



# *Visualization – A Key Concept for Multidimensional Performance Modeling in Software Engineering Management*






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# AGENDA

-  **Problems**
-  **Multidimensional performance models**
-  **Visualization**
-  **Tool - High Level Characteristics**
-  **Conclusion**

# PROBLEMS

- ✚ Software - complex intangible product
  - Does not really have "physical" existence ?
  - It changes very rapidly
  - It always has to be adaptable
  - Difficulties when specifying the requirements
  - High expectations regarding software
- ✚ One-dimensional models - various viewpoints must be taken into account concurrently
- ✚ Represent quantitatively and in a consolidated manner various viewpoints while keeping track of the values of the individual dimensions

# PROBLEMS

- A number of tools dealing with quality
- Few in the area of software engineering performance
- Limited on multidimensionality representation

# PROBLEMS

## QEST prototype



9126 quality tree

The screenshot displays the 'metrics selection' interface. On the left, a tree view shows the ISO 9126 quality model hierarchy. The 'functional implementation completeness' metric is highlighted. On the right, a 'Java Applet Window' titled 'Functional implementation completeness' contains three input fields for 'E', 'S', and 'T' with values 0.2, 0.5, and 0.3 respectively, and a 'SET' button.

**ISO9126**

functional implementation completeness

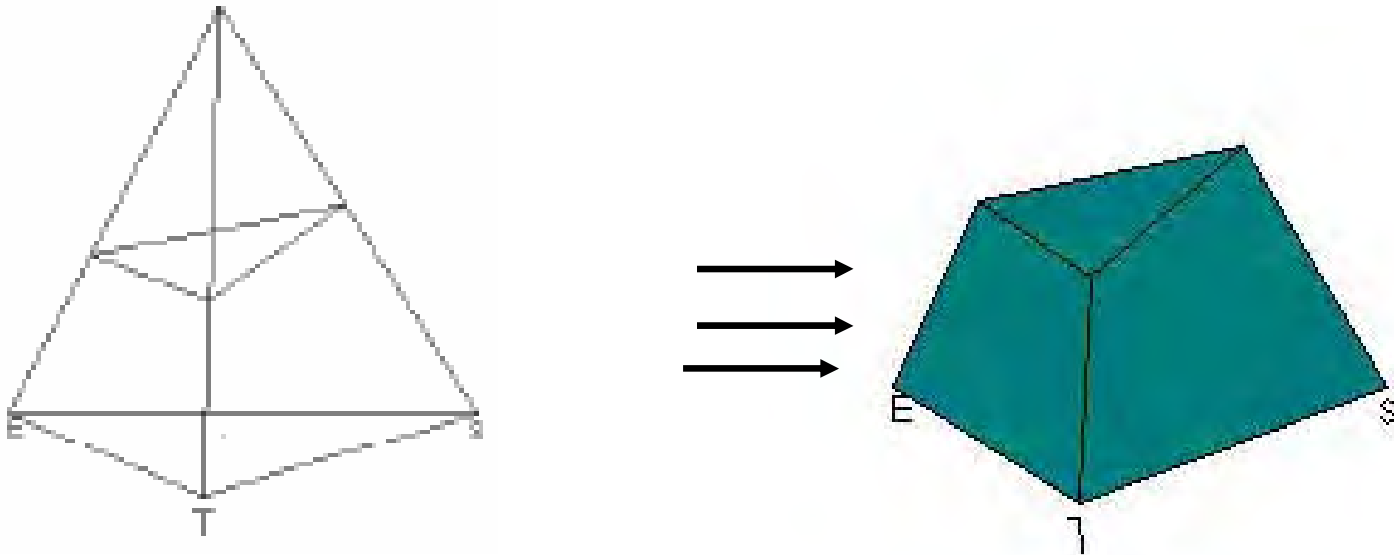
Parameter	Value
E	0.2
S	0.5
T	0.3

**ECONOMIC, SOCIAL AND TECHNICAL  
(E, S, T)**

# PROBLEMS

## QEST prototype

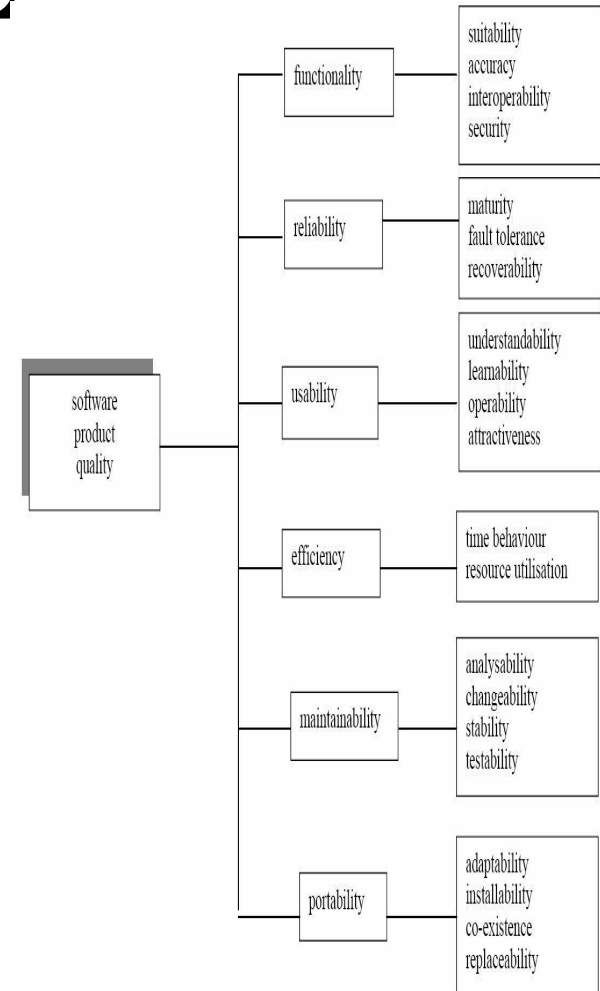
Limited on multidimensionality representation



# Multidimensional performance models in SE

## ISO 9126

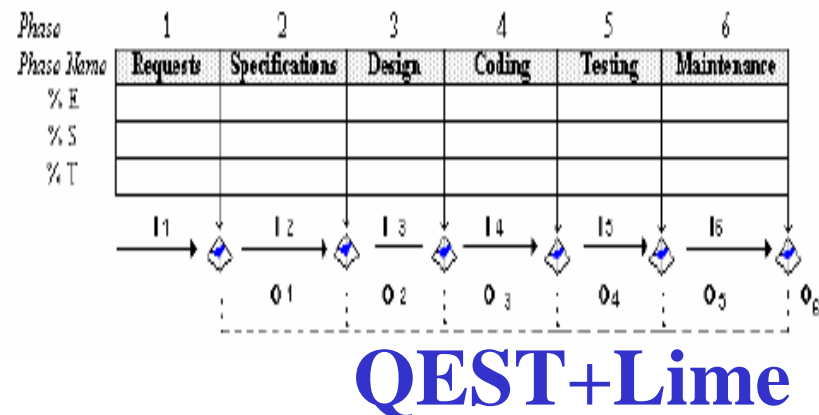
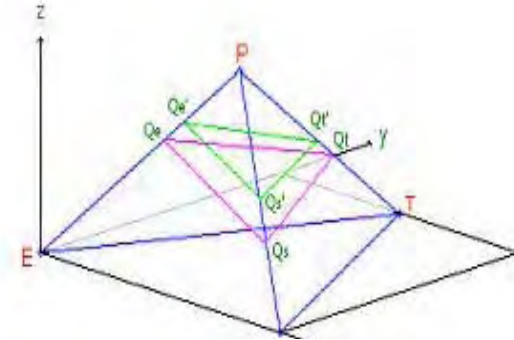
- 1980 Standard
- internal and external quality
- model is generic
- standard framework
- hierarchy is strict : each high-level quality characteristic is related to exactly one set of sub characteristic



# Multidimensional performance models in SE

## QUEST

- + Abran & Buglione
- + Open model
- + Performance : Global vision



- **Q** QUALITY FACTOR
- **E** ECONOMIC      *Dimension Economic (managers)*
- **S** SOCIAL      *Dimension Social (users)*
- **T** TECHNICAL DIMENSIONS      *Dimension Technical (developers)*



# Framework available in MANAGEMENT

**BSC**

**Prism**

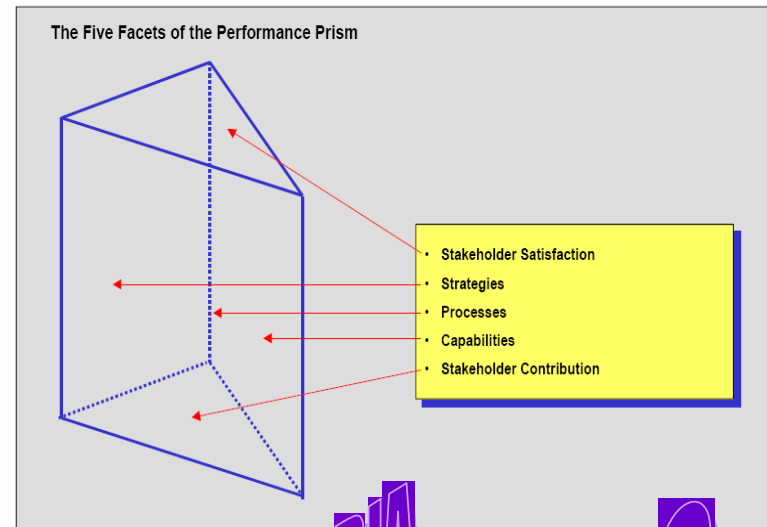
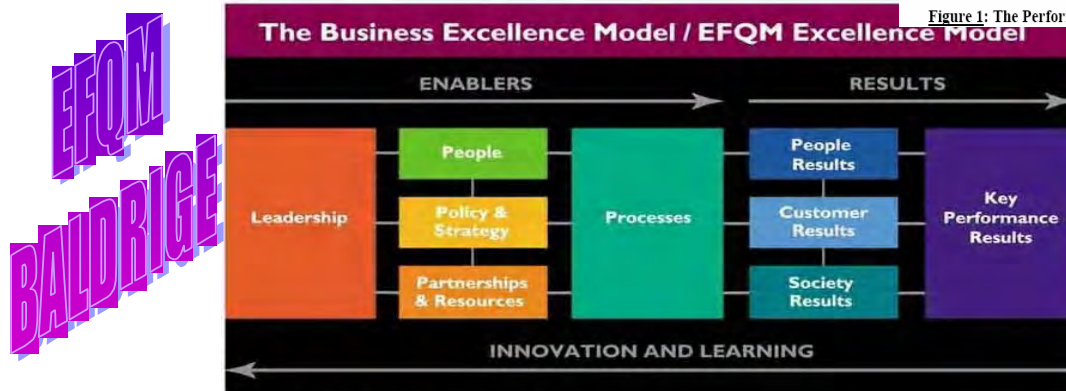


Figure 1: The Performance Prism Framework



©1999 EFQM. The Model is a registered trademark of the EFQM

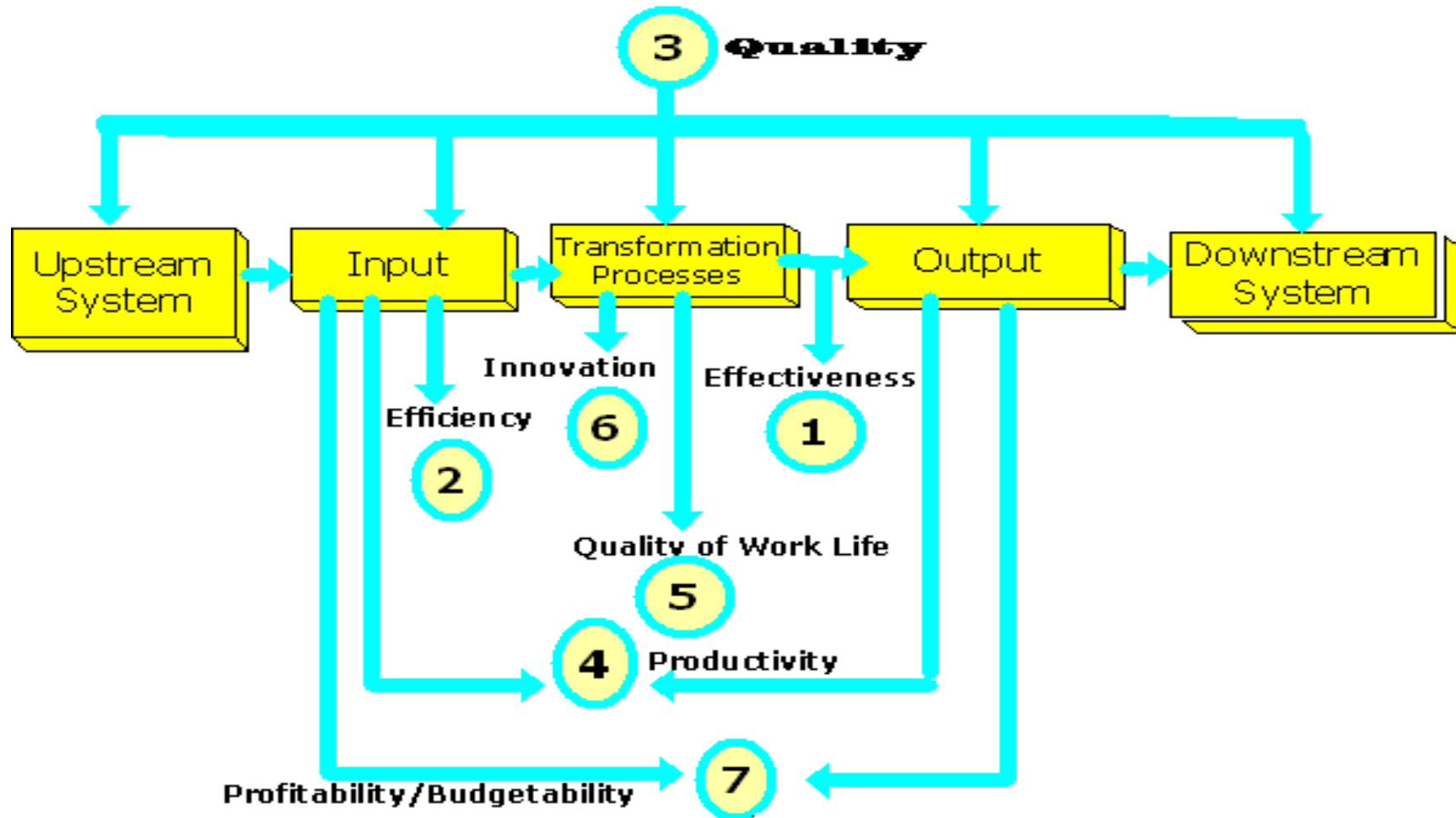
**EFQM  
BALDRIGE**

**SKANDIA  
Pyramide**

**BITS**

# Framework available in MANAGEMENT

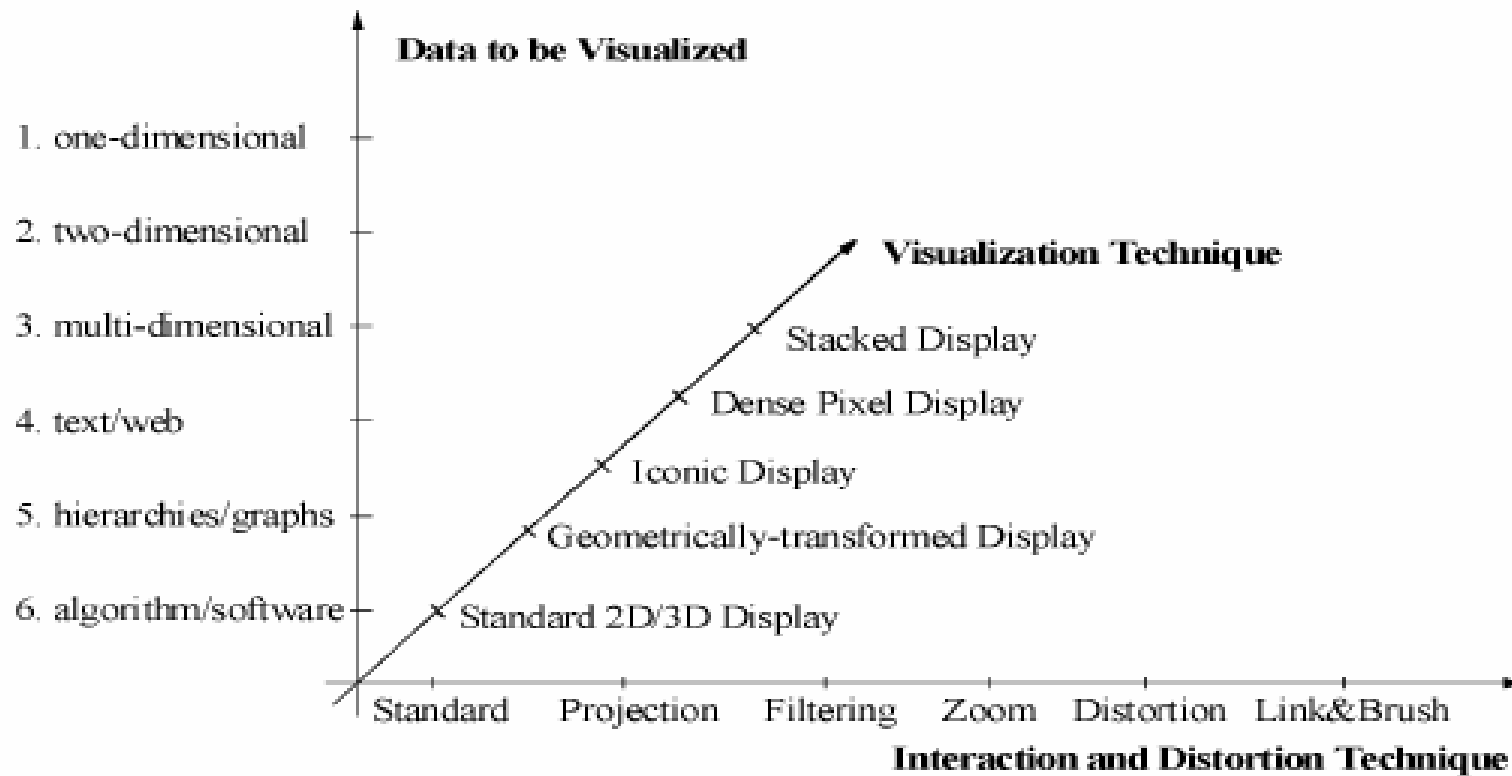
## Generic Framework : *SINK&TUTTLE*



# VISUALIZATION

- ✚ representing data in multidimensional space
  - more natural view
- ✚ exploring and analyzing vast volumes is difficult
- ✚ interactive capabilities are required to allow effective exploration

# VISUALIZATION



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**ISBSG DATABASE+  
Entreprise DATABASE**


**INDICATORS**



**Selection Indicators**  
E.g.: Productivity+Efficiency+Profitability+Open Indicator1+Open Indicator 2

**Build Viewpoints**  
E.g. Economic+Social+Technic

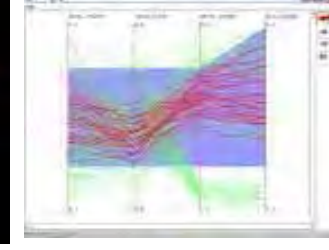
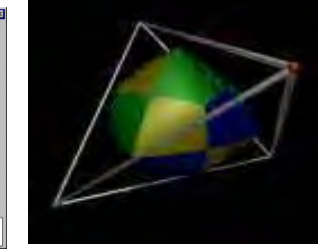
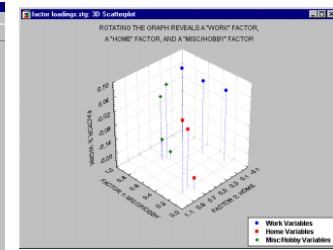
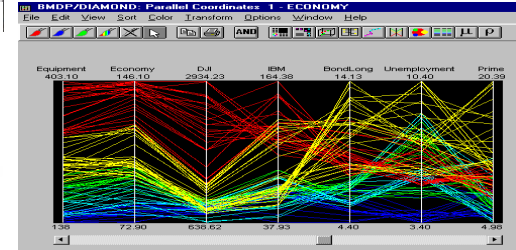
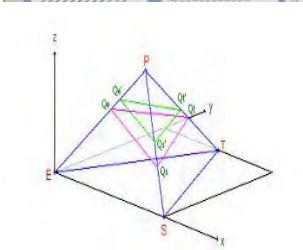
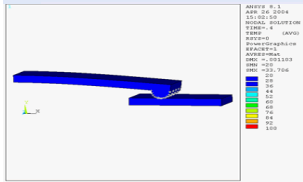
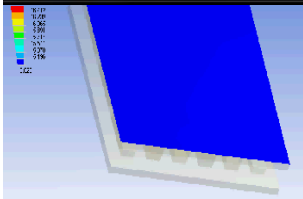
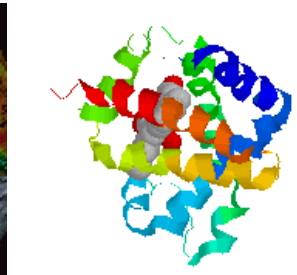
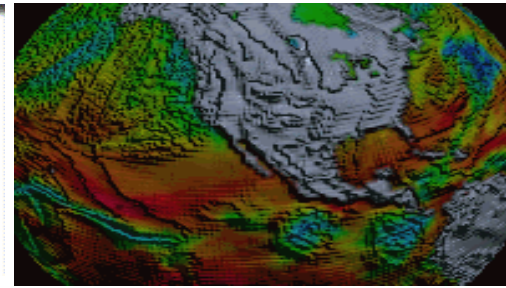
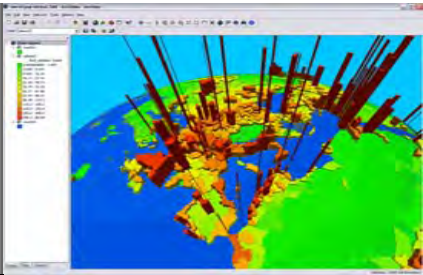
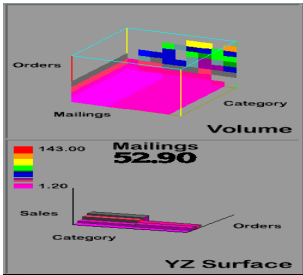
**QEST Algorithm**

**PERFORMANCE** 

# TOOL

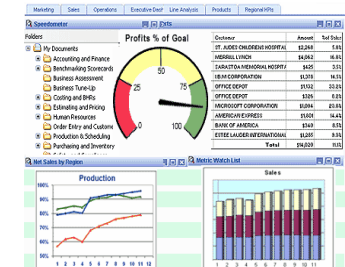
## high-level characteristics

- ✚ adopt the Sink and Tuttle organizational framework
- ✚ build on the open, generic and geometrical QEST
- ✚ enable different visualization techniques to analyze data
- ✚ future potential scenarios on performance
- ✚ International Software Benchmarking Standards Group (ISBSG)



# CONCLUSIONS

- performance-inherently multidimensional
- end-product - intangible
- complex activity
- SE - relatively immature field
- models out of the box
- tools do not include a sophisticated visualization



Question Time!

Merci de votre attention!

Thank you for your attention!

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