



ENBIS Spring Meeting  
on Data Science in Process  
Industries

## Statistical Engineering. Thoughts on the current situation and proposals for the future



Xavier Tort-Martorell

May 2021



**Finding our Identity**  
*Caleb & Lindsay King*

**We Are Not Alone**  
*William Guthrie & Dennis Leber talks*

**Discussants: Marcus Perry, Murat Testik  
and Xavier Tort-Martorell**

19th ENBIS Conference

Statistical Engineering: From practice to theory



Xavier Tort-Martorell

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So far ISEA has done a very good job in:

- Defining SE and centering it in Complex Problem Solving

### Top 10 skills

#### in 2020

1. Complex Problem Solving
2. Critical Thinking
3. Creativity
4. People Management
5. Coordinating with Others
6. Emotional Intelligence
7. Judgment and Decision Making
8. Service Orientation
9. Negotiation
10. Cognitive Flexibility

#### in 2015

1. Complex Problem Solving
2. Coordinating with Others
3. People Management
4. Critical Thinking
5. Negotiation
6. Quality Control
7. Service Orientation
8. Judgment and Decision Making
9. Active Listening
10. Creativity



Source: Future of Jobs Report, World Economic Forum

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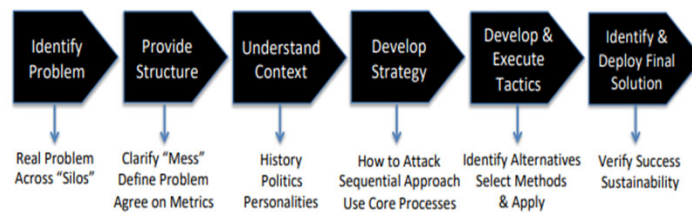
So far ISEA has done a very good job in:

- Defining SE and centering it in Complex Problem Solving
- Defining “Fundamental Principles”
  - Understanding of the problem context
  - Development of a problem solving strategy
  - Consideration of the data pedigree
  - Integration of sound subject matter theory
  - Utilization of sequential approaches

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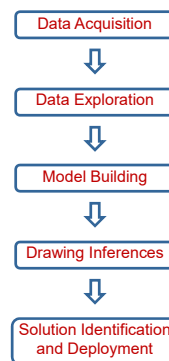
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- Defining “Fundamental Principles”
- Providing a methodology. Phases



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- Defining “Fundamental Principles”
- Providing a methodology. Phases
- Integrating the tools with the methodology (Strategy / Tactics) through the core statistical processes



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- Defining SE and centering it in Complex Problem Solving
- Defining “Fundamental Principles”
- Providing a methodology. Phases
- Integrating the tools with the methodology (Strategy / Tactics) through the core statistical processes
- Disseminating the “new discipline credo” involving statisticians from many countries

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Weak points:

- Who are the customers?
  - Managers?
  - Problems solvers?
  - Students? Graduate level? Background?
  - Statisticians?
  - All of them?

From statisticians, by statisticians, to statisticians

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Weak points:

- Who are the “competitors”?



Operations Research & Analytics are proven scientific mathematical processes that enable organizations to turn complex challenges into substantial opportunities by transforming data into information, and information into insights that save lives, save money and solve problems

Google on problem solving:

Strategy: 274 million results

Methodology: 94 million results



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Weak points:

- Marketing strategy

Not knowing the customers...

There is no favorable wind for those who do not know where they are going

*Seneca (45 AD)*

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Proposals for the future:

1. Keep the “solving complex problem” and all the good work done

B. Top 15 skills for 2025

1	Analytical thinking and innovation	9	Resilience, stress tolerance and flexibility
2	Active learning and learning strategies	10	Reasoning, problem-solving and ideation
3	Complex problem-solving	11	Emotional Intelligence
4	Critical thinking and analysis	12	Troubleshooting and user experience
5	Creativity, originality and initiative	13	Service orientation
6	Leadership and social influence	14	Systems analysis and evaluation
7	Technology use, monitoring and control	15	Persuasion and negotiation
8	Technology design and programming		

Source  
Future of Jobs Survey 2020, World Economic Forum.

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Proposals for the future:

2. Widen the scope of the Statistical Engineering discipline recuperating the vision of the first Hoerl and Snee articles (2009 and 2010)

- “the study of how to best use statistical science concepts methods and tools and integrate them with IT and other relevant sciences to generate improved results”
- “theory on how to make better use of existing statistical science”
- “how known statistical techniques can best be integrated and applied by nonstatisticians for maximum societal benefit

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Proposals for the future. Widen the scope

STATISTICAL ENGINEERING



BETTER USE OF EXISTING  
DATA SCIENCES

- “Embedding” statistical thinking into business processes
- Clinical trials
- DMAIC
- Industry 4.0
- Measurement Systems
- ...

COMPLEX PROBLEM  
SOLVING

- All the good developments already done
- Develop a framework to integrate it into the business normal operation
- Identification of opportunities
- ...

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Proposals for the future. Widen the scope

B. Top 15 skills for 2025

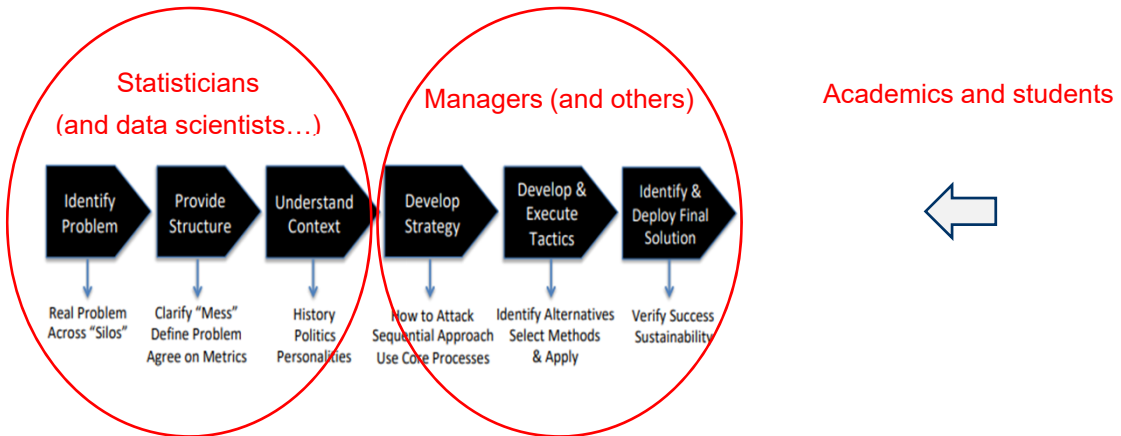
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Proposals for the future:

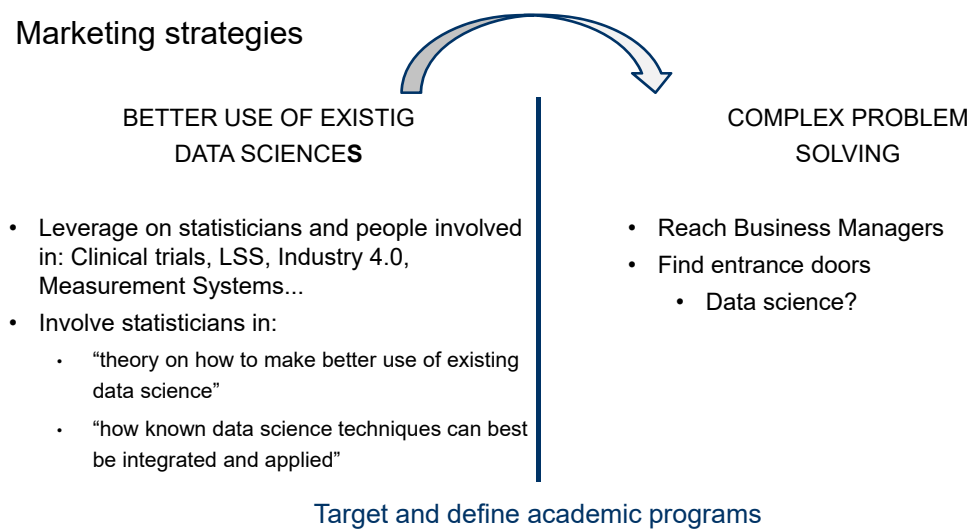
3. Consider three different types of customers and their knowledge and training needs



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Proposals for the future:

4. Marketing strategies



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## CONCLUSIONS

- SE has generated a lot of interest
- A lot of advances in a short time
- A very active and enthusiast group of promoters that should be expanded and rejuvenated
- The boundaries of the discipline should be widened incorporating the initial definition
- Need to clarify the customers and involve them in developing the discipline (What is in it for me?)
- Define a marketing strategy
- Clarify SE academic strategy. Define and promote targeted training programs and research needs

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