Practical Applications of Complexity in Software & Digital Products Development

Luca Minudel
LIVING COMPLEXITY

A catalogue of practices for everyday software and digital products development

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AGILE PRACTITIONER SINCE END 2001

COMPLEXITY PRACTITIONER SINCE 2004

LEAN PRACTITIONER SINCE 2006

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LIVING COMPLEXITY: ACKNOWLEDGEMENTS

BASED ON THE WORK OF:

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FEEDBACK FROM:

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TWO NEW RADICAL APPROACHES TO COMPLEXITY

① PEOPLE NOT HIVES

THE UNIQUE QUALITIES OF HUMAN AGENTS AND HUMAN COMPLEX SYSTEMS. WE ARE NOT HIVES NOR ALGORITHMS.
AGENTS OF THE COMPLEX SYSTEMS: PEOPLE NOT HIVES OR ALGORITHMS
AGENTS OF THE COMPLEX SYSTEMS: PEOPLE NOT HIVES OR ALGORITHMS

IDENTITY
- UNIQUENESS, HETEROGENEITY

INTENTIONALITY
- SPONTANEITY
- FREE-WILL
- AGENCY

INTELLIGENCE
- LEARN
- CO-CREATE NEW KNOWLEDGE
- SHARE KNOWLEDGE
HUMAN SELF-ORGANISATION

In a nutshell, self-organisation is a social process of local interactions leading to the emergence of population-wide patterns.

- SPONTANEOUS, ONGOING
- PEOPLE WORKING IN THE ORG AND ITS PROXIMITY
- LOCAL INTERACTIONS
  E.G. TWO CO-WORKERS DEBATING
- CONSTANTLY NEGOTIATING
  WHAT IS THE MEANING OF AN EVENT WHO THEY WANT TO BE AT WORK WHAT THEY WANT TO DO TOGETHER
- POPULATION-WIDE PATTERNS
  E.G. TENSION DURING A COMPANY MERGER
HUMAN SELF-ORGANISATION

A weather system is a self-organising system. It can equally produce a sunny day or a natural disaster. Self-organisation left alone can go either way.

“SUNNY”

“HURRICANE”

This is why in an organisation we want to orient self-organisation toward desirable and beneficial outcomes.
HUMAN SELF-ORGANISATION

COMPLEXITY SCIENCE

SELF-ORGANISATION

≠

SELF-ORGANISATION

AGILE SOFTWARE DEVEL.
SELF-ORGANISATION BASIC MODEL, JOSEPH PELRINE

Prerequisites

1. Critical mass
2. Diversity and dissent
3. Environment
4. Letting people do it
Basic model's control knobs

Team size  Boundaries  Roles
Orient the emergence of patterns in the self-organising system, amplifying those beneficial, and reversing those detrimental.
A PRACTICE INSPIRED BY COMPLEXITY THEORY IS DESCRIBED WITH THESE SECTIONS:

OVERVIEW
- WHAT DO I NEED TO KNOW BEFORE I CONTINUE READING?

PURPOSE
- WHAT IS THIS PRACTICE FOR? WHO IS FOR?

RELATION TO COMPLEXITY
- WHAT IT HAS TO DO WITH COMPLEXITY THEORY?

DESCRIPTION
- MAIN SECTION: INPUTS, STEPS OF THE WORKFLOW, OUTCOMES, …

PRACTICAL TIPS & STORIES
- WHAT NOW? WHEN? HOW? STORIES. WHAT NEXT?
SELF-ORGANISATION

5 PRACTICES INTRODUCE 21 CONTROL KNOBS

1 - BASIC MODEL  
BY JOSEPH PELRINE

2 - HEAT MODEL  
BY JOSEPH PELRINE

3 - FLOW MODEL  
BY JOSEPH PELRINE

4 - ABIDE MODEL  
BY DAVE SNOWDEN

5 - C2 APPROACH SPACE  
BY DAVID ALBERTS
SELF-ORGANISATION

5 PRACTICES INTRODUCE 21 CONTROL KNOBS
TWO NEW RADICAL APPROACHES TO COMPLEXITY

STARTING WITH PRACTICE

SHIFT UP-SIDE-DOWN THE CENTRE OF GRAVITY OF THE CONVERSATION AROUND COMPLEXITY. TO PUT PRACTICAL APPLICATIONS OF COMPLEXITY THEORY FRONT AND CENTRE.
THE WORK WE DO MAY BE COMPLEX

People that are used to dealing with a lot of simple problems tend to see all problems as simple. People used to deal with very Complex problems tend to see all problems as Complex.

Therefore, practices to estimate the real degree of complexity of a problem are extremely valuable.
**THE WORK WE DO MAY BE COMPLEX**

Common origins of Complexity for a Delivery Initiative

<table>
<thead>
<tr>
<th>Work to do</th>
<th>=&gt;</th>
<th>Potentially complex systems</th>
</tr>
</thead>
<tbody>
<tr>
<td>Domain</td>
<td></td>
<td></td>
</tr>
<tr>
<td><a href="#">Chemical structure</a></td>
<td>=&gt;</td>
<td><a href="#">Network graph</a></td>
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<tr>
<td>People</td>
<td></td>
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<tr>
<td>Technology</td>
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</table>

[Chemical structure](#): ![Chemical structure image]

[Network graph](#): ![Network graph image]
THE WORK WE DO MAY BE COMPLEX

A FEW COMMON ORIGINS OF COMPLEXITY FOR A DELIVERY INITIATIVE

- **REQUIREMENTS** that are incomplete, fragmented, ambiguous; competing priorities, shifting goals, volatility; continuously accelerating rate of change and insufficient time to process all this new information

- **PEOPLE**, collaboration dynamics, unpredictable creativity and uncontrollable; misaligned goals and incentives; conflicting interests; fast changing and savvy customers

- **TECHNOLOGY**: a huge # of systems, accidental dependencies and fragile integrations; massive legacy code-bases; tech-debt; rapidly evolving tech eco-system
ESTIMATING COMPLEXITY, LIZ KEOGH

WHO IN THE WORLD HAS DONE THIS BEFORE?

5. Nobody in the world has done this before.

4. Someone has done it, but not here (we have no access to expertise).

3. Someone within our organization has done it, or we have access to expertise in a different way.

2. Someone in the team has done it.

1. We all know how to do it.
4 PRACTICES TO ASSESS THE DEGREE OF COMPLEXITY

1 - SENSING COMPLEXITY  LUCA MINUDEL  
2 - ESTIMATING COMPLEXITY  LIZ KEOGH  
3 - COMPLEXITY ESTIMATION  LUCA MINUDEL  
4 - FOUR POINTS METHOD  DAVE SNOWDEN
ADAPTING TO THE DEGREE OF COMPLEXITY

4 MORE PRACTICES TO ADAPT TO THE DEGREE OF COMPLEXITY

5  - RUDE ESTIMATION  
   DEAN LATCHANA

6  - CYNEFIN FOR DECISION MAKING  
   BY DAVE SNOWDEN

7  - C2 APPROACH SPACE  
   BY DAVID ALBERTS

8  - ESTIMATES ACCURACY  
   LUCA MINUDEL

"Manoeuvre Agility

is the ability to recognise the approach appropriate for the circumstances at hand, and to transition in a timely manner to that approach."
ORGANISATIONS MAY BE COMPLEX

COMPLEXITY AND COMPLEX DYNAMICS MAY PERMEATE THE ORGANISATION:
=> CO-CREATION, CO-EVOLUTION, EMERGENCE

Co-creation is a collaboration pattern particularly effective when dealing with Complexity.

“Man is essentially a story-telling animal. That means I can only answer the question “what am I to do?” if I can answer the prior question “of what story or stories do I find myself a part?”
- Alasdair MacIntyre
Organisations that are complex are more susceptible to Complexity, and at the same time are better suited to cope with and exploit Complexity.

“It takes a network to compete with a network”
- Stanley Allen McChrystal, US Army general
ORGANISATIONS MAY BE COMPLEX

3 PRACTICES BASED ON CO-CREATION

1 - RED TEAM TECHNIQUE  DEAN LATCHANA
2 - CULTURE AFFINITY ASSESSMENT  LUCA MINUDEL
3 - LEAN INCEPTION  BY THOUGHTWORKS
A LANDSCAPE OF PRACTICAL APPLICATIONS OF COMPLEXITY IN SW & DIGITAL PRODS DEV

LISTS AND CATALOGUES ARE ATTEMPTS TO MAKE INFINITY COMPREHENSIBLE, TO CREATE ORDER OUT OF CHAOS.

“

The list is the origin of culture
- Umberto Eco

“
A LANDSCAPE OF PRACTICAL APPLICATIONS OF COMPLEXITY IN SW & DIGITAL PRODS DEV

REGION 3 ⇒

WHOLE ORG MAY BE COMPLEX

REGION 2 ⇒

WORK WE DO MAY BE COMPLEX

REGION 1 ⇒

WE ARE COMPLEX
REGION 1: WE ARE COMPLEX SELF-ORGANISATION

6 PRACTICES FROM THE BOOK INTRODUCE 20-ODD CONTROL KNOBS

- Self-organisation & teams
  - ABIDE Model
  - Heat Model
  - Flow Model
  - Basic Model

- Complexity, Agility & teams
  - C2 Approach Space
  - Cynefin for decision making
REGION 2: WORK MAY BE COMPLEX

COMPLEX SYSTEMS

6 PRACTICES TO SENSE AND ADAPT TO COMPLEXITY

Sensing Complexity

- Sensing Complexity
- Estimating Complexity
- Four points Method
- Complexity Estimation

Complexity & Estimates

- Estimates accuracy with Cone of unc.
- Rude Estimation
REGION 3: ORG MAY BE COMPLEX CO-CREATION

Part 3 practices

- Red Team Technique
- Lean Inception
- Culture Affinity
KEY CONCEPTS

- Self-organisation
- Co-creation
- Emergence
- Co-evolution
- Complexity
- Agility
- Manoeuvre Agility

APPENDIX A:
INTRODUCTION TO COMPLEXITY, RESOURCES
BOOK: LIVING COMPLEXITY
BUY AT: LEANPUB.COM

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HTTPS://WWW.SMHARTER.COM/BLOG/
PART 2 – OPEN MIC Q&A
⇒ POST AND VOTE THE QUESTIONS

PRACTICAL APPLICATIONS OF COMPLEXITY IN SOFTWARE & DIGITAL PRODUCTS DEVELOPMENT

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