

# Complex systems paradigms applied to solve an old problem: How to make road side bombs and land mines ineffective.

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Presentation at UCS2006 - [www.how-why.com/ucs2006](http://www.how-why.com/ucs2006)

Some Complex Systems Paradigms:

1. Harmony: Self-adjusting systems avoid chaos
  2. Resonance: A dynamical system reacts most sensitive to its own dynamics
  3. Prediction of Chaos: Long term prediction with ensemble predictors
  4. Minimum Resistance: Stationary state in an open dissipative system is often the state of minimum resistance
  5. Whole more than the sum of parts: The shape of the system is more important than its content
  6. Dynamical Reconstruction-Model (and Control) the extremes: Maximum norm is the appropriate norm
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1. **Prevention:** Control of social groups: (i) Self-adjusting systems avoid chaos (ii) Control the boundaries, the extremes, (iii) create favorable least resistance paths, (iv) use resonances to communicate, (v) predict the behavior and act on these predictions (atomic neural nets optimized by genetic algorithms: extreme data mining) (vi) control of chaos
  2. **Detection:** resonances of nonlinear dynamical systems - use chaos to detect
  3. **Survival:** (i)  $1/r^2$  -law, (ii) negative dimensional shapes, (iii) anti-resonances: swarms (iv) high gradient materials

How will the next generation road side bombs work?