# <u>Where</u> project complexity lies, what causes it, and how to manage it: the case of the Brazilian **Army Strategic Projects**

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### Background Defence projects in Brazil









### **PM Bibliometric Analysis** Articles x Topics x Keywords



- 1961 Burns & Stalker
- 1962 Simon
- 1967 Thompson
- 1976 Mccabe
- = 1980 Saaty
- = 1981 Boehm
- 1981 Steward

1987 - Morris

= 1990 - Cohen & Levinthal

1990 - Henderson & Clark

1991 - Clark

- 1992 Wheelwright & Clark
- 1995 Eisenhardt & Tabrizi
- 1995 Kolisch, Sprecher, & Drexl
- 1996 Baccarini
- 1996 Shenhar & Dvir
- 1999 Brucker et al.
- 1999 Williams
- 2000 Sterman
- 2000 Tatikonda & Rosenthal
- 2001 Browning

2001 - Shenhar

2002 - Pich et al.

- 2003 Engwall
- 2003 Flyvbjerg

2004 - Sommer & Loch

2005 - Williams

2006 - Loch, De Meyer, & Pich

- 2007 - Danilovic & Browning

2007 - Shenhar & Dvir

- 2008 - Thomas & Mengel

2009 - Whitty & Maylor

2011 - Geraldi et al.

#### Analysis Project Complexity Model 1 - System Thinking 2 - Uncertainty Framework 3 - Novelty System 4 - Dynamics Design 5 - Pace Network = 6 - Socio Political Uncertainty 7 - Norms Innovation Technology = **Capabilities / Competency** Simulation -8 - Flexible Organizational Structure Organization = 9 - Learning / Building Capacity Strategy 10 - Experimentation / Selectionism Knowledge Performance / Success Concerns Performance 12 - Scheduling Success

13 - Cost / Resource Allocation 14 - Complex Decision Making -

Optimization =

## **Systematic Review Method**

Web of Science Core Collection (SCI-EXPANDED; SSCI; A&HCI); ESCI: "project\$ complexit\*" OR "complex project\$" OR "program\$ complexit\*" OR "programme\$ complexit\*" OR "complex program\$" OR "complex programme\$"

Web of Science Core Collection (SCI-EXPANDED; SSCI; A&HCI); ESCI: ("project manage\*") OR ("program\* manage\*") OR ("portfolio manage\*") OR ("PMO\*") OR (project management office\*)

AND

(competenc\*) OR (knowledge) OR (skill) OR (abilit\*)

Coded:



Thematic and narrative synthesis







Complexity

### **Project Management Competency Framework**







### Where, What, and How

Where project complexity lies, what causes it, and how to manage it



### **Goals domain**



#### **Reduce complexity**

- Less ambitious goals and objectives (focus, keep it simple)
- Develop incrementally (divide and conquer)
- Too big to fail (political engineering)

#### **Increase delivery capacity**

- Develop competencies
- Mobilise competencies

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- Find a strong sponsor (inside and outside the organisation)
- Create a common agenda (jobs and income)

### **Product domain**



#### **Reduce complexity**

- Reduce the number of product functions
- Outsource development (specialised company)
- Use known technology (COTS)
- Assess technology readiness before committing to a solution

#### **Increase delivery capacity**

Develop competencies

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- Tools and techniques (system engineering, requirement engineering, configuration management, DSM, software, digital twin, VR)
- Mobilise competencies (engineers, SME)

### **Process domain**



#### **Reduce complexity**

- Develop incrementally (focus region, organisation, system)
- Outsource development (system integrator)

#### Increase delivery capacity

• Develop competencies

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- Mobilise competencies (project managers, SME)
- Invest in PM and engineering tools (software, DSM)

## People domain



#### **Reduce complexity**

- Hire reservists, civilians or private companies
- PMO: change/negotiate better human resource policy (resource allocation)

#### Increase delivery capacity

- Develop competencies (mentoring and apprenticeship programmes)
- Mobilise competencies
- Capture and share knowledge (lectures, workshops, lessons learned, communities of practices, KM systems)

## **Tools domain**



#### **Reduce complexity**

- Use known solutions and technologies
- Use uncertainty frameworks to grasp uncertainty
- Foster communication (C&C style vs open comm)
- Reduce number of contractors (prime contractor or system integrator)

#### Increase delivery capacity

- Develop competencies
- Mobilise competencies

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- Plan multiple scenarios
- Capture and share knowledge (lectures, workshops, lessons learned, communities of practices, KM systems)

### **Organisation domain**



#### **Reduce complexity**

PMO: review, simplify, and automate processes



Develop competencies

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• Mobilise competencies (hire retired personnel)

### **Environment domain**



#### **Reduce complexity**

 Long term strategy: PMO, MoD, Industry, and Congress

#### Increase delivery capacity

Develop competencies

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- Mobilise competencies
- Plan multiple scenarios



### Conclusion



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