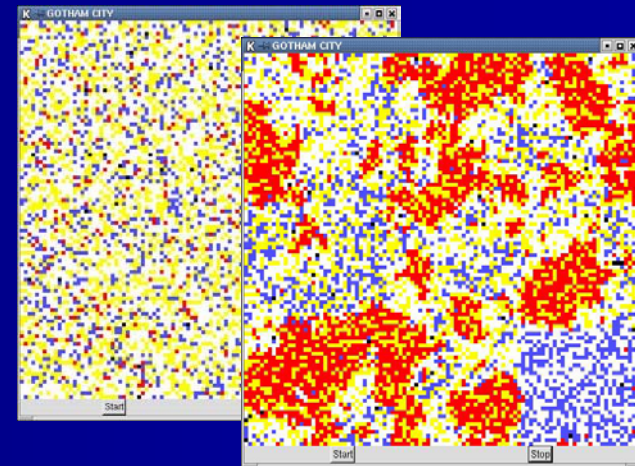
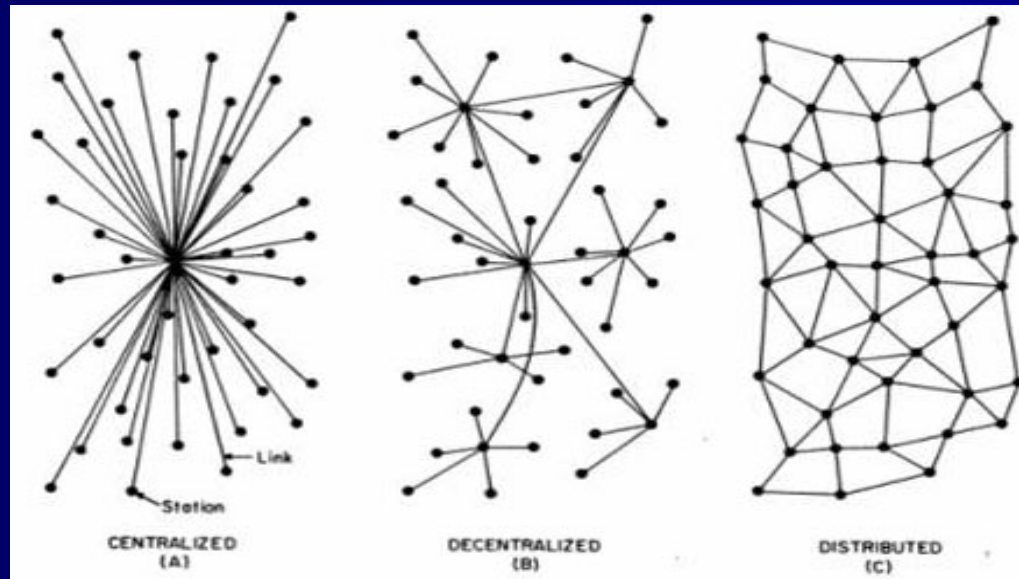
Complex Systems Concepts



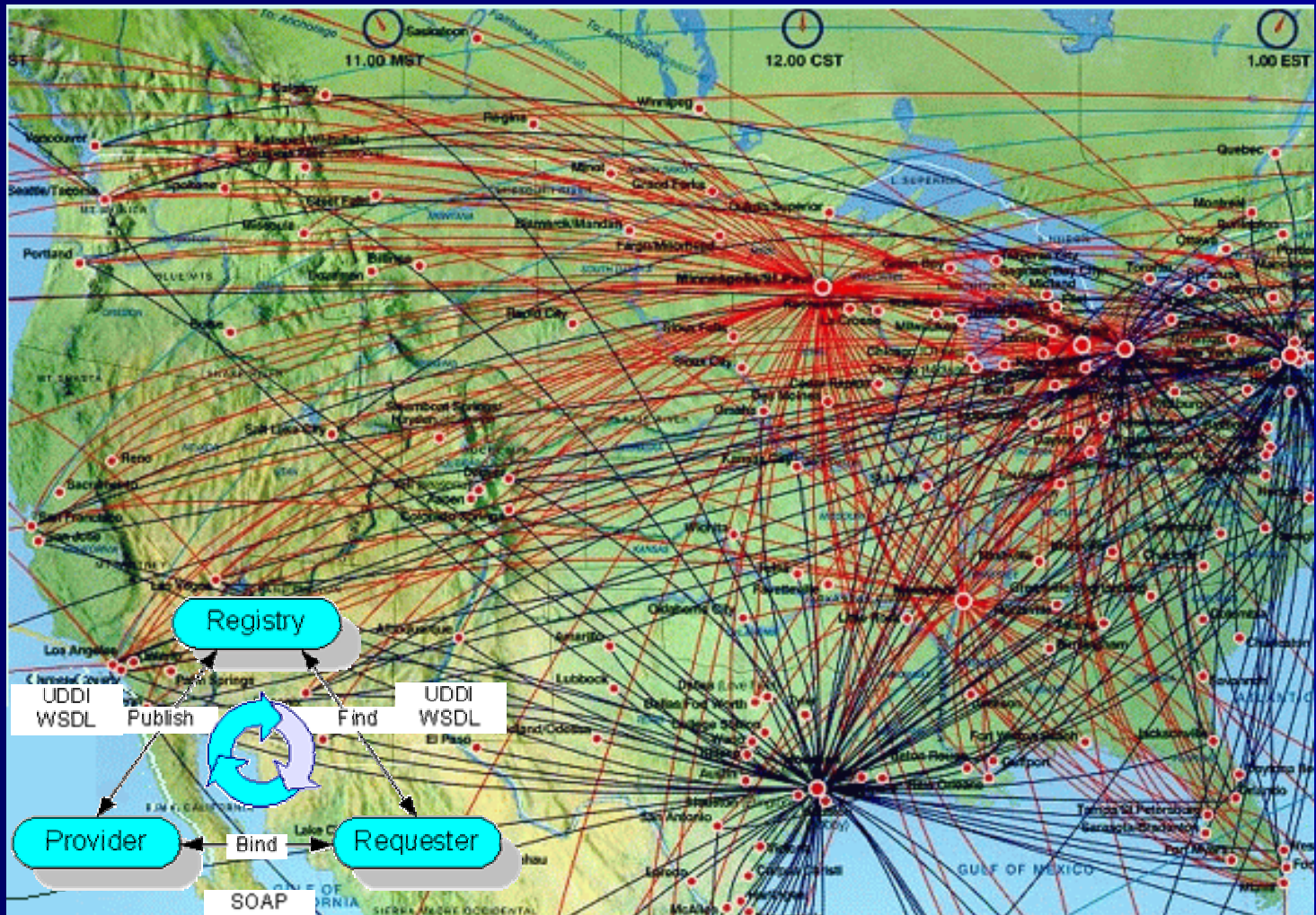
Emerging Edge Concepts: Social & Market Driven

- Self-organization
- Small world theory & hubs
- Scale-free networks
- Information economics and markets
- Digital rights management

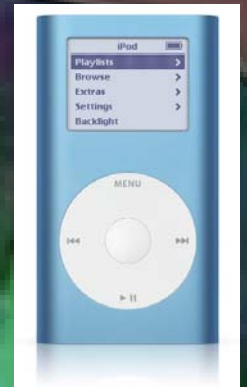
Scale Free Networks & Hubs



SOA, Hubs and Market Economics – “The Edge”



How do We Enable the New Digital Information Economy?



... "Lessons Learned from iTunes."

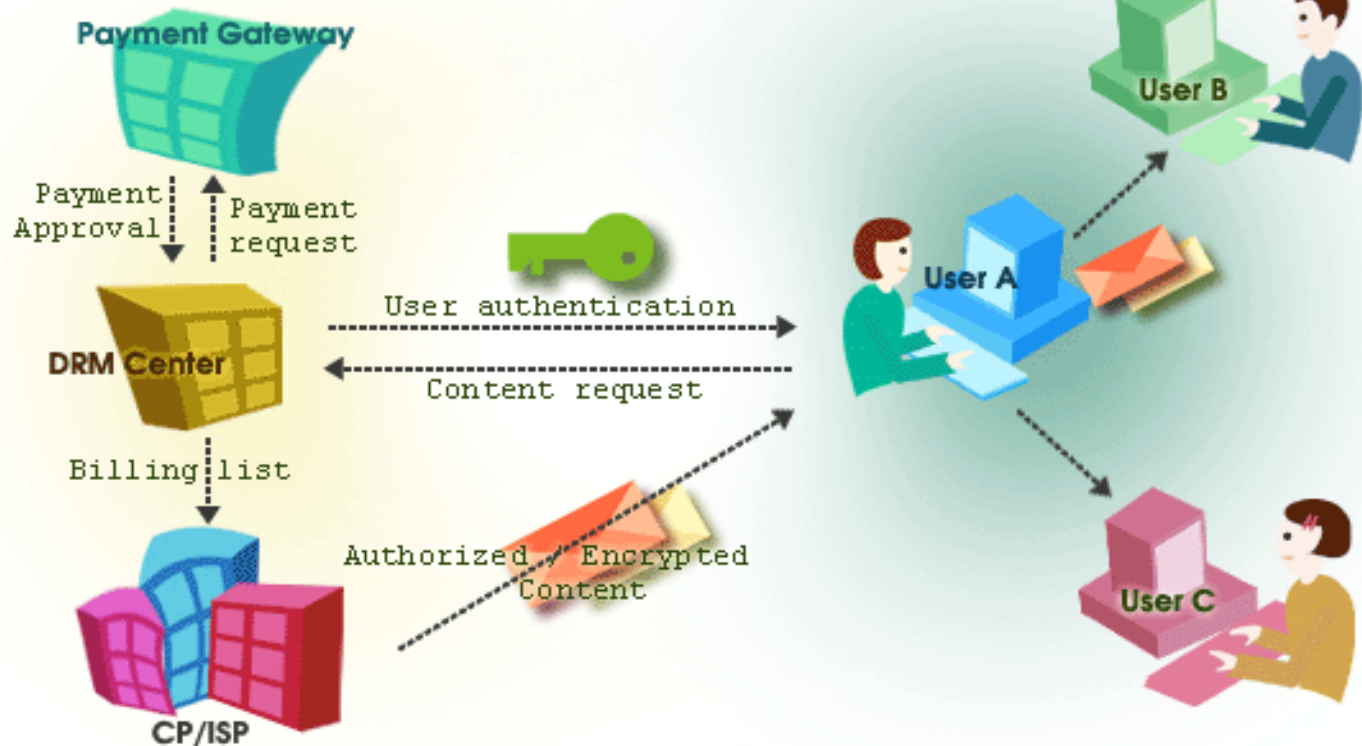
Think Digital Information and Digital Rights!



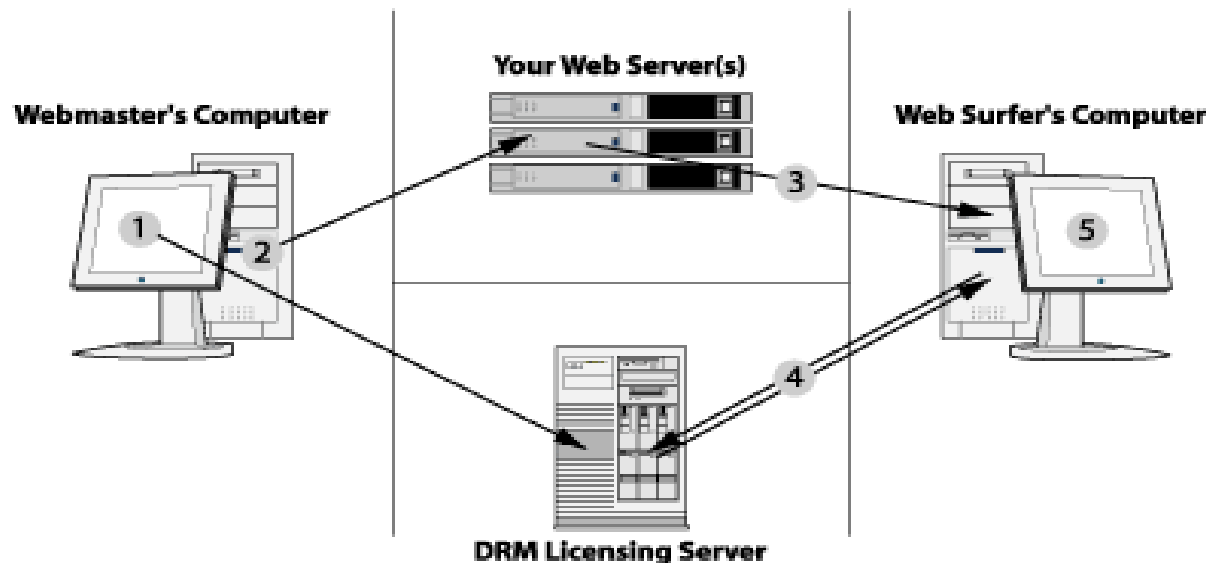
Think Digital Rights Management!



DRM : Digital Rights Management



Digital Rights Management (DRM)



- 1** The digital movie file (.wmv) is encrypted on your computer using our proprietary software.
- 2** Once encrypted, you simply upload your content to your server. You do not have to serve your content from our DRM server!

- 3** The web surfer downloads your movie file and launches it.
- 4** The encrypted movie then contacts the DRM licensing server for a license. If the conditions of the rule are met, the server grants the license to the surfer.

- 5** The file plays on the surfer's computer in accordance with the license granted by the DRM licensing server.

Summary:

A Break from Pictures!

- Future edge organizations are all connected in a vast global information economy.
- Information sharing is incentivized by the preservation of digital rights.
- Solves numerous issues around intelligence community information sharing, such as:
 - who saw the data – top secret control process
 - source validation – solves issues of compartmented information
 - full audit trail from cradle to grave
- DoD net-centric goals are facilitated by digital rights management concepts.

SilkRoad's DRM Permission Server Example:



Access Log Report for Service: pw_silk

dt	uid	did	mid	uuid	perms	rq	id3 ip
2005-06-11 18:05:05.0	bozo	PARADISE_LINK_TRACE_ACCOUNTS.pdf	2988XE56	ab05eda4-d144-11d9-b4a3-00e018d31820	89	DocPerm	24.250.112.150
2005-06-11 01:27:55.0	falcon	Saxon Flowers Drive.PDF	KA6WUSXY	9660d48-d85c-11d9-93f5-001111a711f7	69	DocPerm	204.111.92.127
2005-06-10 22:27:23.0	Guest	Grants_Recipients_FY05.pdf	2988XE56	ab05eda4-d144-11d9-b4a3-00e018d31820	1	DocPerm	24.250.112.150
2005-06-10 22:24:52.0	Guest	Grants_Recipients_FY05.pdf	2988XE56	ab05eda4-d144-11d9-b4a3-00e018d31820	1	DocPerm	24.250.112.150
2005-06-10 22:22:50.0	Guest	Grants_Recipients_FY05.pdf	2988XE56	ab05eda4-d144-11d9-b4a3-00e018d31820	0	DocPerm	24.250.112.150
2005-06-10 22:21:56.0	Guest	Grants_Recipients_FY05.pdf	2988XE56	ab05eda4-d144-11d9-b4a3-00e018d31820	0	DocPerm	24.250.112.150
2005-06-10 22:20:55.0	Guest	Grants_Recipients_FY05.pdf	2988XE56	ab05eda4-d144-11d9-b4a3-00e018d31820	69	DocPerm	24.250.112.150
2005-06-10 22:03:21.0	Guest	Grants_Recipients_FY05.pdf	2988XE56	ab05eda4-d144-11d9-b4a3-00e018d31820	69	DocPerm	24.250.112.150
2005-06-10 22:02:45.0	Guest	Grants_Recipients_FY05.pdf	2988XE56	ab05eda4-d144-11d9-b4a3-00e018d31820	69	DocPerm	24.250.112.150
2005-06-10 22:01:19.0	Guest	Grants_Recipients_FY05.pdf	2988XE56	ab05eda4-d144-11d9-b4a3-00e018d31820	69	DocPerm	24.250.112.150
2005-06-10 22:00:39.0	Guest	Grants_Recipients_FY05.pdf	2988XE56	ab05eda4-d144-11d9-b4a3-00e018d31820	69	DocPerm	24.250.112.150
2005-06-10 21:56:01.0		Grants_Recipients_FY05.pdf	2988XE56	ab05eda4-d144-11d9-b4a3-00e018d31820	0	DocPerm	24.250.112.150
2005-06-10 16:39:01.0	bozo	Saxon Flowers Drive.PDF	2988XE56	ab05eda4-d144-11d9-b4a3-00e018d31820	69	DocPerm	24.250.112.150
2005-06-10 16:37:33.0	bozo	Saxon Flowers Drive.PDF	2988XE56	ab05eda4-d144-11d9-b4a3-00e018d31820	0	DocPerm	24.250.112.150
2005-06-10 12:38:55.0	hockeyman	PARADISE_LINK_TRACE_ACCOUNTS.pdf	DSQZWYBE	71b15952-d8ca-11d9-a474-000b0b07d82	69	DocPerm	213.190.144.50
2005-06-10 11:43:19.0	strider	PARADISE_LINK_TRACE_ACCOUNTS.pdf	EJVCR3LN	2a223f14-d805-11d9-b4e9-00038a000015	69	PrintPerm	68.104.65.178
2005-06-10 11:42:20.0	strider	PARADISE_LINK_TRACE_ACCOUNTS.pdf	EJVCR3LN	2a223f14-d805-11d9-b4e9-00038a000015	69	DocPerm	68.104.65.178
2005-06-10 08:44:56.0	falcon	PARADISE_LINK_TRACE_ACCOUNTS.pdf	KA6WUSXY	9660d48-d85c-11d9-93f5-001111a711f7	69	DocPerm	204.111.90.38
2005-06-09 23:17:22.0		PARADISE_LINK_TRACE_ACCOUNTS.pdf	KA6WUSXY	9660d48-d85c-11d9-93f5-001111a711f7	0	DocPerm	204.111.84.105
2005-06-09 23:16:31.0		PARADISE_LINK_TRACE_ACCOUNTS.pdf	KA6WUSXY	9660d48-d85c-11d9-93f5-001111a711f7	0	DocPerm	204.111.84.105

First Previous Next Last
1 to 20 of 43




Remarks

- We all must shift our worldview from industrial-age thinking to information-age thinking.
- Future edge organizations are all members of a digital information economy.
- The economics of digital information sharing is facilitated by understanding digital rights, intellectual property rights, digital pedigrees, and all DRM concepts.
- DRM concepts and applications can help enable net-centric goals for the future of C2 in the DoD.

Recall The Prisoner's Dilemma**


"Basic Idea of Cooperation from Classical Game Theory."

	Jones Confesses (“Defection”)	Jones Remains Silent (“Cooperation”)
Smith Confesses (“Defection”)	Smith and Jones get 5 years each.	Jones get 10 years. Smith goes free.
Smith Remains Silent (“Cooperation”)	Smith get 10 years. Jones goes free.	Smith and Jones get 1 year each.

** In classical game theory, a situation in which two players must choose between the risks of cooperation and competition as equated with two prisoners separately deciding whether to confess to a crime. Naturally, the “payoffs” gets more complex as the number of participants increases.

The Prisoner's Dilemma**


"IT Lessons Learned from Classical Game Theory."

 SilkRoad	Organization "A" Hoards Information ("Defection")	Organization "A" Shares Information ("Cooperation")
Organization "B" Hoards Information ("Defection")	"A" and "B" get \$5M of funding each.	"B" get \$10M of funding. "A" gets zero.
Organization "B" Shares Information ("Cooperation")	"A" get \$10M of funding. "B" gets zero.	"A" and "B" get \$3M of funding each.

** Based on classical game theory, we observe that the "payoff" is higher for those who hoard information. Sharing information can have adverse consequences.

Net-Centric Transformation**

"Changing the rules to facilitate cooperation."

	Organization "A" Hoards Information ("Defection")	Organization "A" Shares Information ("Cooperation")
Organization "B" Hoards Information ("Defection")	"A" and "B" get \$0 dollars of funding each.	"B" get \$0 funding. "A" gets \$4M.
Organization "B" Shares Information ("Cooperation")	"A" get \$0 funding. "B" gets \$4M.	"A" and "B" get \$3M of funding each.

** Changing the "rules of the game" where the individual payoffs are higher for sharing information. In this model, the equilibrium point shifts to cooperation v. the established business "rules of the game" that tend to reward information hoarding.

Conclusions

- SOA is interesting, industrial-age thinking, but SOA does not solve the classical Prisoner's Dilemma for digital information sharing.
- DoD C2 has not shifted from industrial-age thinking to information-age thinking.
- All roads lead to new economic models for digital information sharing and digital rights.
- DRM offers a glimpse into the future of C2 for agile, self-organizing, DoD edge organizations.

***Implications and Recommendations for
Service-Oriented Architectures (SOAs)***



The New Global Information Economy

presented by

Tim Bass

www.silkroad.com

bass@silkroad.com

16 June 2005, McLean, VA