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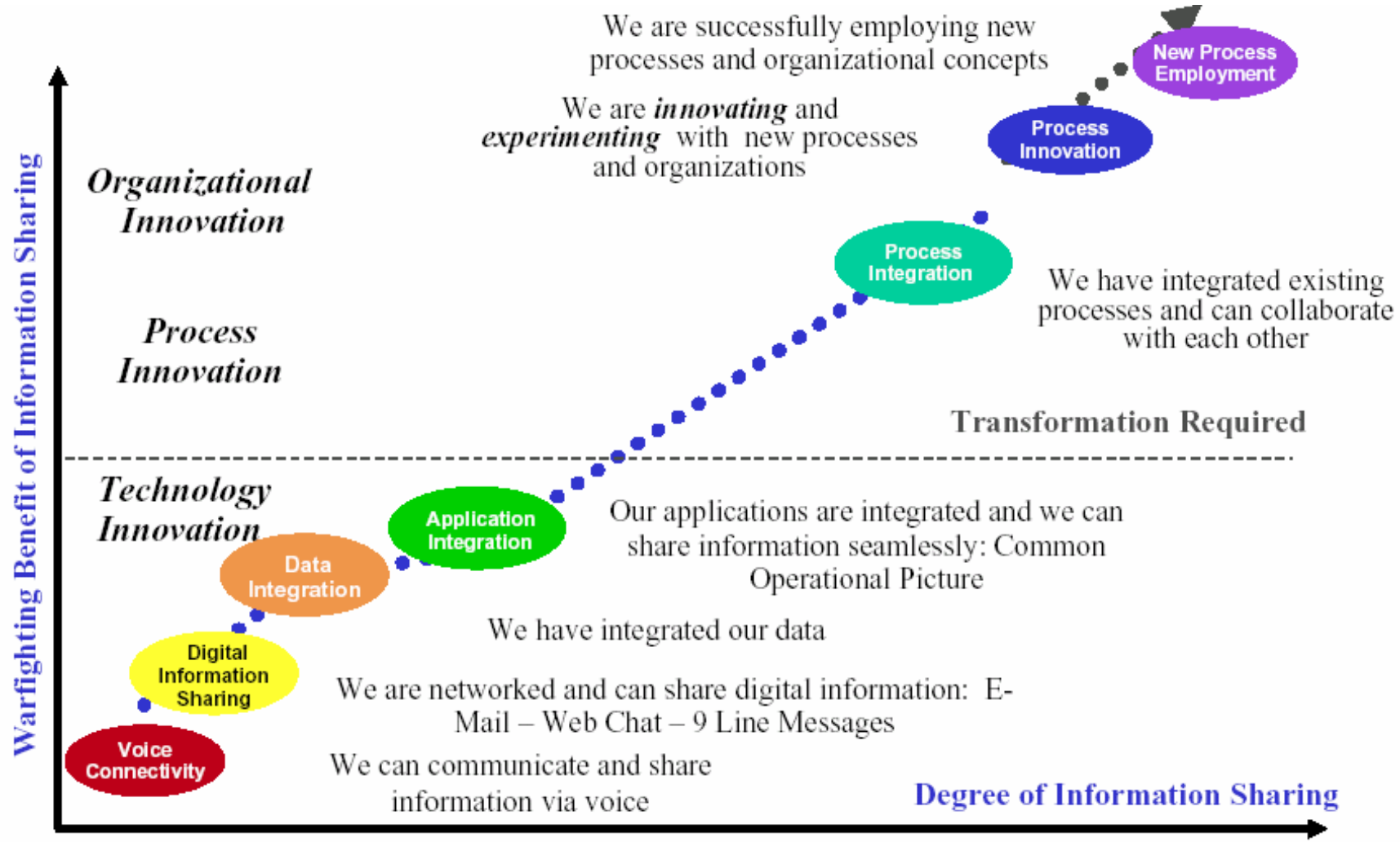
Extreme C2

Garstka and Cebrowski envisioned early in the life of NCW, "a single network enabled process: *killing.*"*

- **NCW is not an all encompassing theory of everything**
- **Cultural**
- **Social**
- **Human Interface**
- **Informational**

*Schachtman, Noah "How Technology Almost Lost the War: In Iraq the Critical Networks are Social – Not Electronic", Wired Magazine, November 2007

Garstka & Cebrowksi



Garstka, J., "Defense Transformation and Network Centric Warfare", Presentation to Network Centric Warfare Europe Conference, Brussels, Belgium, June 2003.

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Extreme C2

- **A C2 concept attempting to remedy the limitations of NCW in:**
  - Social – NCW expresses little concern for social relationships in the development of its networks
  - Human Interaction – Humans are disconnected in subtle ways that can cause information loss and communication errors.
  - Graphical – 3D maps and worlds are important ways to represent the world
  - Informational – Vast amounts of information bombard the user.
- **Fundamentally, NCW does not provide for an effective interface with human concerns**
- **Through the promotion of the following concepts**
  - Pair Planning – Collocated planning can provide notable error reduction (literature)
  - Automated Testing – Embedded simulation can provide real time perspective on performance of plans, so decisions can be made more quickly
  - Cultural Lens* – How to view allies and adversaries actions with respect to their cultural
  - Automated Battle Management Aids (ABMAs) – Reduce the amount of information a user has to see and present information ready for decision, not just a set of facts.
  - New Forms of Interaction – Mouse point and click on a desktop computer is not the most effective way to control information.
- **We have a paper for the 2008 Command and Control Research and Technology Symposium on this topic**

*Klein, Helen Altman; Pongonis, Anna; Klein, Gary Cultural *Barriers to Multinational C2 Decision Making*, DARPA Contract No: DAAH01-00-C-R094

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Social, Human Interaction

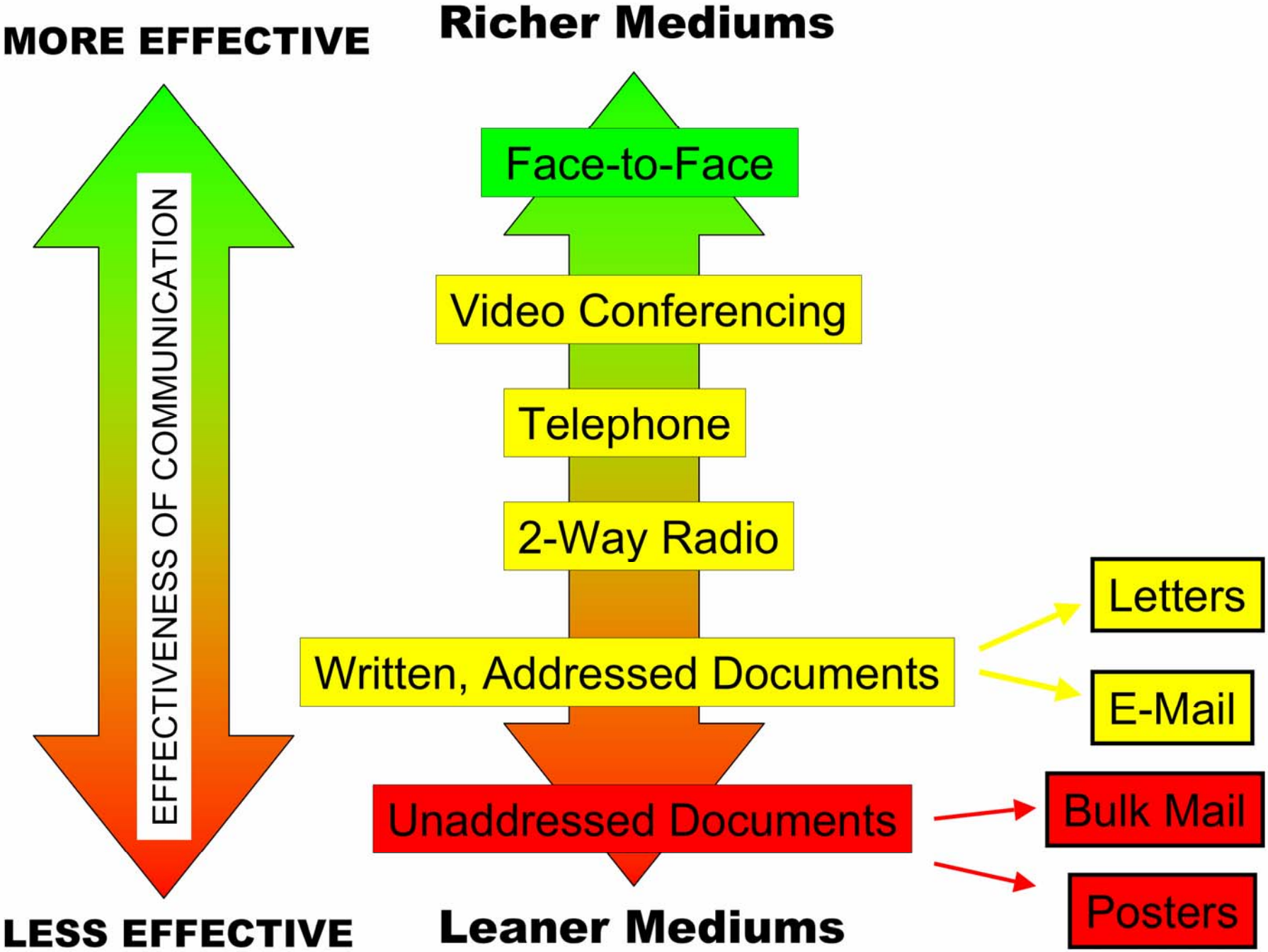
- **Social**
  - Iraq – The battle is no longer about who can kill the most, its about who can influence the most
  - Social networks are key in transmitting knowledge
  - Media Richness – most technical based communication methods have low richness and fail to transmit the majority of knowledge content possible
- **Human Interaction**
  - Difficult to interact with the bulk of information particularly across application's borders
  - As new processes become available, the most efficient processes/methods for executing them may not be available

Graphical, Informational

- **Graphical**
  - 3D information is more important than ever
  - Hierarchical menus are hard to manage
- **Informational**
  - Novel problems require high amounts of information to solve
  - Decision makers who have lots of information make better decisions (Gioia)
  - Cognitive loading can be high which can produce time delays

Pair Planning

- **Based on a comparison of Pair Programming, a practice in the Extreme Programming software development methodology**
- **Two planners side by side, helping each other, switching off tasks**
- **Empirical evidence for pair programming**
  - Reduced error rate
  - Increased productivity
  - Reduced re-work likelihood
- **Increased Information (Media) Richness**


MORE EFFECTIVE
Richer Mediums
EFFECTIVENESS OF COMMUNICATION
Face-to-Face
Video Conferencing
Telephone
2-Way Radio
Written, Addressed Documents
Letters
E-Mail
Unaddressed Documents
Bulk Mail
Posters
LESS EFFECTIVE
Leaner Mediums

Automated Testing

- **Another practice of Extreme Programming**
- **Set up the tests beforehand, and run them as you go**
- **Convert this concept to embedded simulation**
- **Simulation that occurs during the planning process**
- **Tied to the goals, automatically identifies viability of plan.**
- **Every plan that is created is automatically run through these tests**
  - Provides standardized, pre-agreed on performance measurement

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Cultural Lens

- In many non-combat operations, there is a heavy social component, both among allies, adversaries and the general populace
- The Cultural Lens is a concept that helps address this social gap
- Currently, it is being used to help train soldiers before they deploy
- It needs to be used in all facets of planning, especially in theater, not just for soldiers heading towards deployment

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Automated Battle Management Aids (ABMAs)

- **Help deal with the vast amount of information out there and condense it to Information Ready for Decision (IRD)**
- **ABMAs are part of the original FnEP work**
- **Specific Case : Downed pilot, CSAR type scenario**
  - Automatically calculate AoU
  - Identify resources and readiness
  - Calculates search paths
  - Uses embedded simulation to evaluate fitness (coverage)
  - Takes advantage of a large Multi-Touch, Multi-User screen as an enhanced interface
  - Presents sensor routes and their performance to decision maker

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New Forms of Interaction

- **Gesture/Touch based**
  - Touch screen technology, iPhone like controls
  - Reduced training time
  - Process improvements
- **Eye Tracking**
  - Measurement of cognitive processes
  - Predictive positioning of alerts, important information
  - Control by gaze
- **Neural Interfaces**
  - Distant future, but very promising

Video