Group-Centric Secure Information Sharing: A Lattice Interpretation

Ravi Sandhu
Executive Director and Endowed Professor
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ravi.sandhu@utsa.edu, www.profsandhu.com, www.ics.utsa.edu

Secure Information Sharing (SIS)

Goal: Share but protect

Containment challenge

- Client containment
  - Absolute assurance infeasible (e.g., analog hole)
  - Appropriate assurance achievable
- Server containment
  - Typically higher assurance than client

Policy challenge

- How to construct meaningful, usable, agile SIS policy
- How to develop an intertwined information and security model

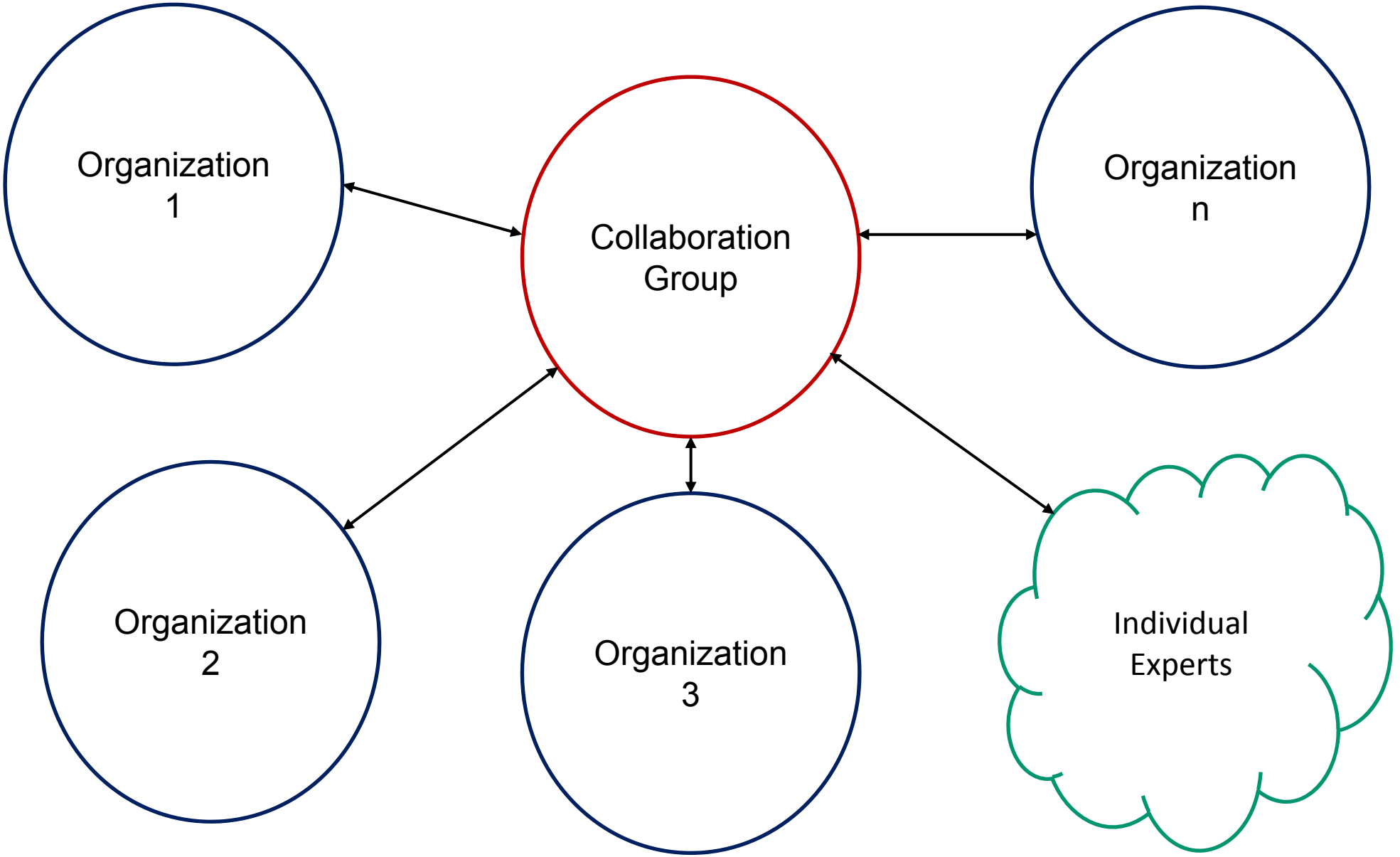
Object Centric

- Dissemination oriented

Group Centric

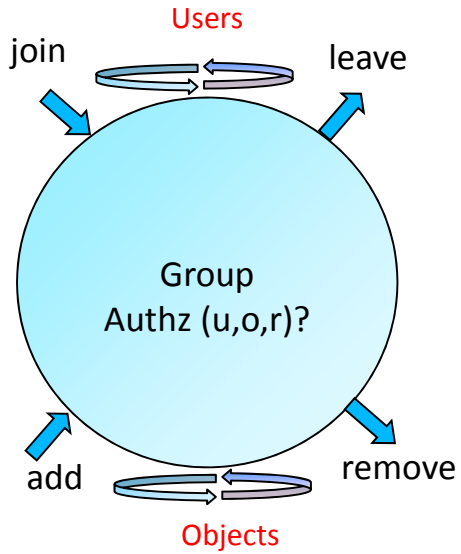
- Collaboration oriented

Group-Centric Collaboration



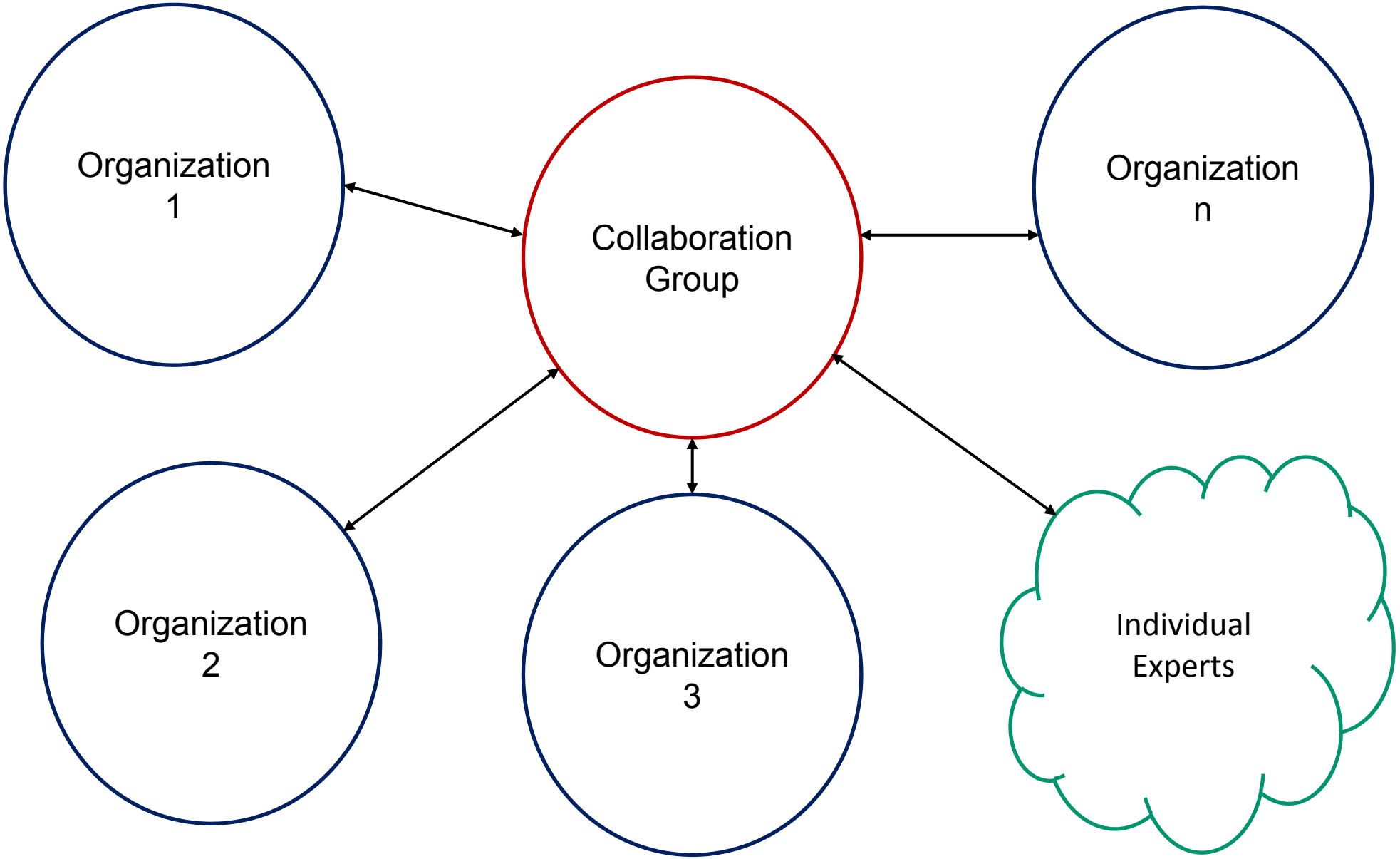
Group-Centric Formal Models

- Operational aspects
  - Group operation semantics
    - Add, Join, Leave, Remove, Export, Merge, etc
    - Multicast group is one example
  - Object model
    - Read-only
    - Read-Write (no versioning vs versioning)
  - User-subject model
    - Read-only vs read-write
  - Policy specification
- Administrative aspects
  - Authorization to create group, user join/leave, object add/remove, object export/merge etc.

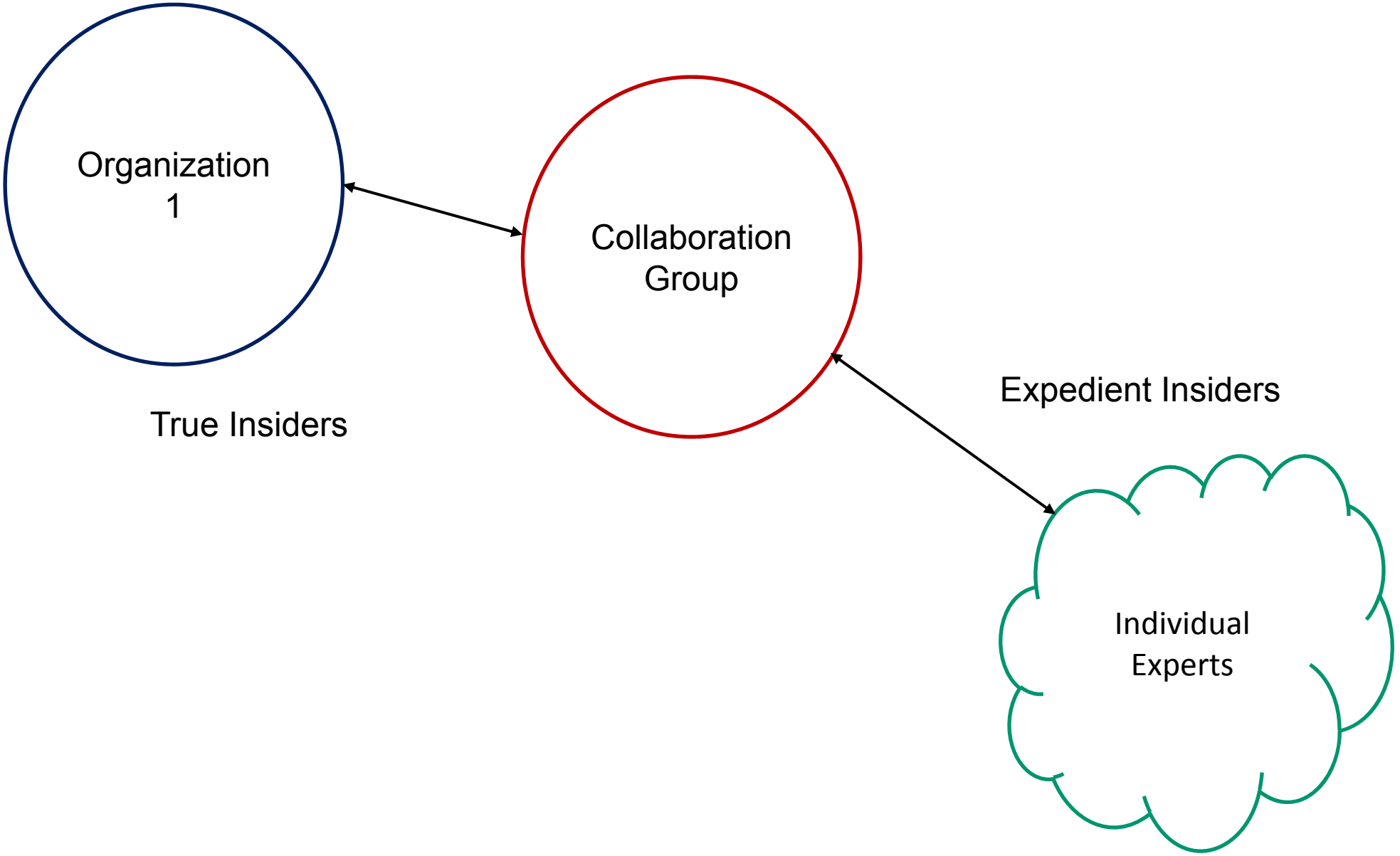


R. Krishnan, J. Niu, R. Sandhu and W. Winsborough, Group-Centric Secure Information-Sharing Models for Isolated Groups, ACM TISSEC, Vol. 14, No. 3, Nov. 2011, 29 pages.

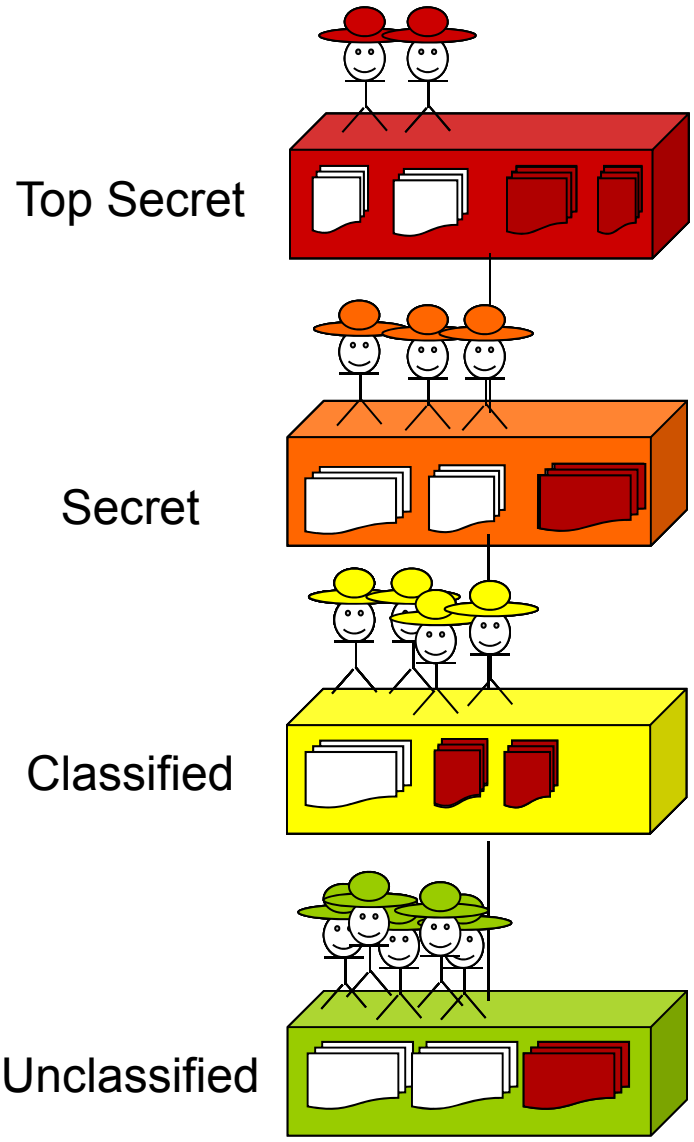
Group-Centric Collaboration

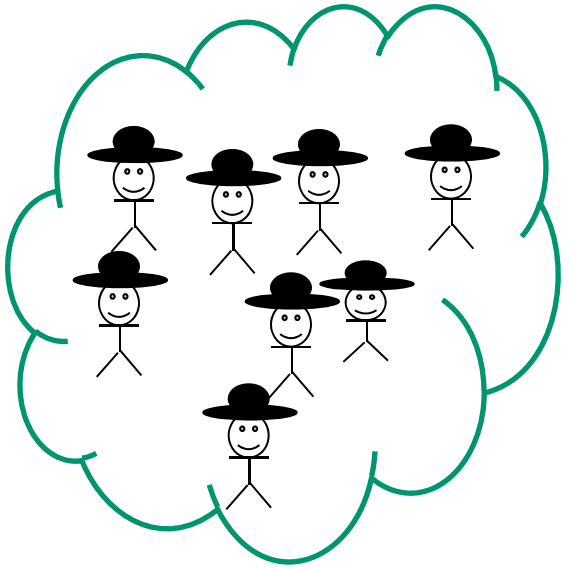


Group-Centric Collaboration



Collaboration with Expedient Insiders in Traditional MAC (or LBAC)

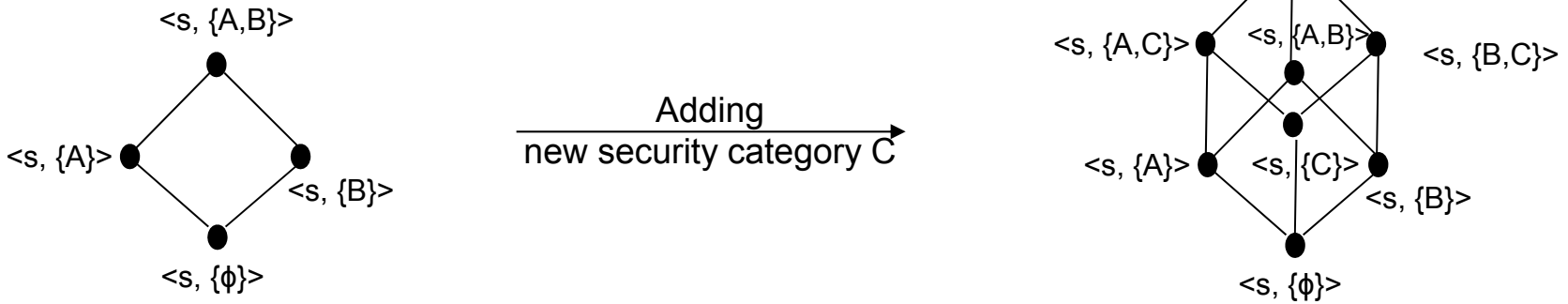




Individual Experts

Sharing more information than necessary

Collaboration by Adding a New Security Category in Traditional MAC (or LBAC)

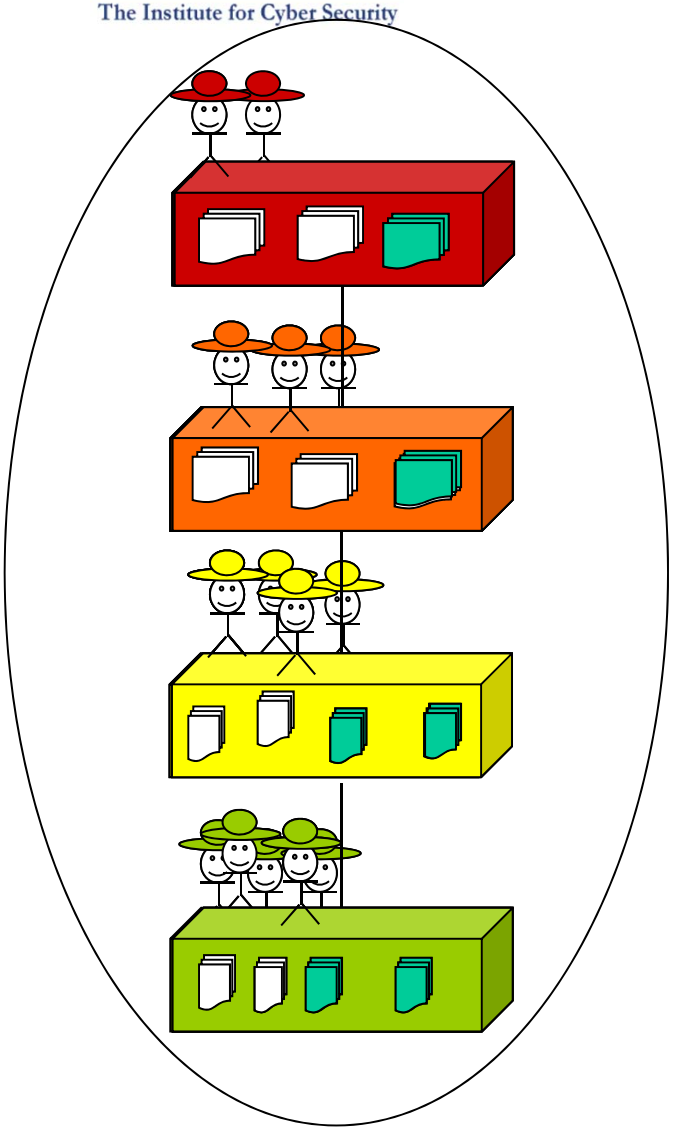


Existing Lattice

Modified Lattice after adding new security category C

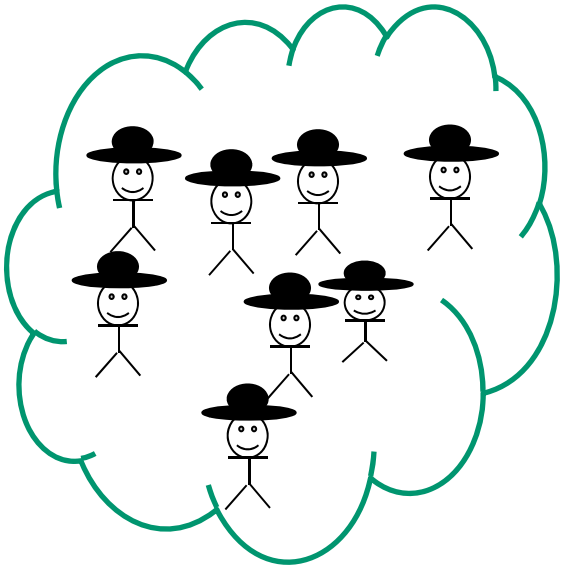
Sharing more information than necessary

Group Centric Collaboration with Expedient Insiders (GEI)



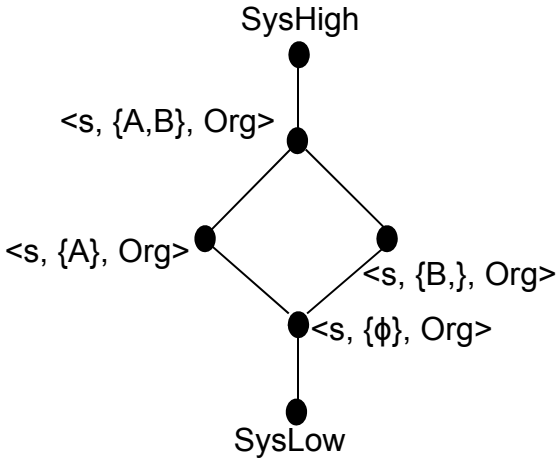
Organization

Collaboration Group



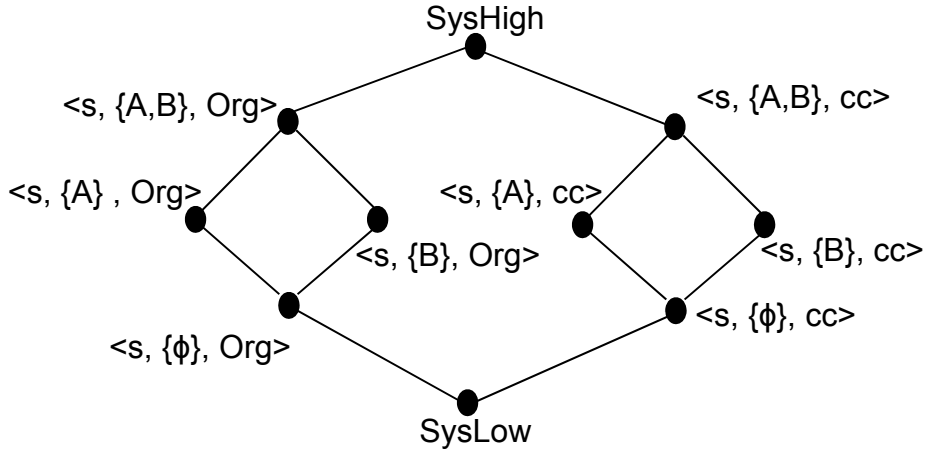
Individual Experts

Lattice with Collaborative Compartments (LCC)



Existing Lattice

Adding new
Collaboration category cc



Modified Lattice after adding collaboration category cc

Theorem. GEI is formally equivalent to LCC

CONCLUSION
Traditional MAC (or LBAC) can support collaboration groups NOT with traditional categories BUT with collaboration categories

Sharing just right information sharing

Publications Include

- Khalid Bijon, Tahmina Ahmed, Ravi Sandhu and Ram Krishnan, "A Lattice Interpretation of Group-Centric Collaboration with Expedient Insiders." In *Proceedings 8th IEEE International Conference on Collaborative Computing: Networking, Applications and Worksharing (CollaborateCom),* Pittsburgh, Pennsylvania, October 14-17, 2012, 10 pages.
- Khalid Bijon, Ravi Sandhu and Ram Krishnan, "A Group-Centric Model for Collaboration with Expedient Insiders in Multilevel Systems." In *Proceedings IEEE International Symposium on Security in Collaboration Technologies and Systems (SECOTS 2012)*, Denver, CO, May 24th, 2012, 8 pages.
- Ram Krishnan, Jianwei Niu, Ravi Sandhu and William H. Winsborough, "Group-Centric Secure Information-Sharing Models for Isolated Groups." ACM Transactions on Information and System Security, Volume 14, Number 3, November 2011, Article 23, 29 pages.
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- Ram Krishnan and Ravi Sandhu, "A Hybrid Enforcement Model for Group-Centric Secure Information Sharing." *Proc. IEEE International Conference on Computational Science and Engineering (CSE-09)*, Vancouver, Canada, August 29-31, 2009, pages 189-194.
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- Ram Krishnan and Ravi Sandhu, "Enforcement Architecture and Implementation Model for Group-Centric Information Sharing." In *Proceedings of the 1st IEEE International Workshop on Security and Communication Networks (IWSCN)*, Trondheim, Norway, May 20-22, 2009, 8 pages.
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- Ram Krishnan, Jianwei Niu, Ravi Sandhu and William Winsborough, "Stale-Safe Security Properties for Group-Based Secure Information Sharing." Proc. 6th ACM-CCS Workshop on Formal Methods in Security Engineering (FMSE), Alexandria, Virginia, October 27, 2008, pages 53-62.