

# Improving Quality and Safety in a Complex World

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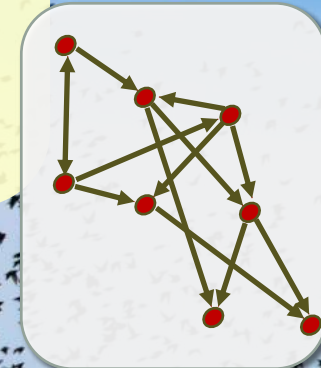
# Complex Adaptive System (CAS)

Insect Colony



- Collection of parts
- Share an environment or space
- Parts are interconnected
- Parts can act independently
- Action by any part affects the whole

Stock Market



Flock of Birds

People Interacting



Immune System



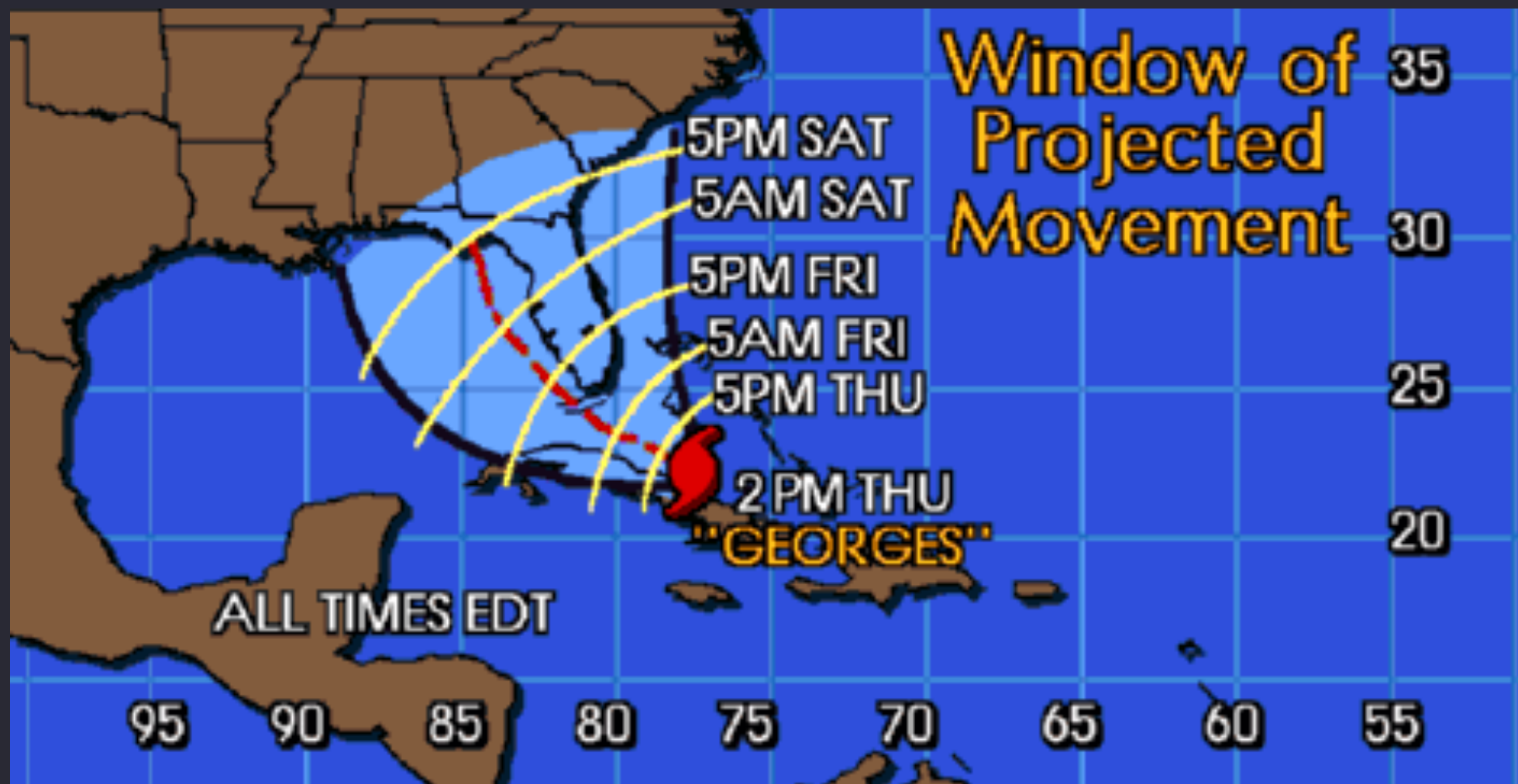
*Improving quality and safety in a complex world...*

**“PLANS ARE USELESS,  
PLANNING IS ESSENTIAL”**

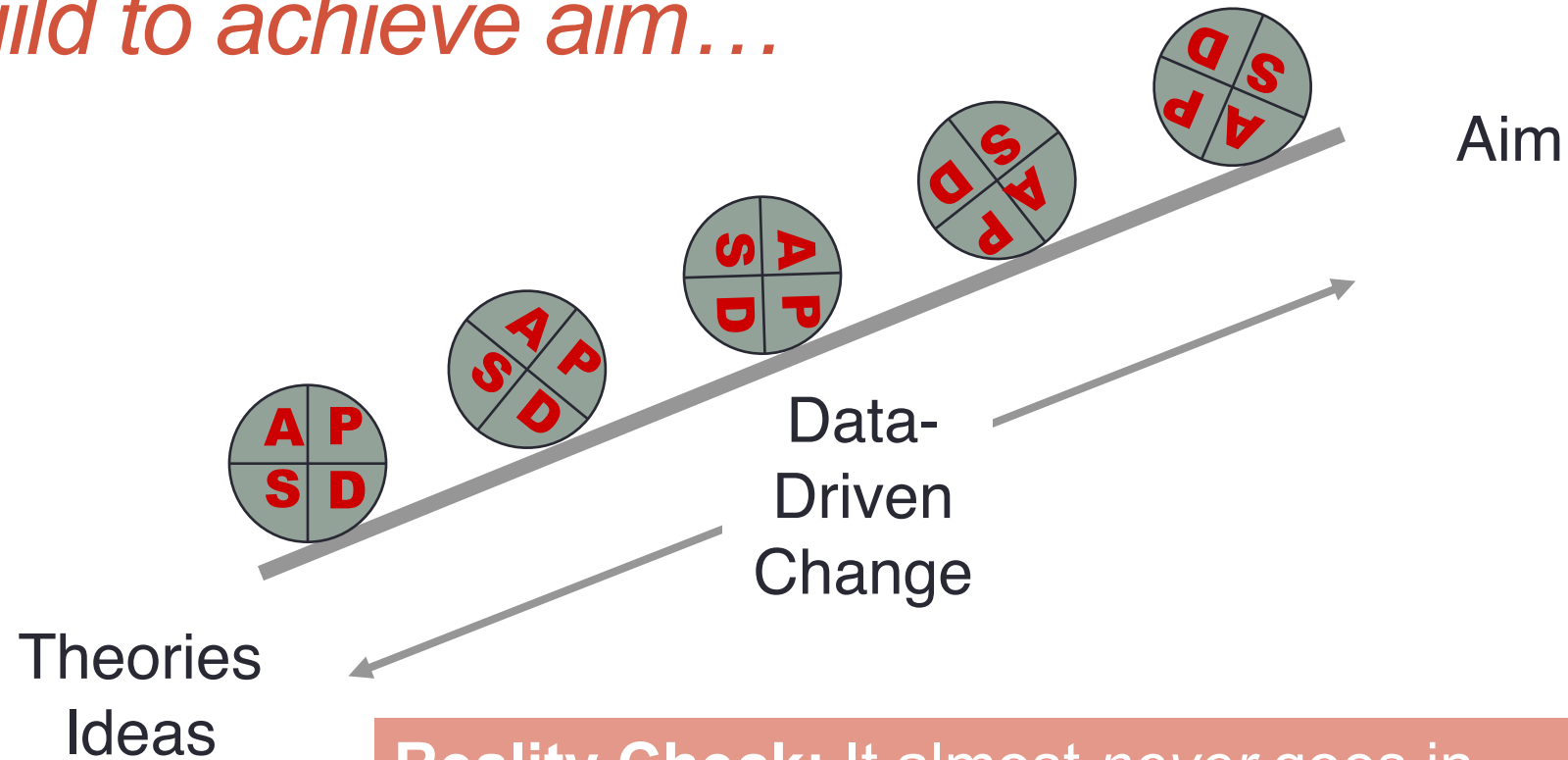
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*General Dwight Eisenhower  
Allied Commander, WWII*



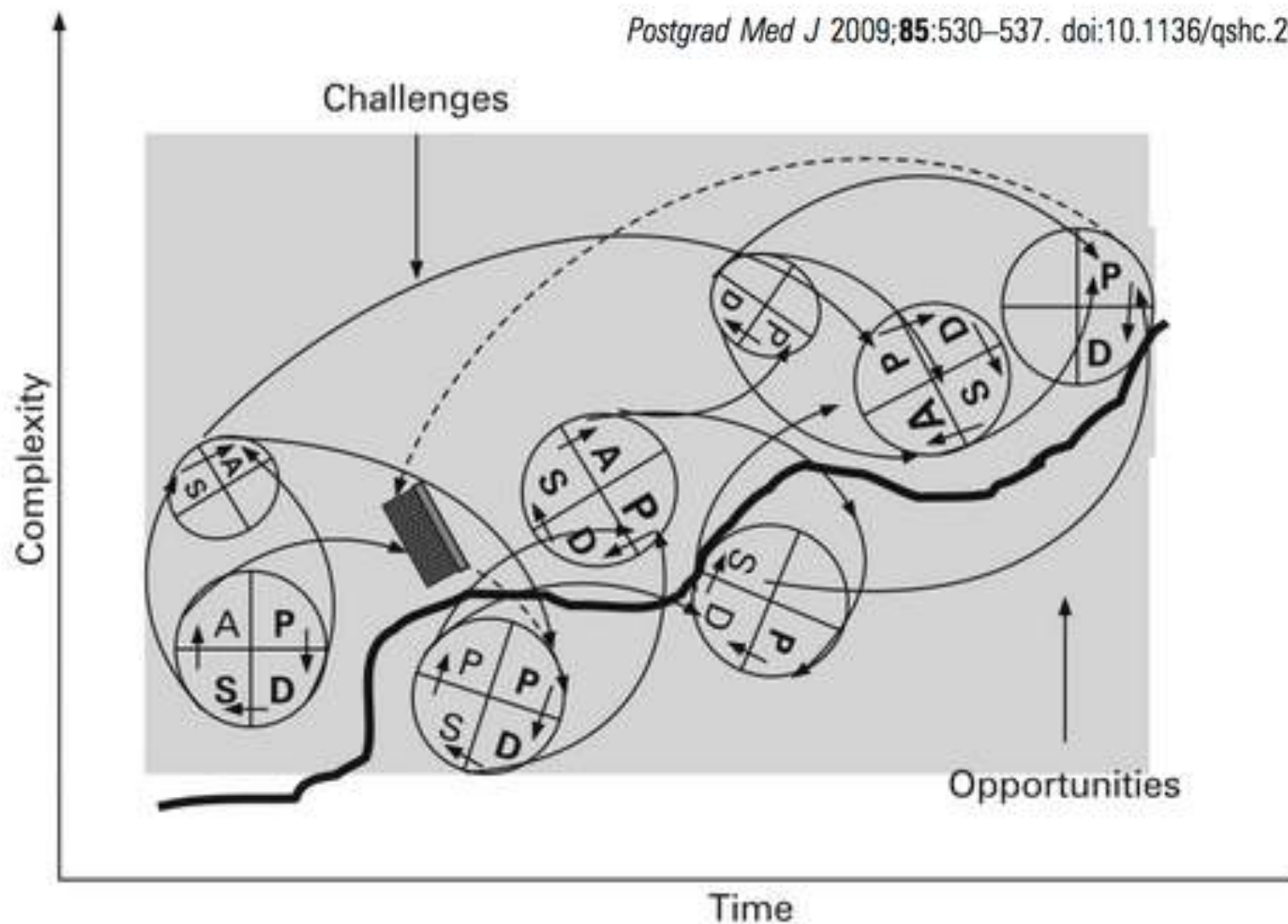


# Multiple PDSA cycles build to achieve aim...



Source: IHI

**Reality Check:** It almost *never* goes in such a linear, step-wise build up to the Aim



P = Plan	D = Do	= Barrier	— = Direct flow of impact
S = Study	A = Act	----- = Lingering background impact	Arrowhead = Feedback or feedforward
Different sizes of letters and cycles and bold letters = denotes differences in importance/impact			

# Improvement based on systems thinking

Machine-like System	Complex System
<ul style="list-style-type: none"><li>• Analysis period to maximize what is known, before acting</li></ul>	<ul style="list-style-type: none"><li>• Acknowledge that some things are inherently unknowable until you act</li></ul>
<ul style="list-style-type: none"><li>• Detailed, explicit plans</li></ul>	<ul style="list-style-type: none"><li>• Less detailed, less explicit plans; flexible next steps</li></ul>
<ul style="list-style-type: none"><li>• Strategy formulation followed by Implementation</li></ul>	<ul style="list-style-type: none"><li>• Strategy formulation, followed by testing, reflection, updating the strategy, repeat...</li></ul>
<ul style="list-style-type: none"><li>• Plan, then act</li></ul>	<ul style="list-style-type: none"><li>• “Act-learn-plan and act again;” continual inquiry and feedback</li></ul>



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**HIERARCHICAL CONTROL  
MAY NOT BE NECESSARY**

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*Simple rules lie behind complex phenomenon*  
*Example: Flocking...*

- Maintain a minimum distance from all other birds and objects
- Match speed with neighboring birds
- Move toward the center of mass of birds in your neighborhood

# Order via *Minimum* Specifications



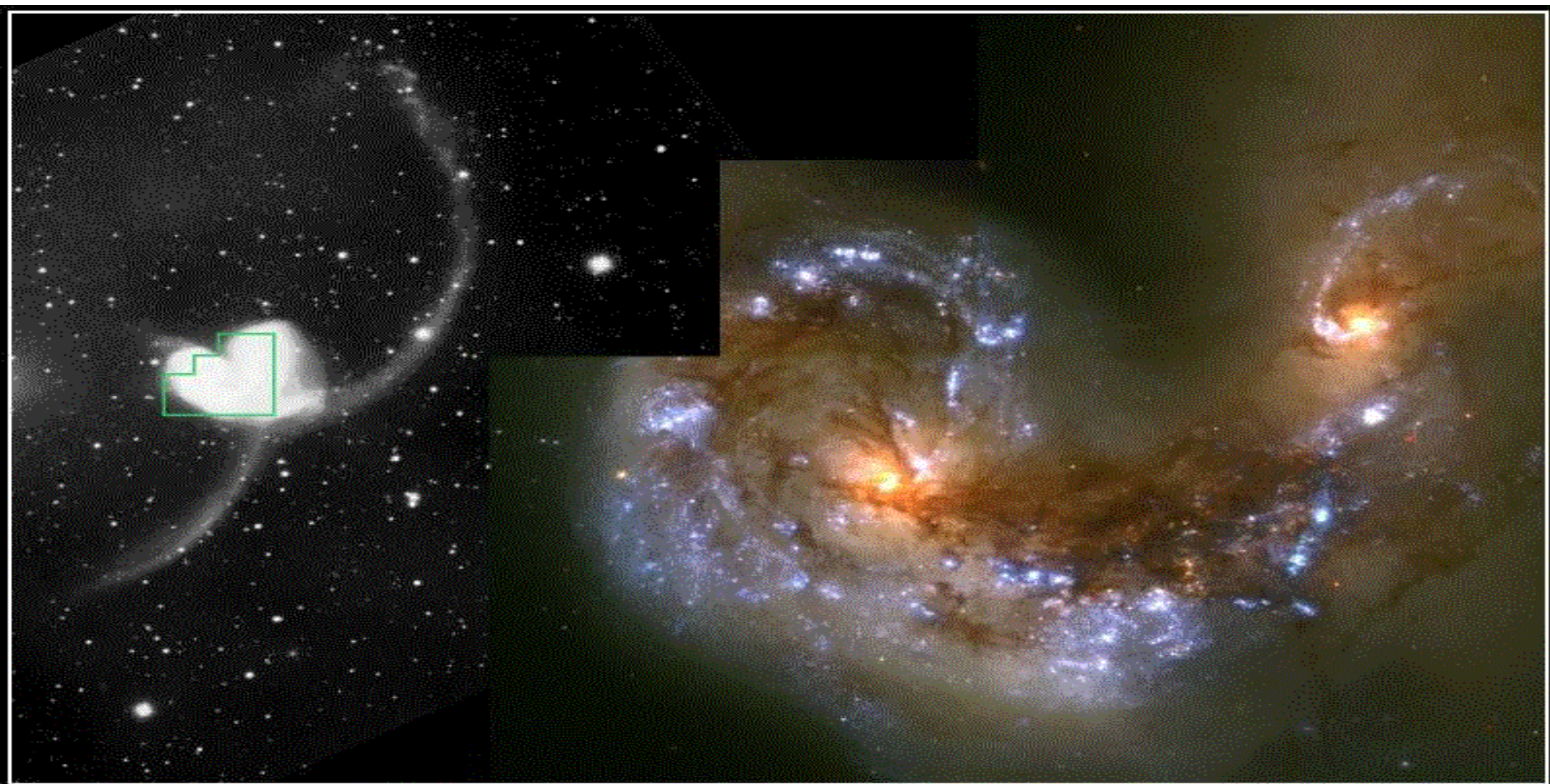
Without a detailed  
step-wise procedure!?!

Without an avian  
Chief Exec!?!

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# RELATIONSHIP CULTIVATION IS A LEADER'S KEY JOB

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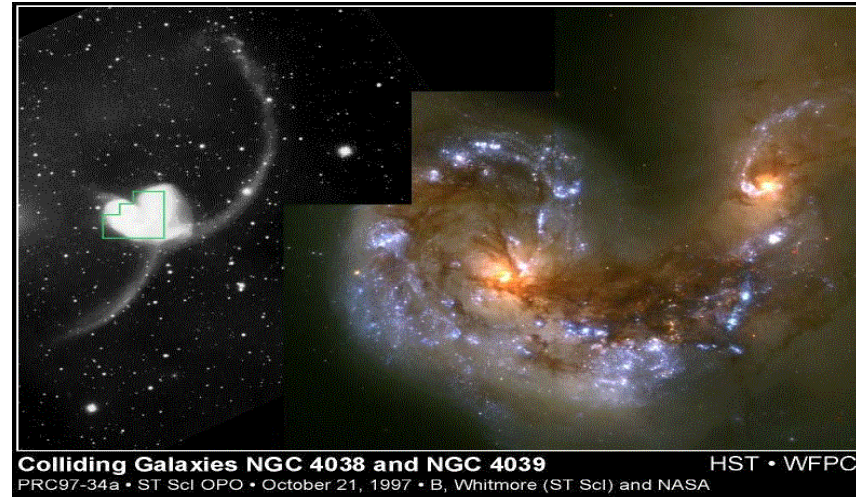
**Colliding Galaxies NGC 4038 and NGC 4039**

HST • WFPC2

PRC97-34a • ST ScI OPO • October 21, 1997 • B, Whitmore (ST ScI) and NASA

# *What happens when things come together?*

What happens when two galaxies come together?



**Colliding Galaxies NGC 4038 and NGC 4039** HST • WFPC2  
PRC97-34a • ST ScI OPO • October 21, 1997 • B. Whitmore (ST ScI) and NASA



What happens when two cars come together?

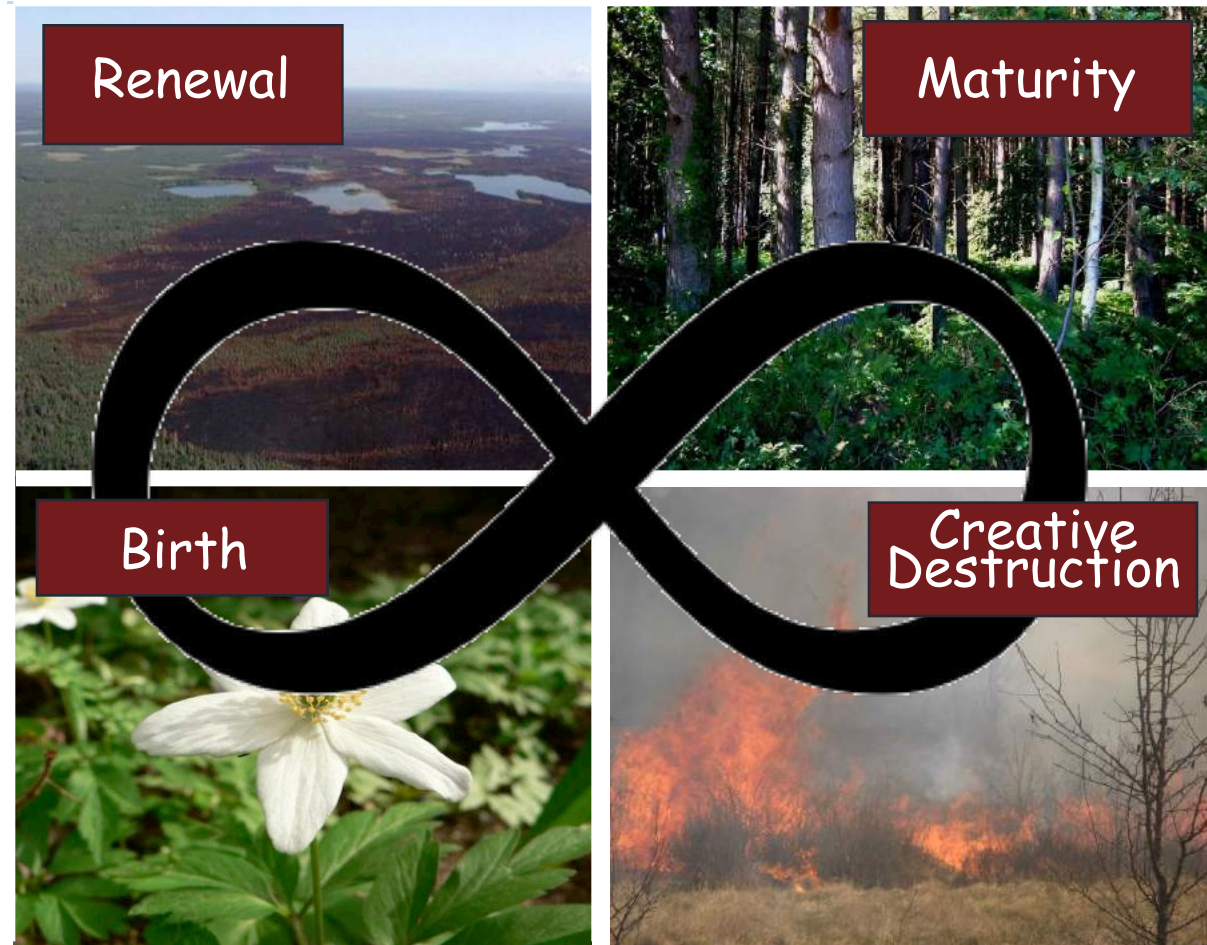
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TAKING THINGS OFF THE PLATE IS AS  
IMPORTANT AS PUTTING THINGS ON IT

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# Forest Ecocycle



# *Improving quality and safety in a complex world...*

- Good enough plan, get on with it
  - Minimum specifications, local action
  - Constant attention to relationships
  - Stop doing things of limited value
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# The Road to the Future?



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