Theorem of hypomochlion

or finally know what is simulation

how to use simulation

why to use simulation

where to use simulation

Simulation is feigning
Simulation is feinting
Simulation is fake !

Simulation is feigning ?
Simulation is feinting ?
Simulation is fake ?

Agenda :

1. A definition for simulation

2. Theorem of hypomochlion

3. The knowledge systems

4.The M&S operational application areas

1. A definition for simulation

[BiSC 75-3] [IEEE et M&S Master Plan 1998]

Simulation is the execution over time of models representing the attributes of one or more entities or processes.

[BiSC 75-3] [Bi-SCD 75-2]

A unique form of instruction, with emphasis on operational training, to facilitate complex and integrated learning, primarily utilising electronic means to imitate as realistically as possible the operating environment (e.g. natural and tactical).

[BiSC 75-3] [JWC Definition]

A means of representing dynamically the operating conditions of a real system. Simulation used in training dynamically models real environments and/or equipment to enable trainees to acquire and practice of skills, knowledge and attitudes.

Definition of the simulation :

Models are representation of systems.

(real or imagined)

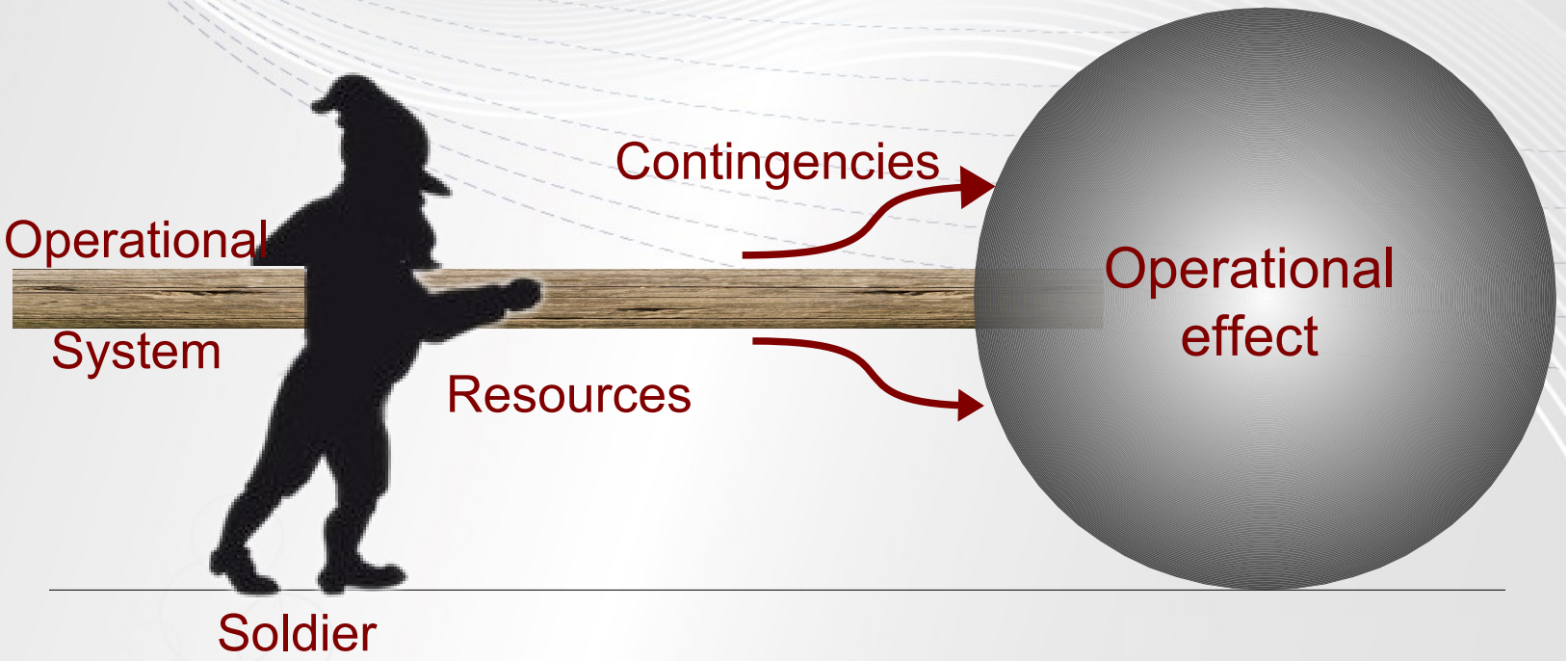
Simulation is the use of models.

(execution, implementation, running)

2. Theorem of hypomochlion

A **soldier** wants to produce an **operational effect**.
How? Which tool to use?

Produce operational effect requires
a tool (**operating system**) and effort (**resources**).
The point of application is empirical (**contingencies**).

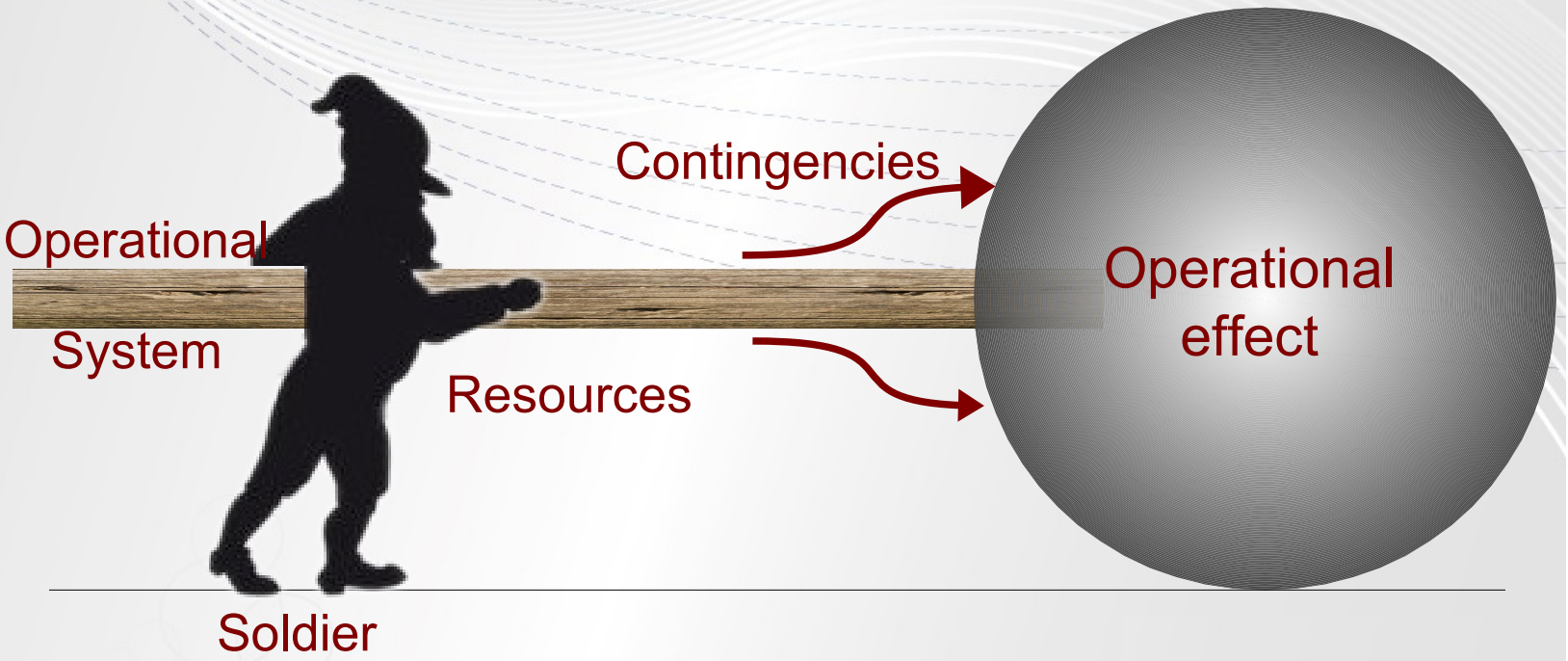


No operational effect produced by this system of systems:

> If there is no resource

> If the soldier handles badly the operational system

> He does not know or apply the operating system



How to reduce contingencies?

How to multiply resource efficiency?

How to make my action more effective?

The solution is in knowledge.

The solution is in knowledge.

I need a **knowledge system** to better know the **operational system**, ie :

> its elements, its interactions,

> its relationship with other systems

> its operational environment.

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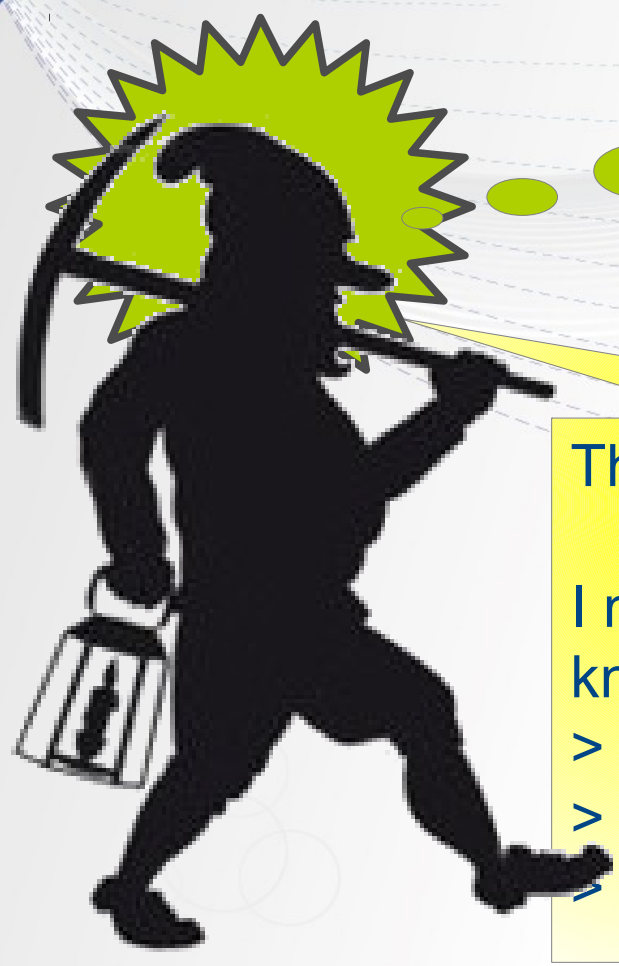

A fulcrum !!!!

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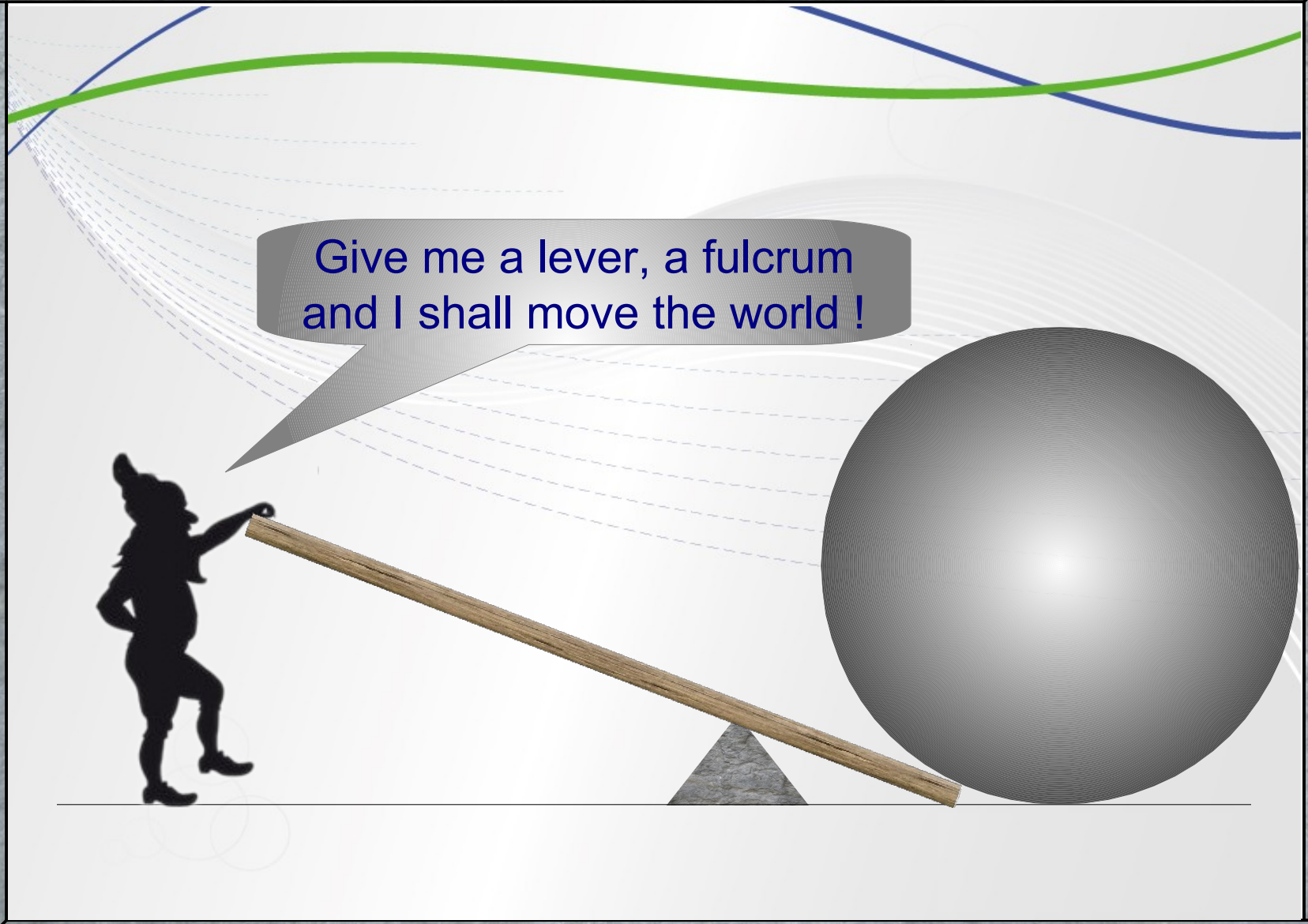
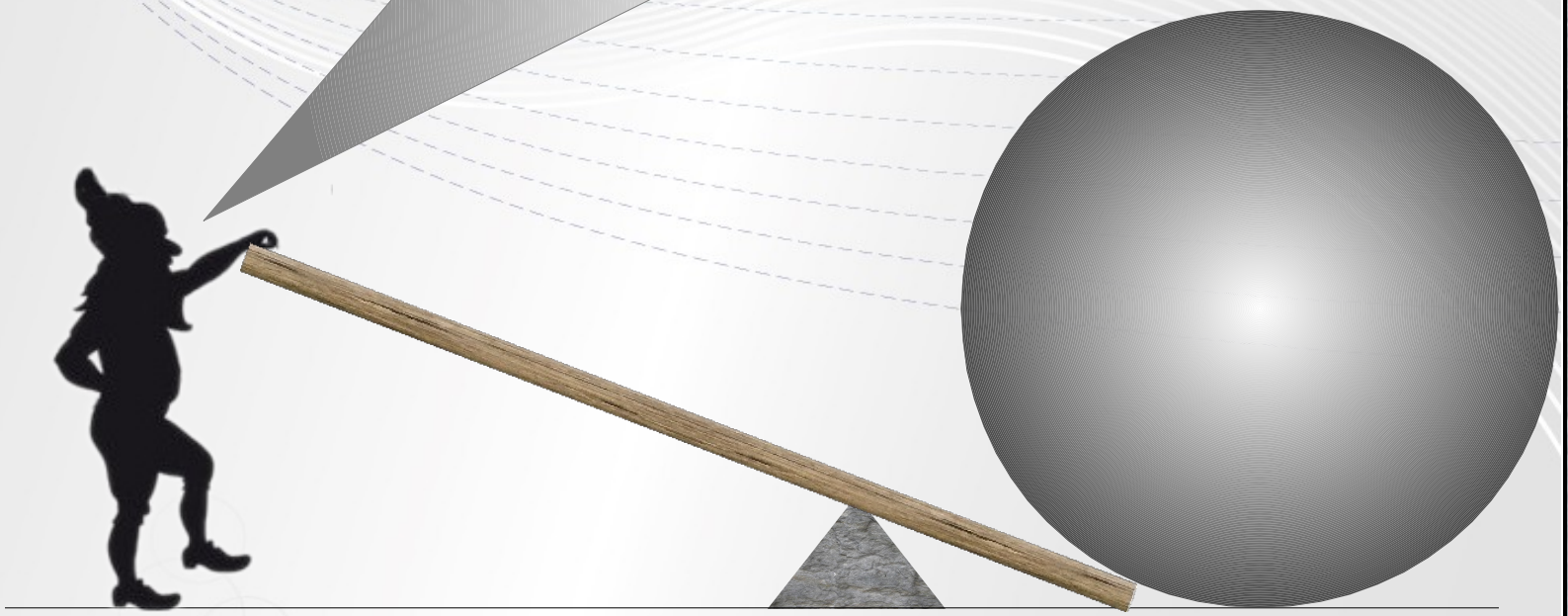
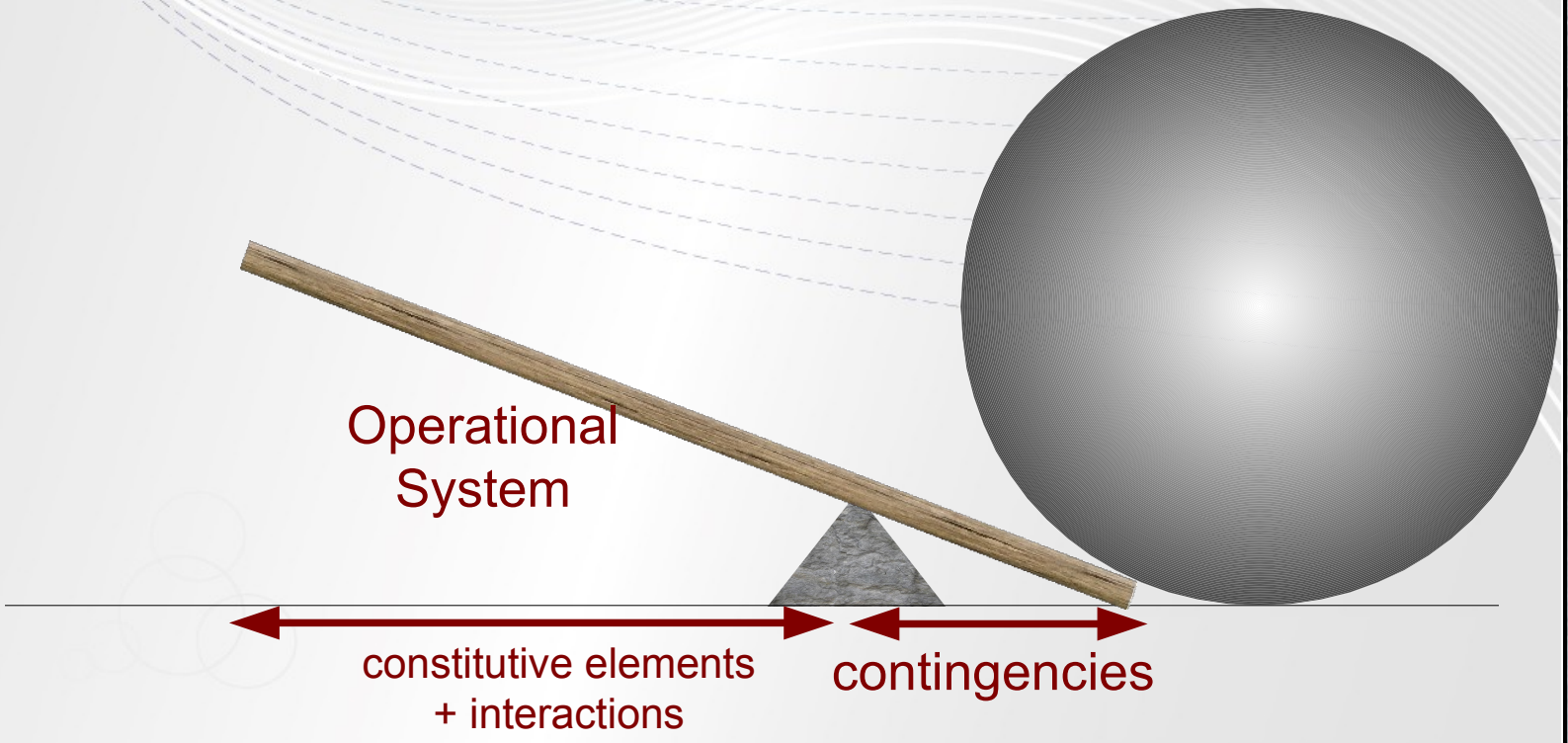

Give me a lever, a fulcrum
and I shall move the world !

Give me a simulation, an operational system and I shall produce the operational effect !

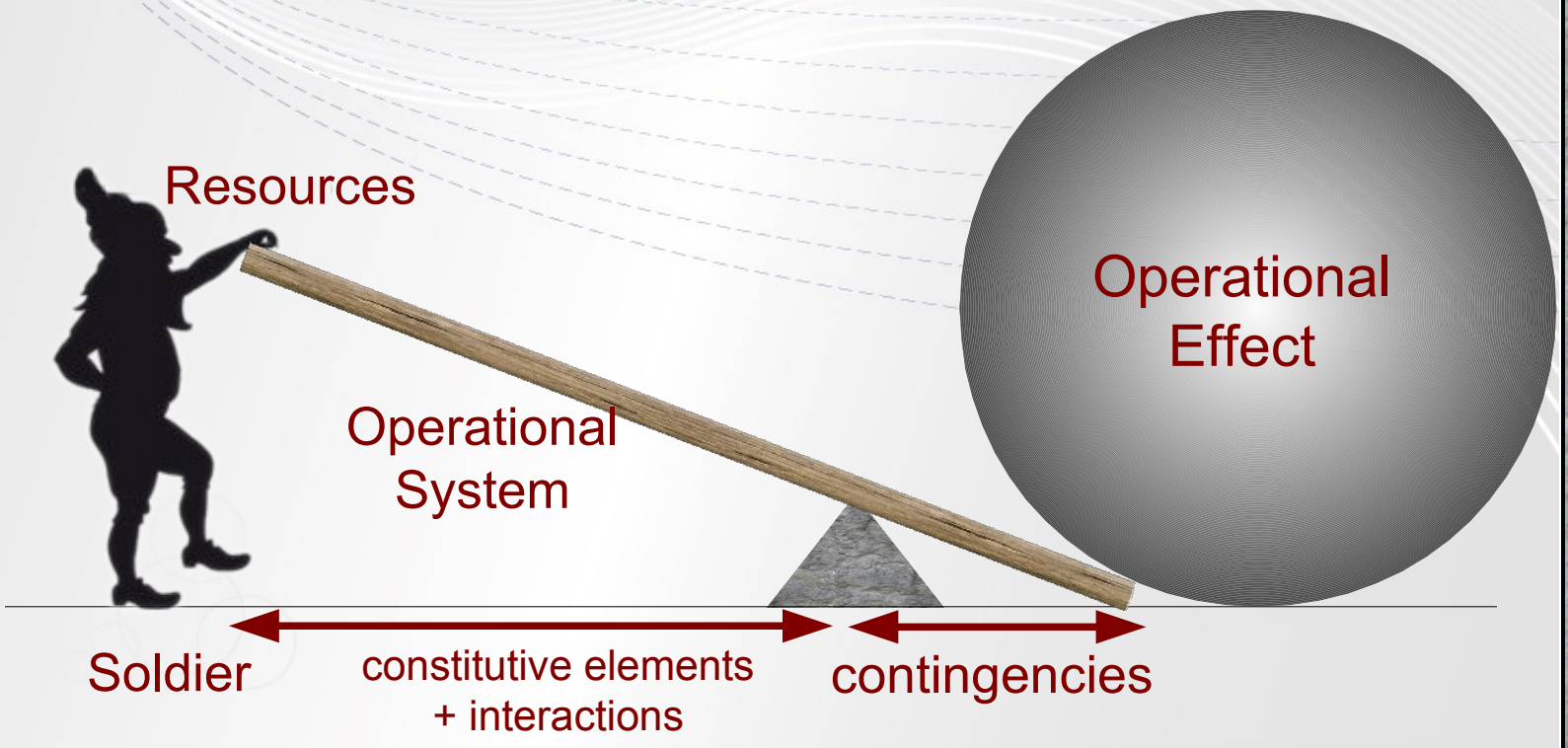


Axiom of the simulation :

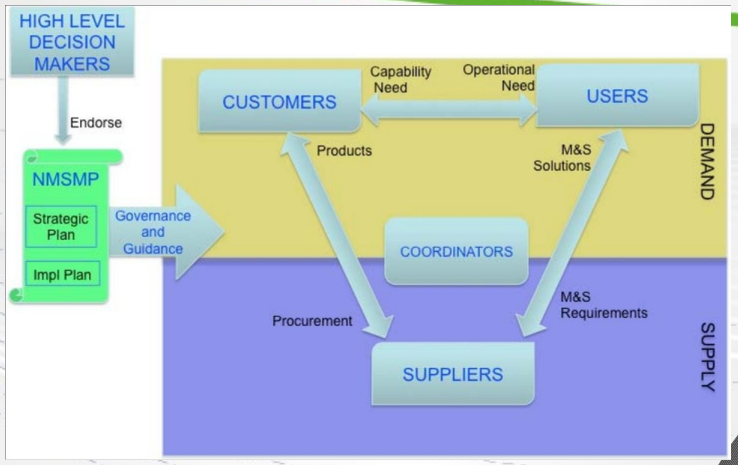
Simulation of interactions between components of a system with other systems within environment reduces contingencies.

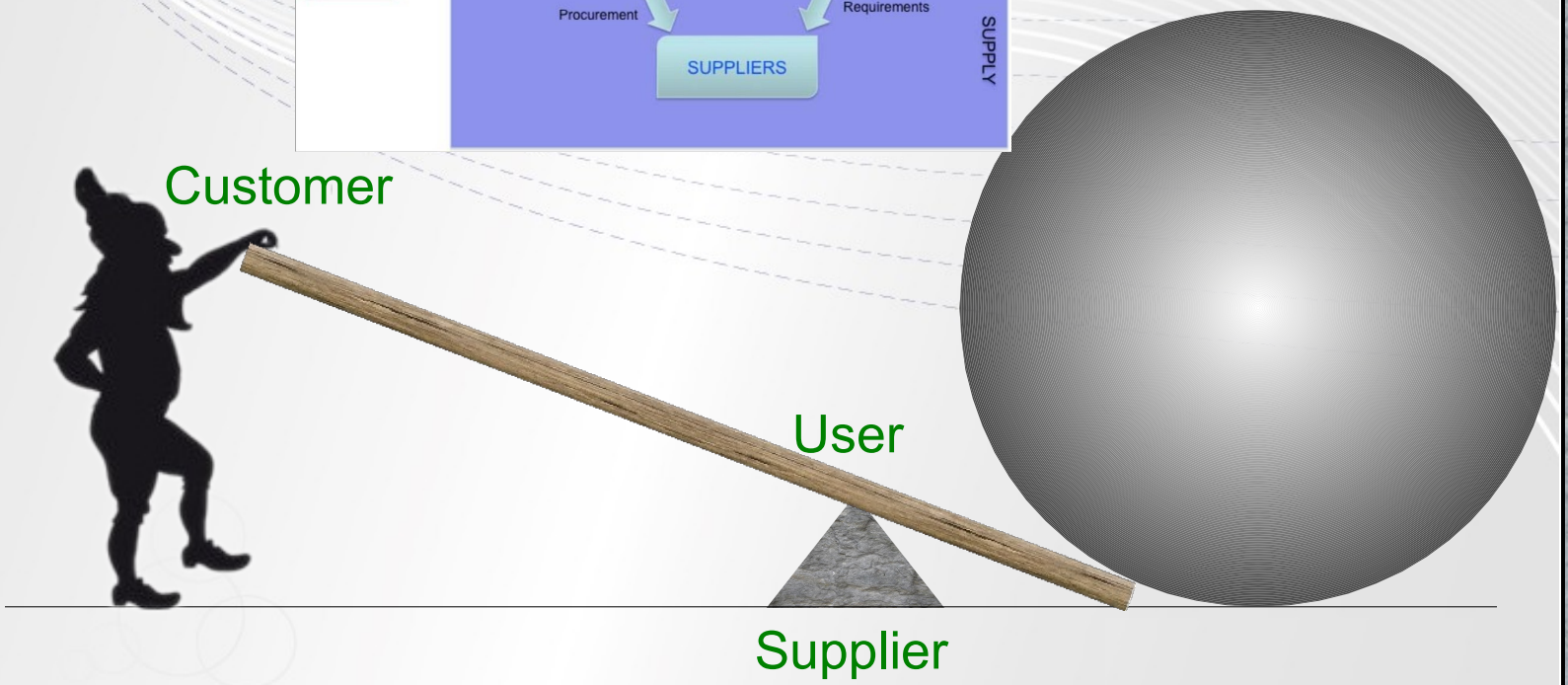


Theorem of the simulation (hypomochlion) :
Because it reduces the contingencies, simulation multiplies the strength of resources applied to an operational system and boosts operational effect.



NATO simulation stakeholders :





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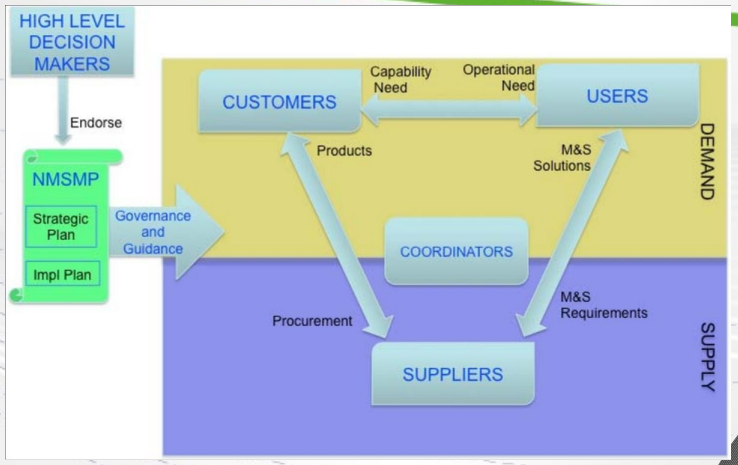

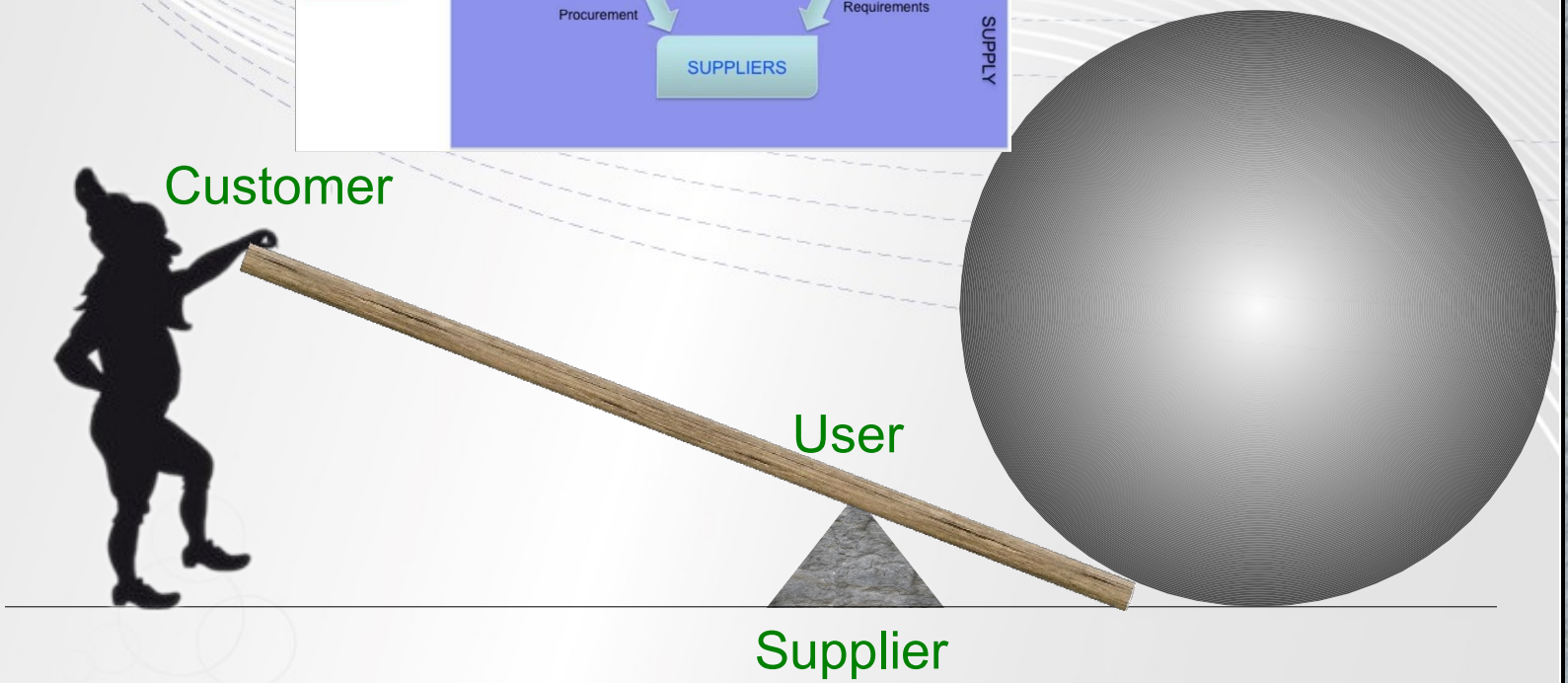

A customer doesn't use simulation !!!

Corollaires de la simulation :

A. la simulation ne produit **pas d'effet opérationnel direct**. Son effet sur les activités opérationnelles est donc indirect.

B. la simulation contribue au **maintien de l'effet opérationnel** visé avec des **ressources moindres**.

C. la simulation peut bénéficier à **tous les systèmes opérationnels** donc à toutes les capacités opérationnelles.

D. la simulation rend **plus efficaces** et **moins coûteuses** les **activités opérationnelles**.

E. la simulation nécessite un **investissement**.

F. **au-delà d'un point d'application**, l'utilisation de la simulation est **contre-productive**.

G. sans système opérationnel à appuyer, la simulation n'a pas d'**utilité**.

H. la **simulation** peut **faire partie** des éléments constitutifs **d'un système opérationnel**.

I. la **simulation n'est pas** un système **opérationnel** ; elle a vocation à être **intégrée dans les systèmes opérationnels**.

Corollaries of the simulation:

A. Simulation does not have direct operational effect. Its **effect on operations is indirect**.

B. Simulation helps **maintain the operational intended effect** with fewer resources.

C. Simulation **can benefit all operational systems** so all operational capabilities.

D. Simulation makes it **more efficient and less costly** operations.

E. Simulation requires an **investment**.

F. B**eyond a point of application**, the use of simulation is cons-productive.

G. Without **operational system to support**, the simulation is unnecessary.

H. Simulation may be part of the **constituent elements** of an operational system.

I. The simulation **is not an operational system** itself, it is intended to be integrated into operational systems.

Corollaries of the simulation :

J. The **operational effect is measured** against the objectives set in the operational contracts.

K. More **a system is with contingencies**, ie more complex a system is, the more the effects of the simulation are beneficial.

L. Simulation is part of **information system** designed to transmit (learning), to understand (decision support), estimate (qualification) and retain (capitalization).

M. **Simulation is a knowledge system**.

N. The simulation is not an operational need is a **solution**.

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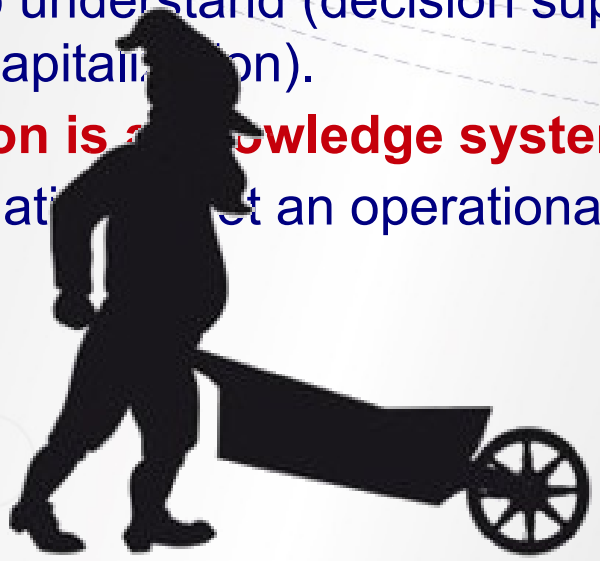

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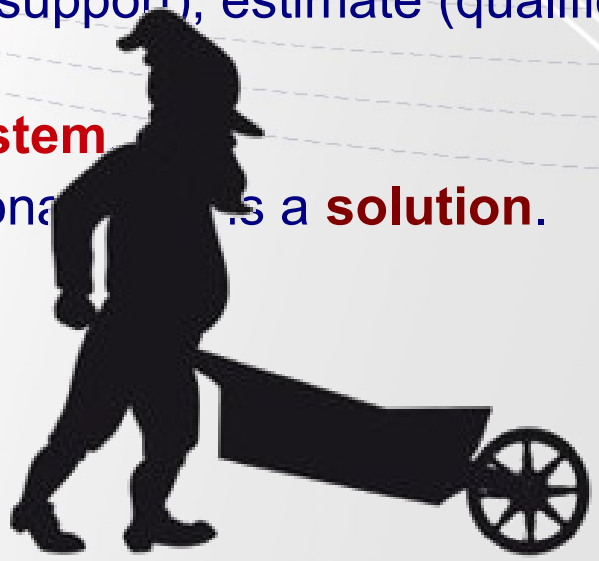

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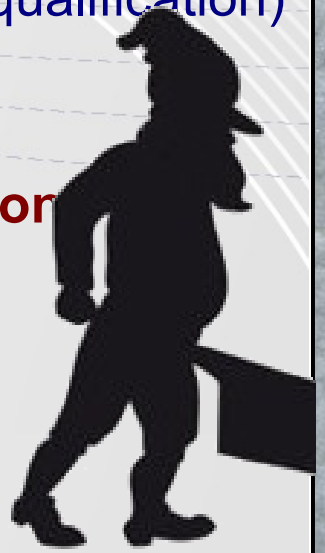

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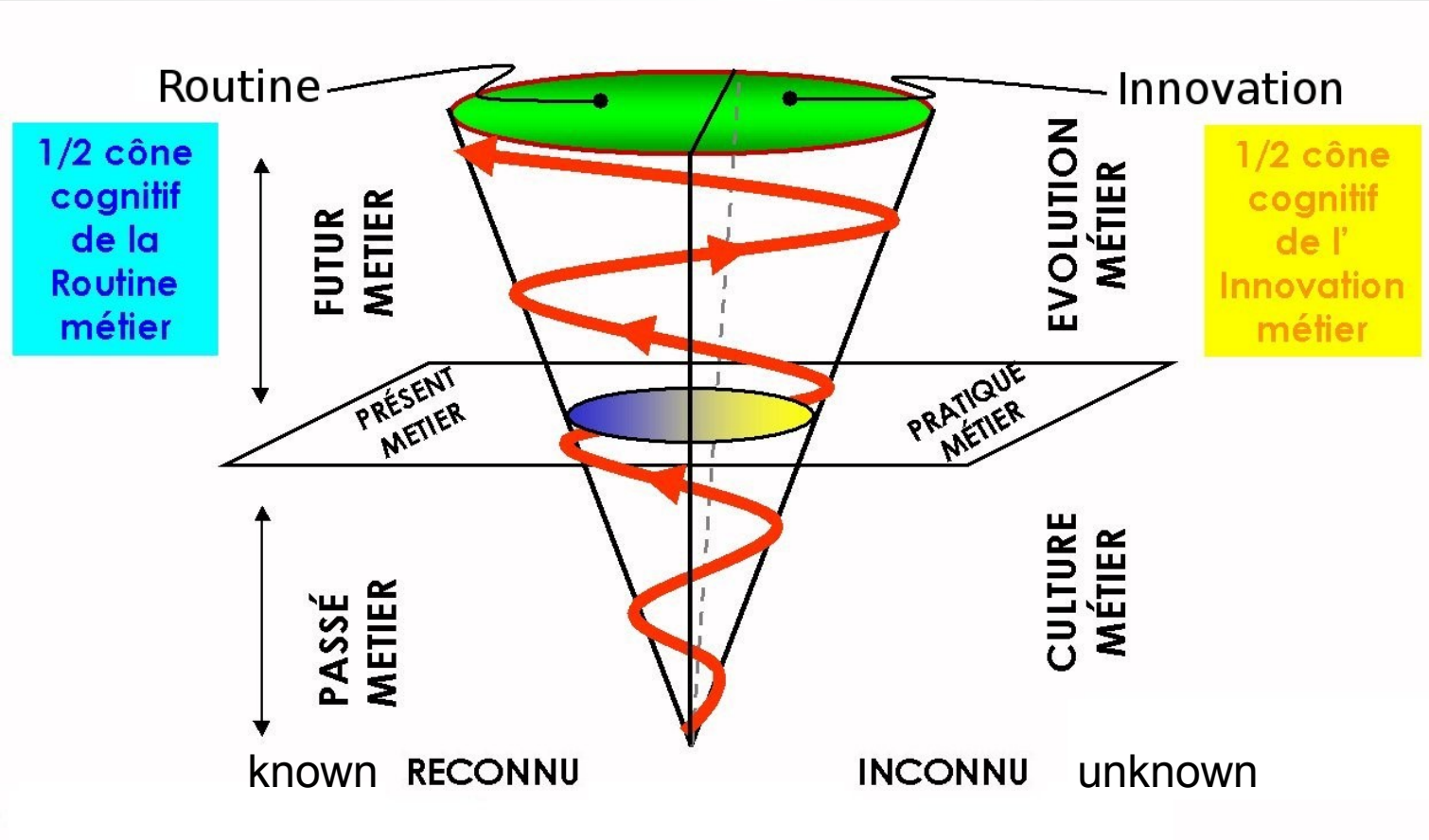
3. The knowledge systems

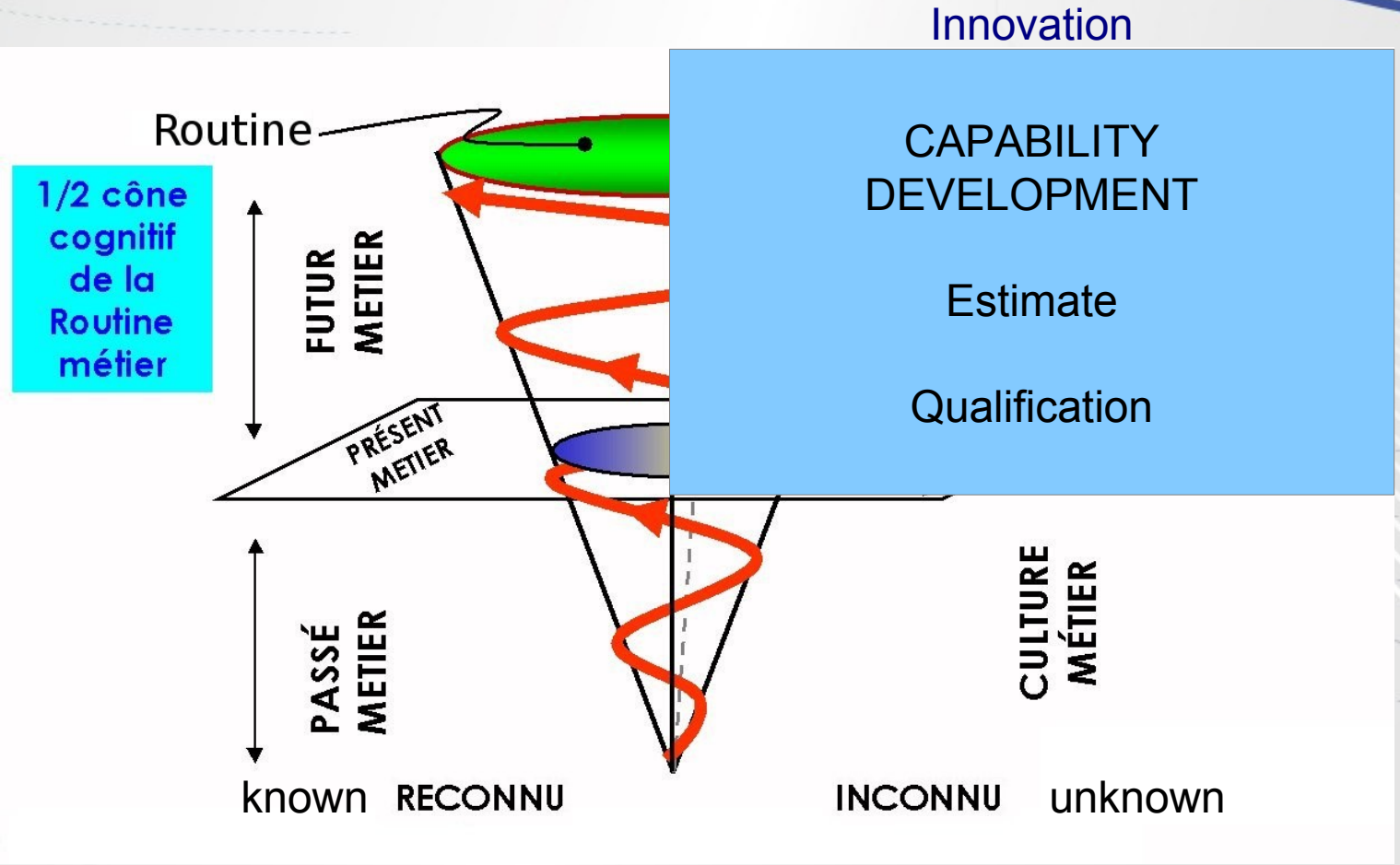
Knowledge systems



Used for understanding the complexity growth knowledge.

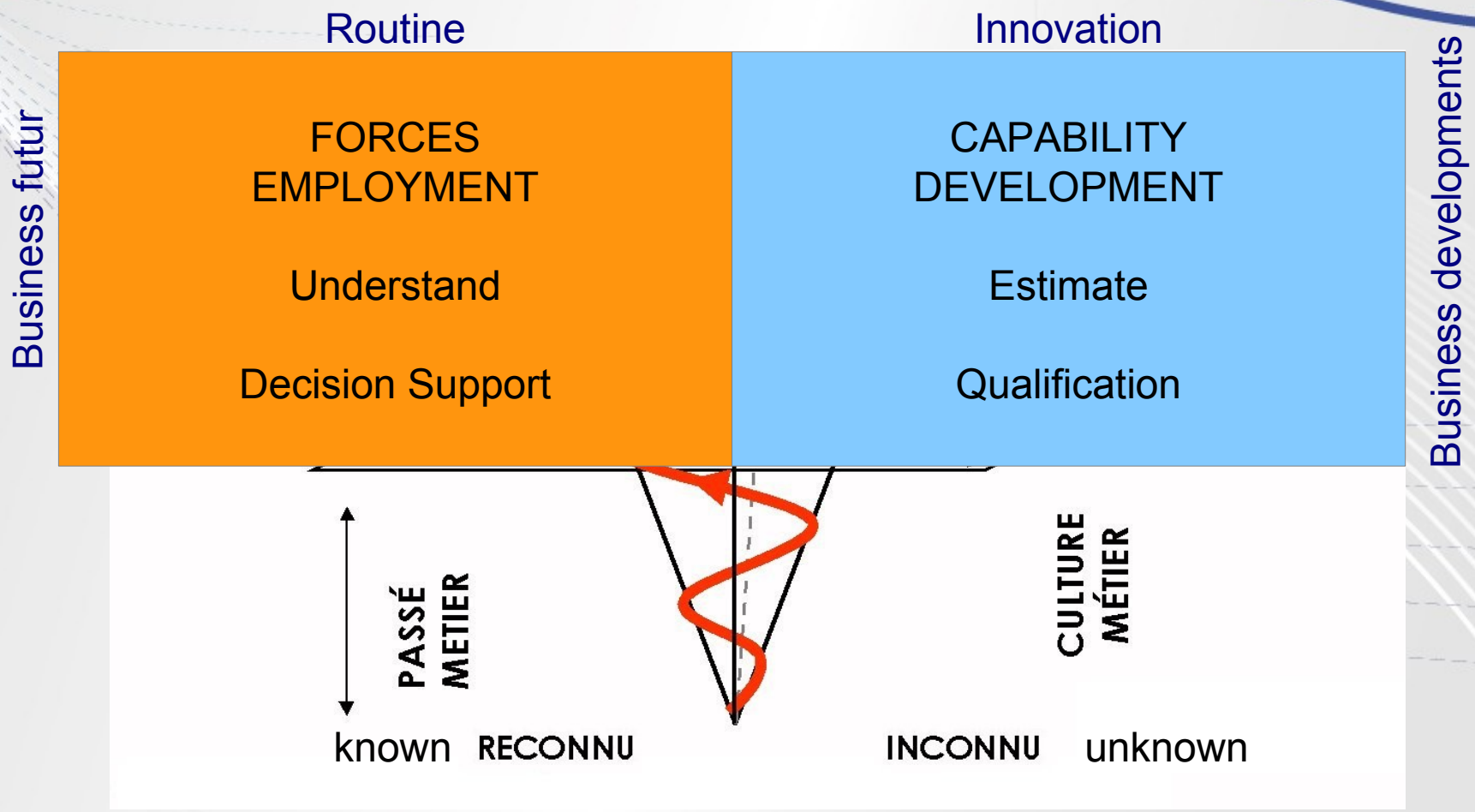
The knowledge Macroscope

Knowledge systems



The knowledge Macroscope

Knowledge systems



The knowledge Macroscope

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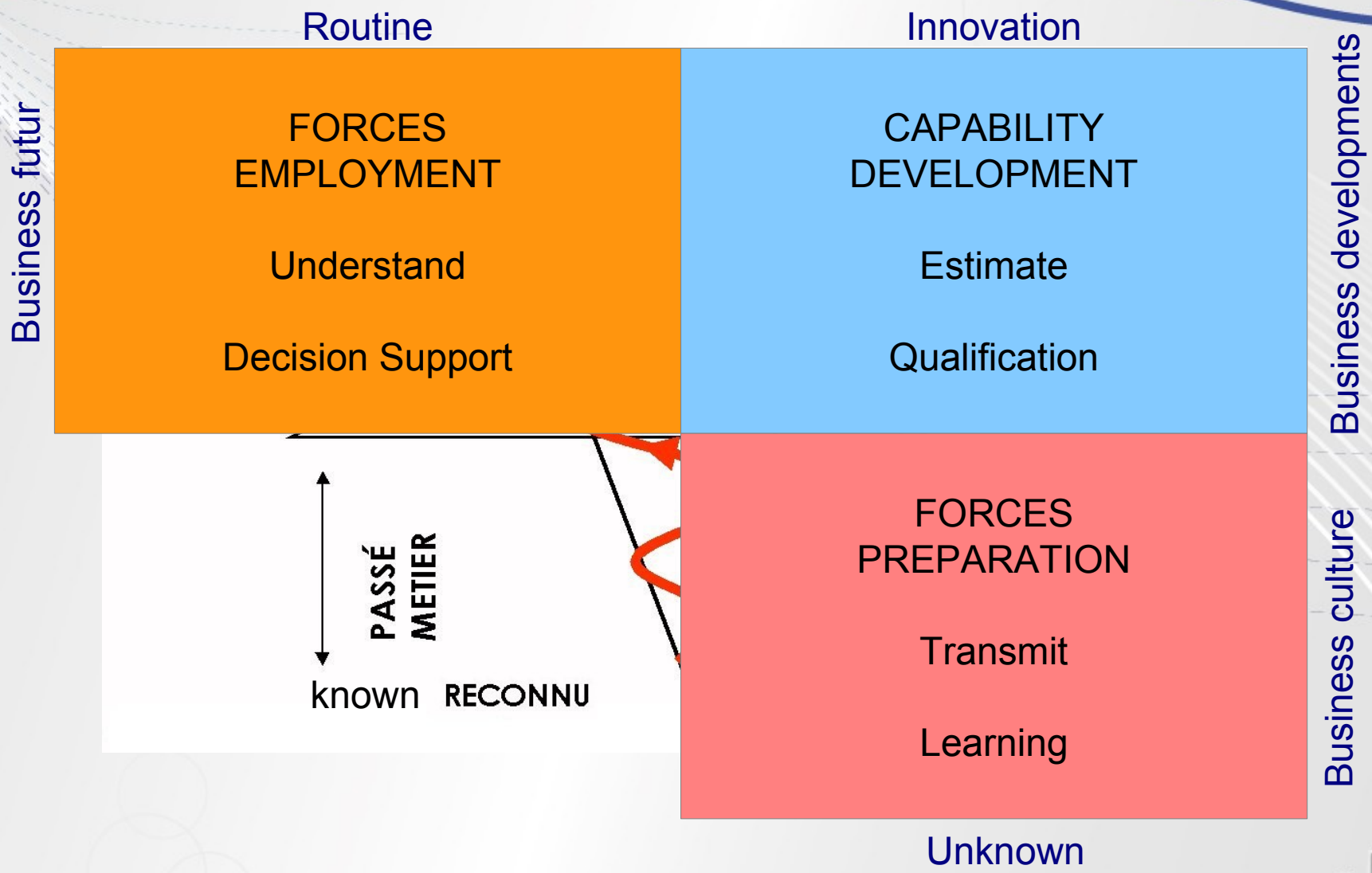

The knowledge Macroscope

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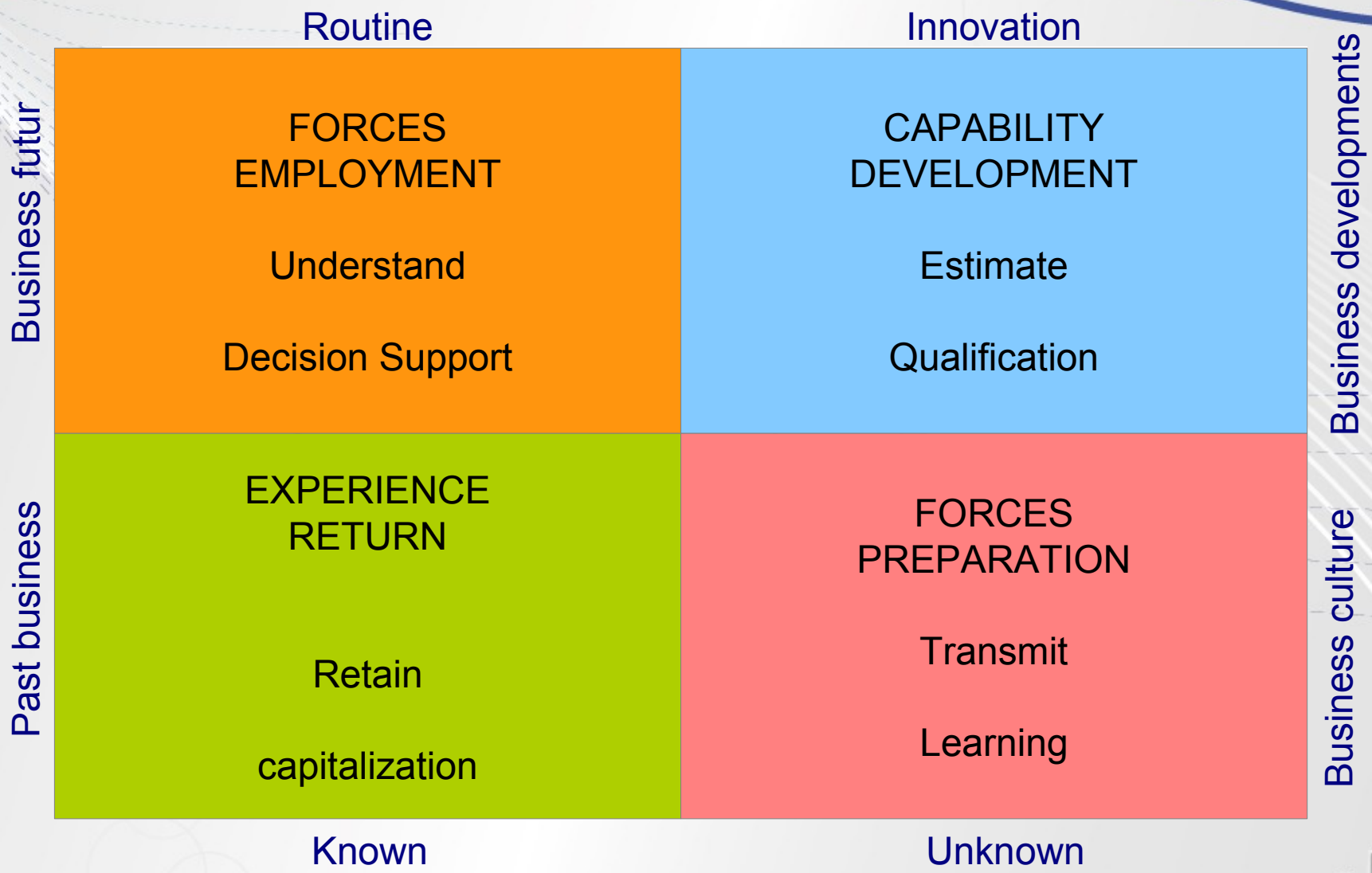
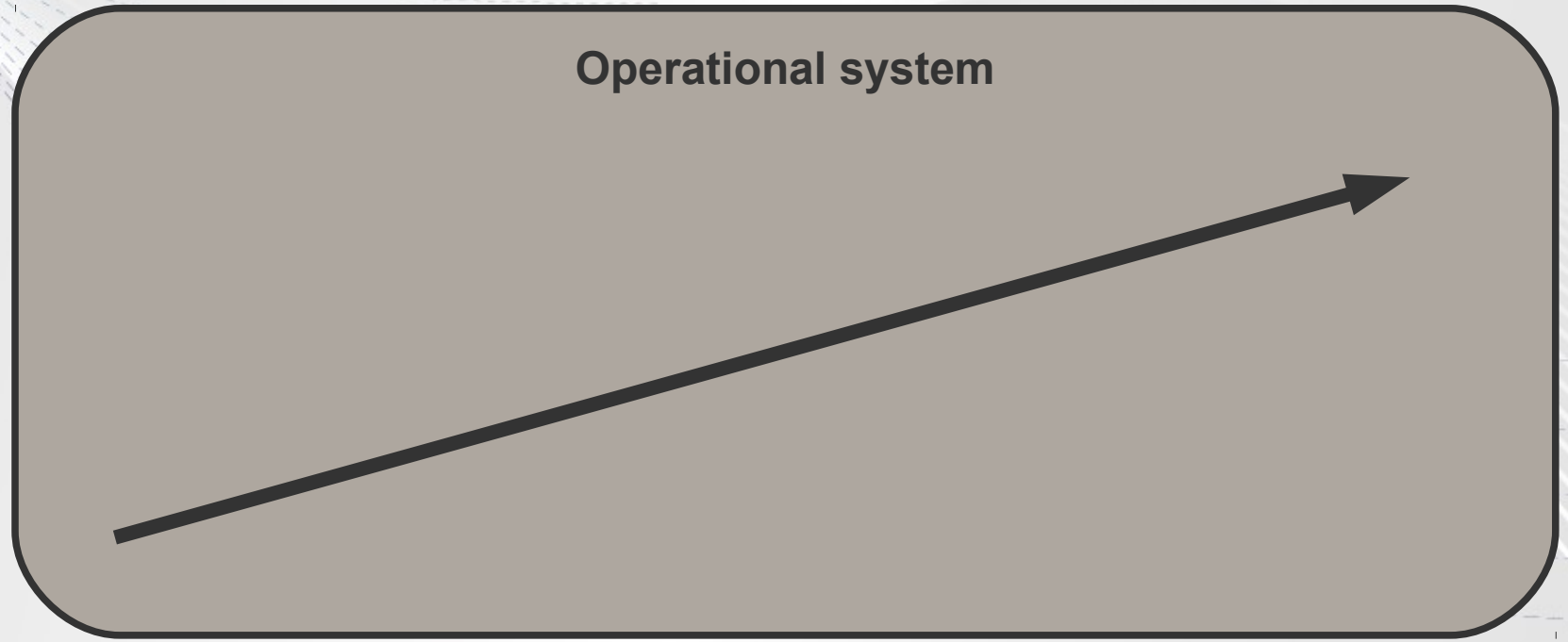


The knowledge Macroscope

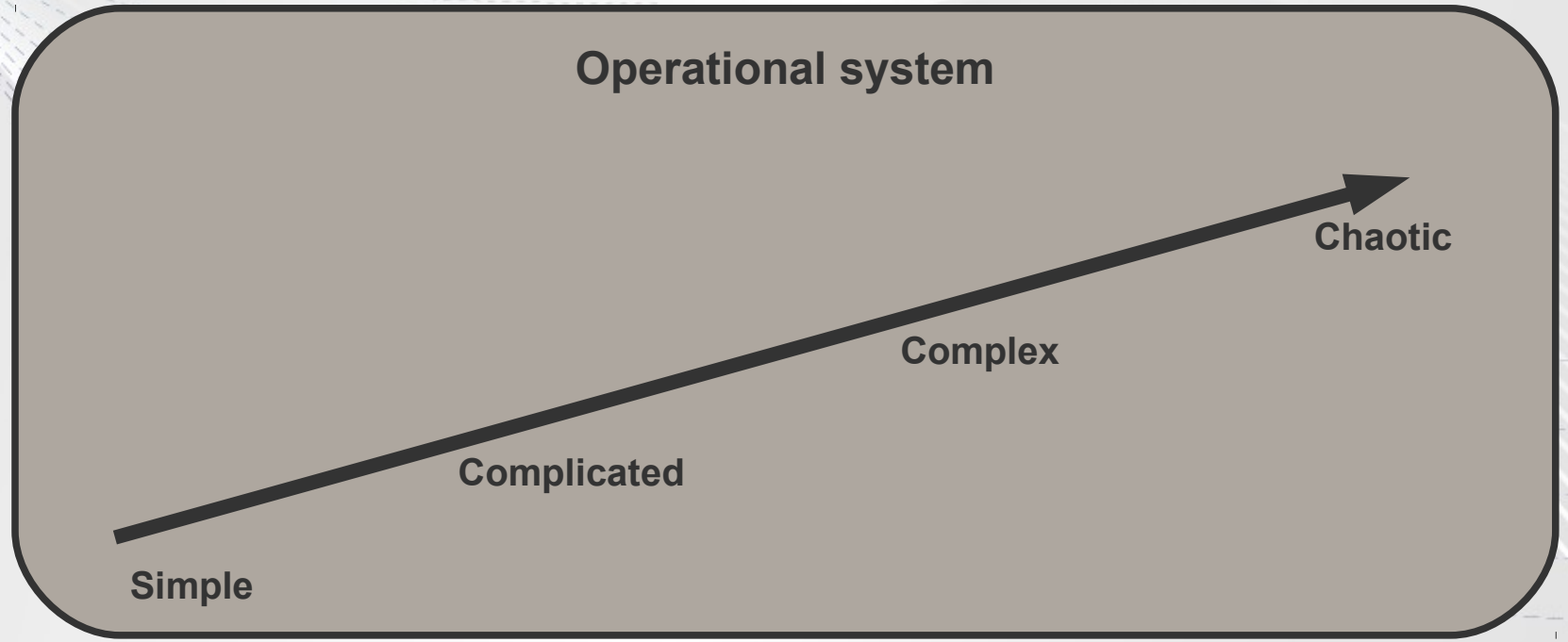
4.The M&S operational application areas

Simulation within operational systems



Simulation is **a knowledge system**.
It is used to reduce **complexity** of operational systems.
Simulation brings the **knowledge** needed to handle complexity.

Simulation within operational systems



Entropy is the quantity associated with the complexity of a system :

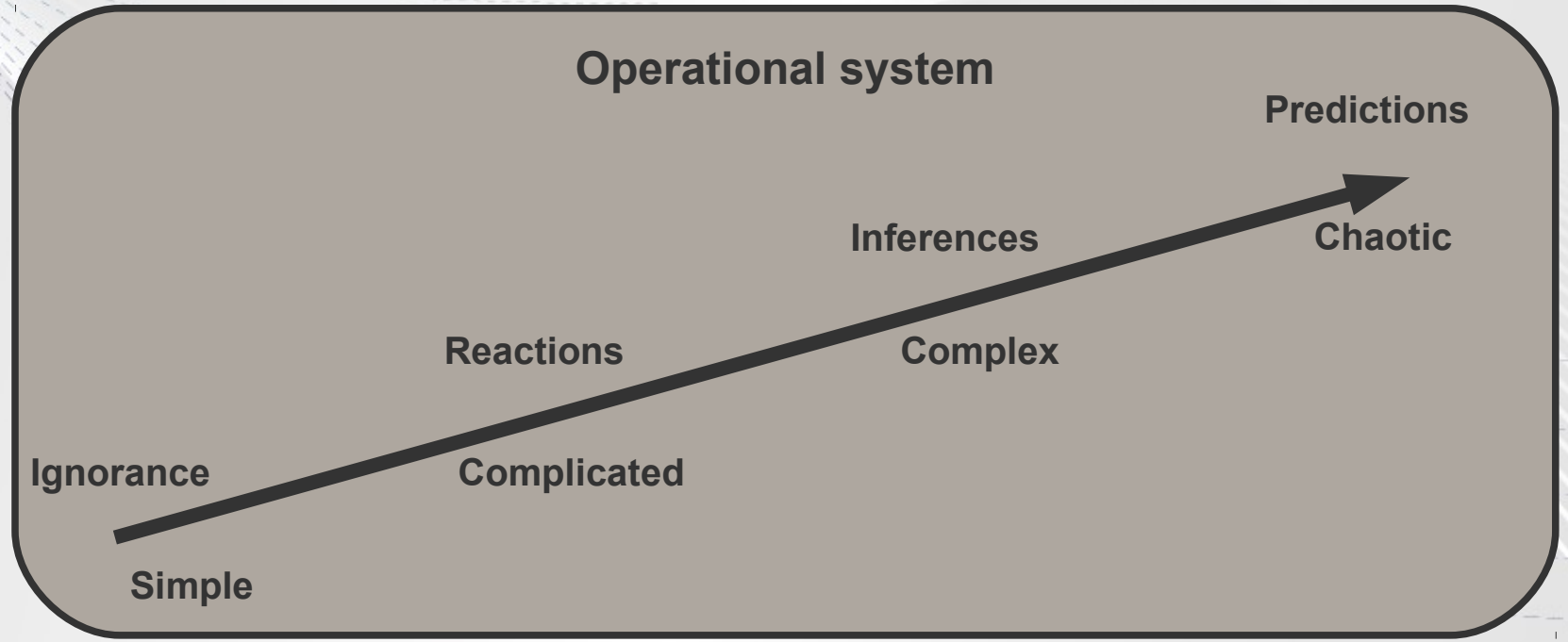
Simple : The problems are predictable and can be solved. If the instructions are followed, the chances of success are high.

Complicated : With enough research, expertise and experimentation, it is possible to predict the outcome of a series of steps.

Complex : The experts can not accurately predict the evolution of the system. The plans do not work exactly as forecast.

Chaotic : system is unstable and on the verge of bursting. The future is unpredictable and can change very quickly.

Simulation within operational systems



To understand ad handle this complexity, each level of entropy corresponds to a level of knowledge

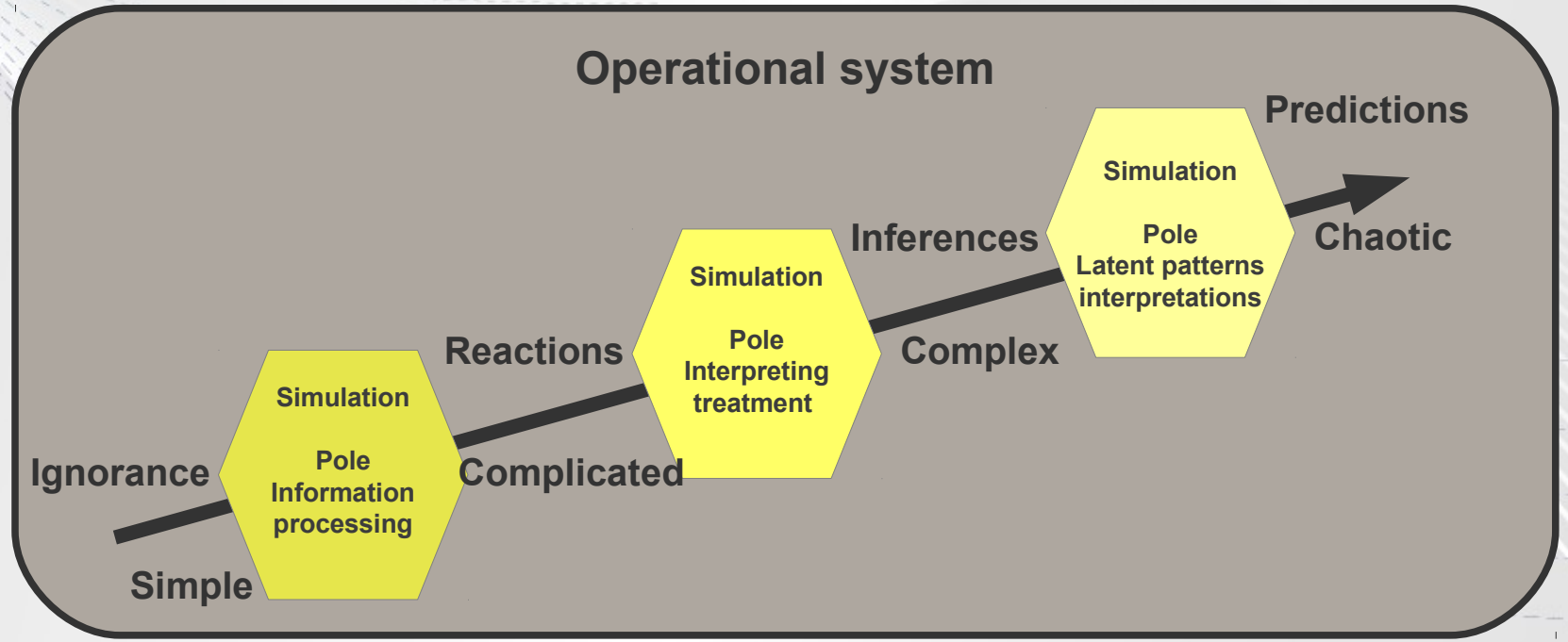
Ignorance : Nothing is known of the operational system, nor its relations and its operational environment ..

Reactions : The perfect knowledge of the operational system is possible because it is controlled. The knowledge gained is of the order of automation, ie no reflection to act.

Inferences : Mastery of knowledge is based on choice or well defined procedures. The perimeter of the operational system is extended to the understanding of the relationship with other systems.

Predictions : The operational system is taken as a whole which includes the uncontrollable operational environment by definition. The decision is subject to a capacity analysis and assumptions.

Simulation within operational systems



The simulation is grouped into clusters supporting knowledge functions and depending of level of knowledge and also the scope of the system.

Pole information processing : to cope with problems of enumeration.

Pole interpretating treatment : solutions depend on other related systems.

Pole latent patterns interpretations : the choices are many and based on user engagement.

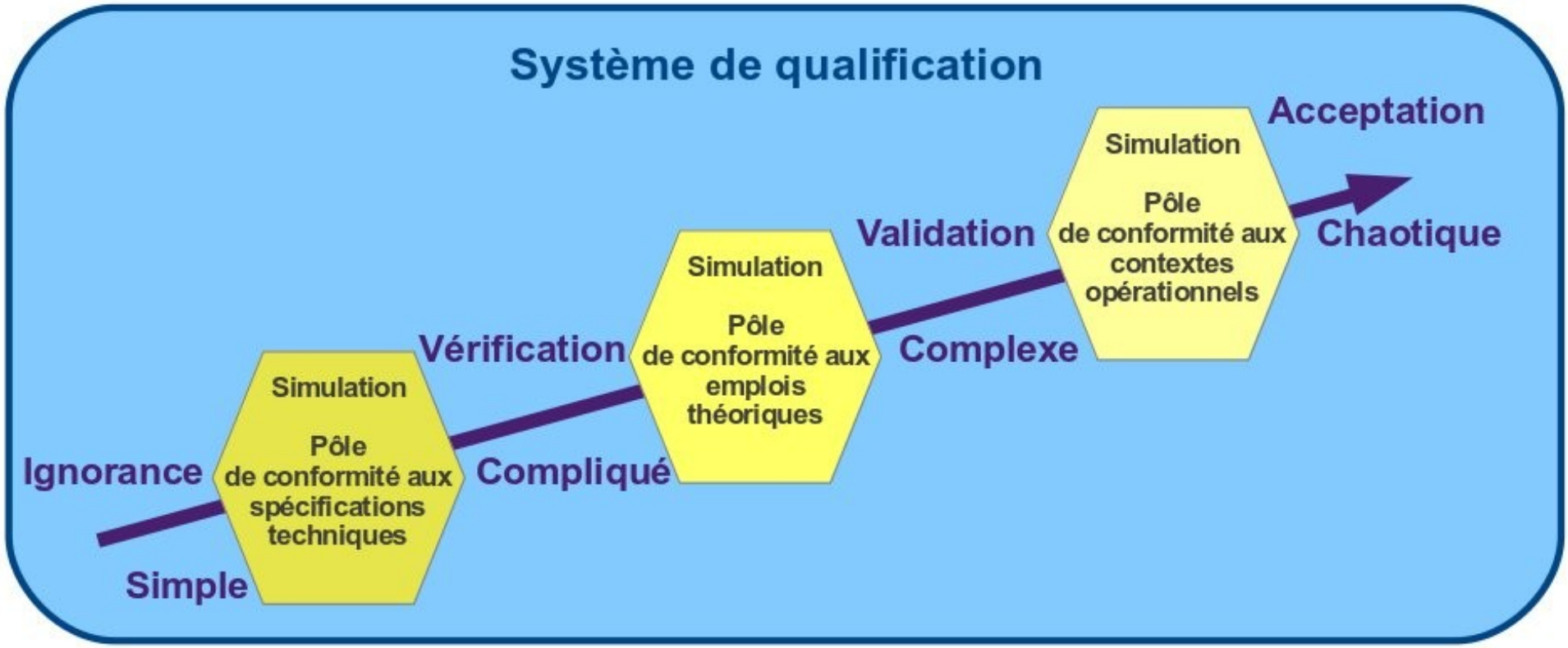
Simulation within knowledge systems

FORCES EMPLOYMENT Understand Decision Support	CAPABILITY DEVELOPMENT Estimate Qualification
EXPERIENCE RETURN Retain capitalization	FORCES PREPARATION Transmit Learning

The knowledge Macroscope

Simulation within knowledge systems

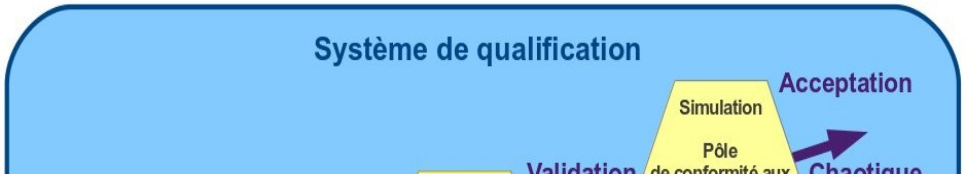
EMPLOI DES FORCES	PRÉPARATION CAPACITAIRE

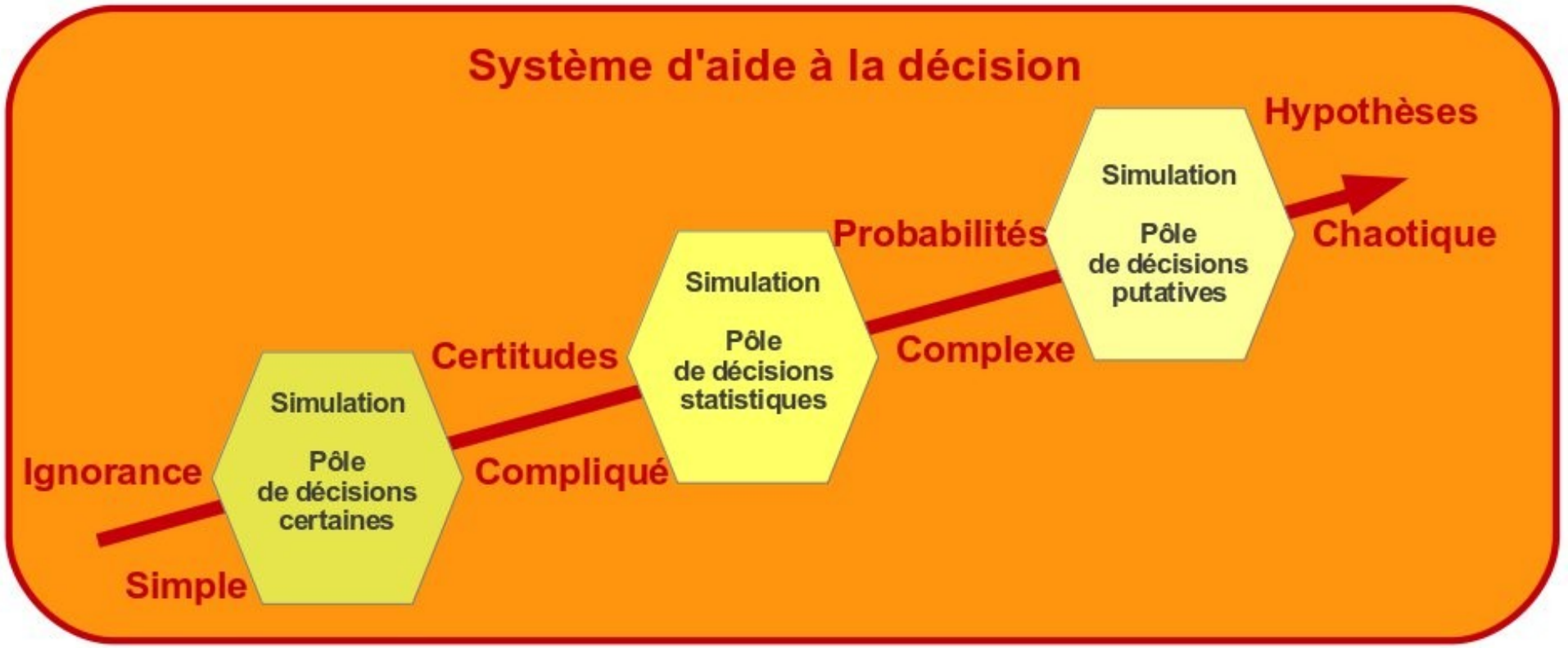


Qualification systems

Simulation within knowledge systems

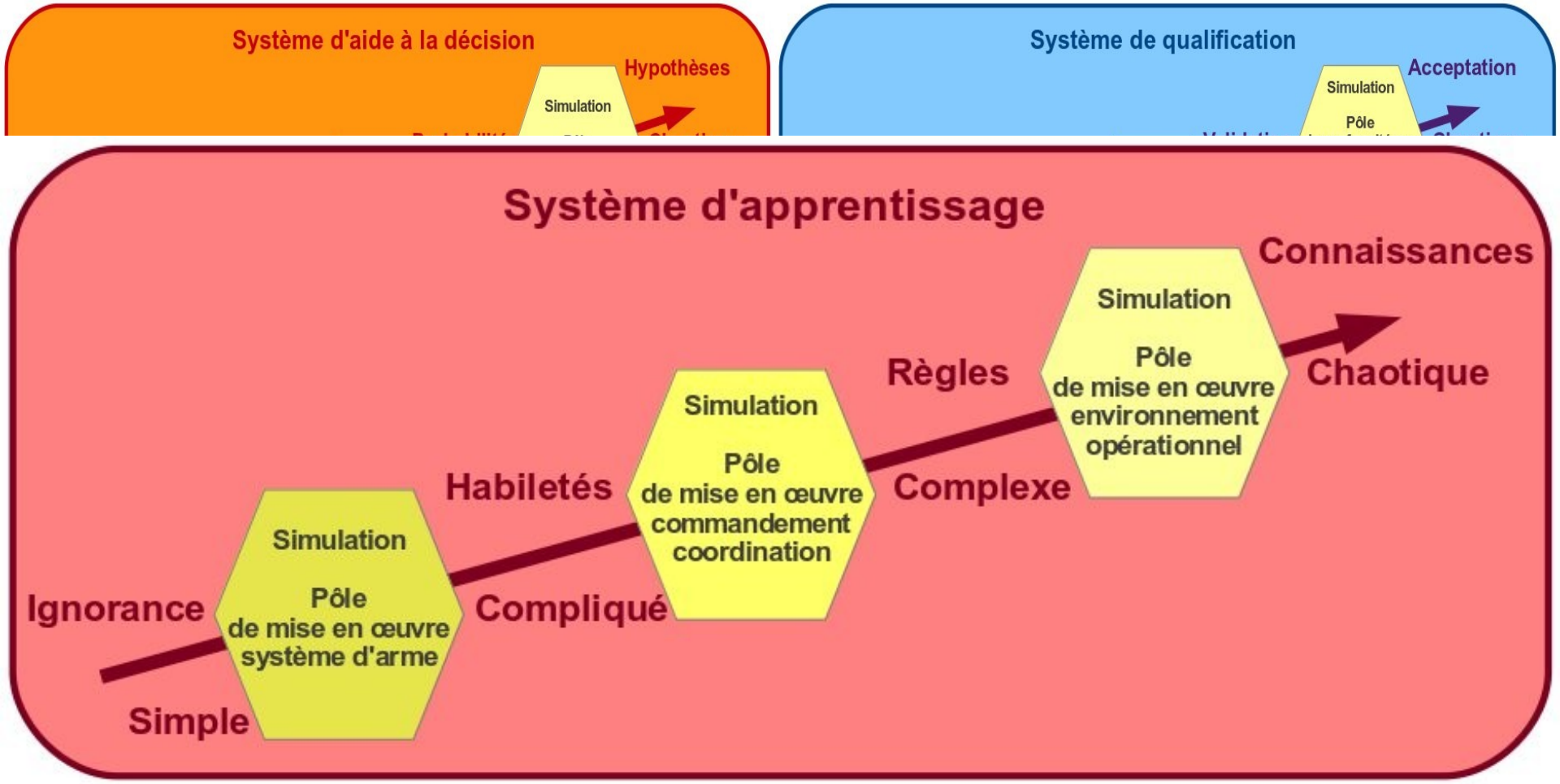
EMPLOI DES FORCES





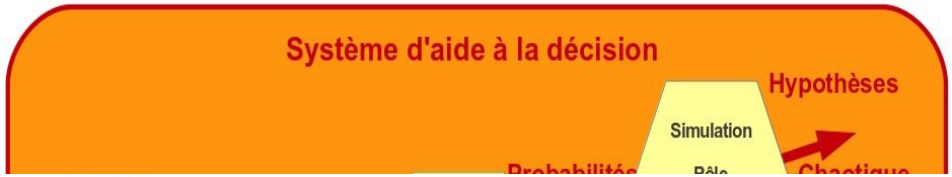
Decision support systems

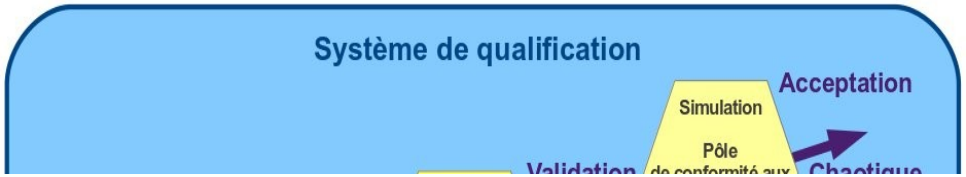
Simulation within knowledge systems



Learning systems

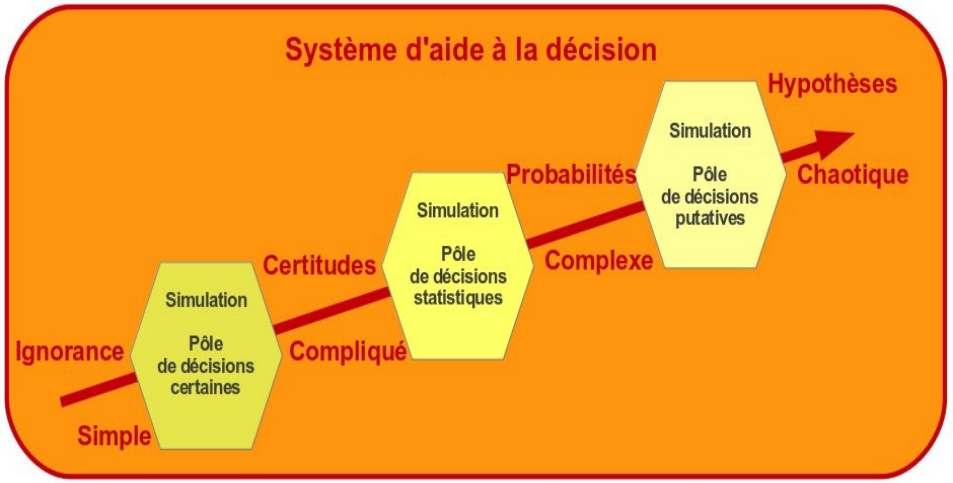
Simulation within knowledge systems

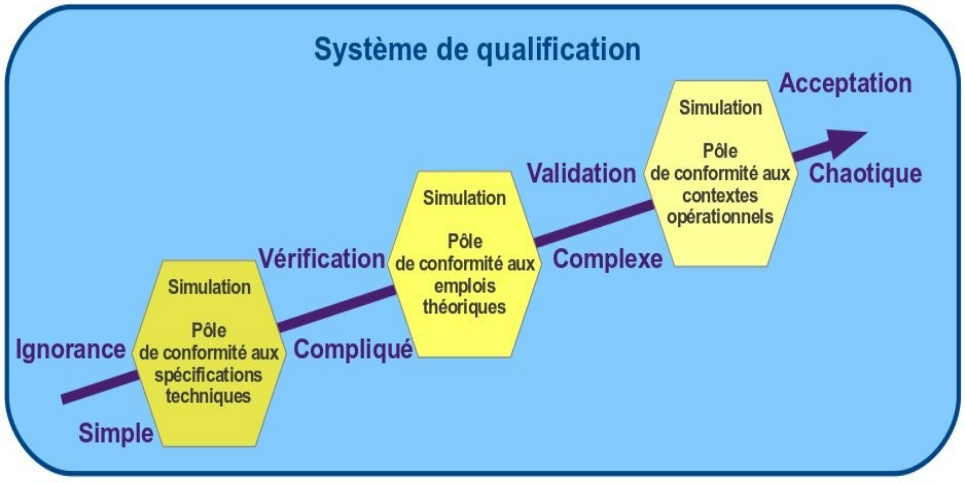


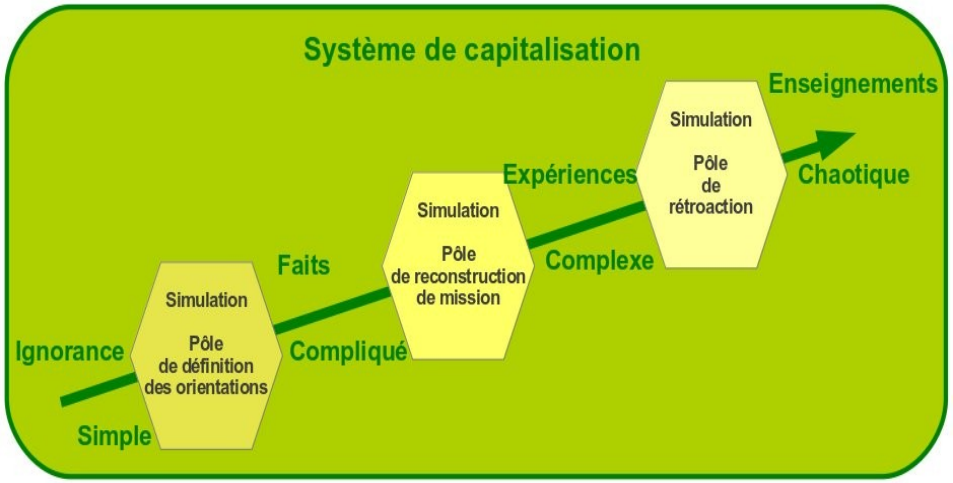


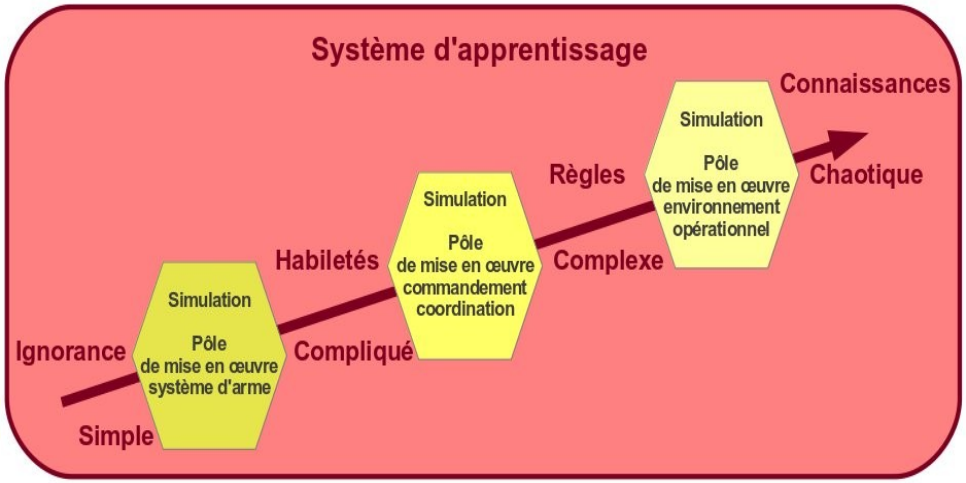
Capitalization systems

Simulation within knowledge systems









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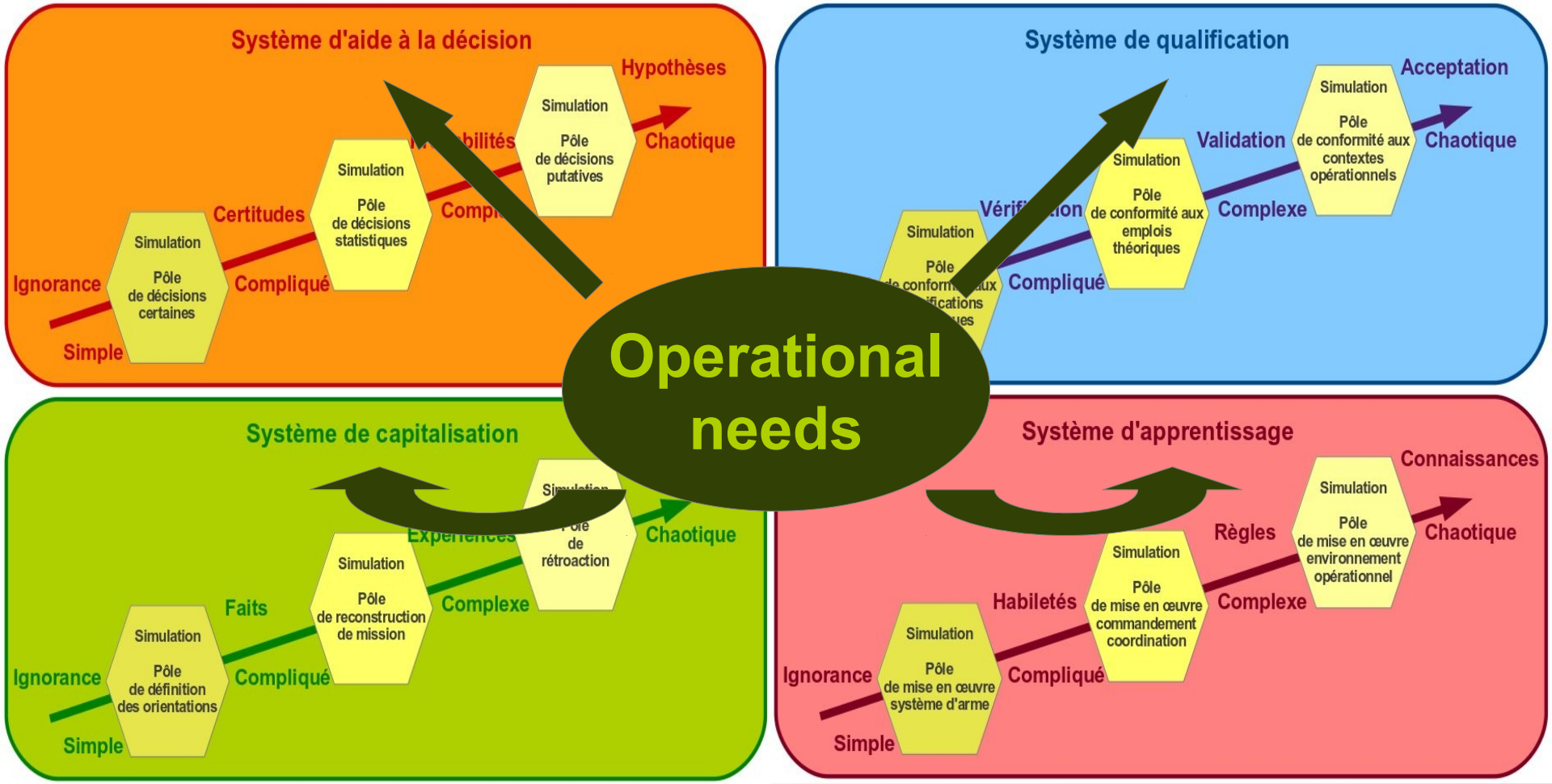


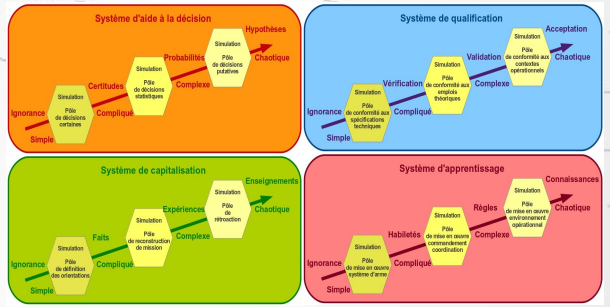
Le Macroscope de la connaissance

The M&S operational application areas

NMSG : NATO M&S Group

Support to operations	Capability development	Mission rehearsal	Training and education	Procurement

?



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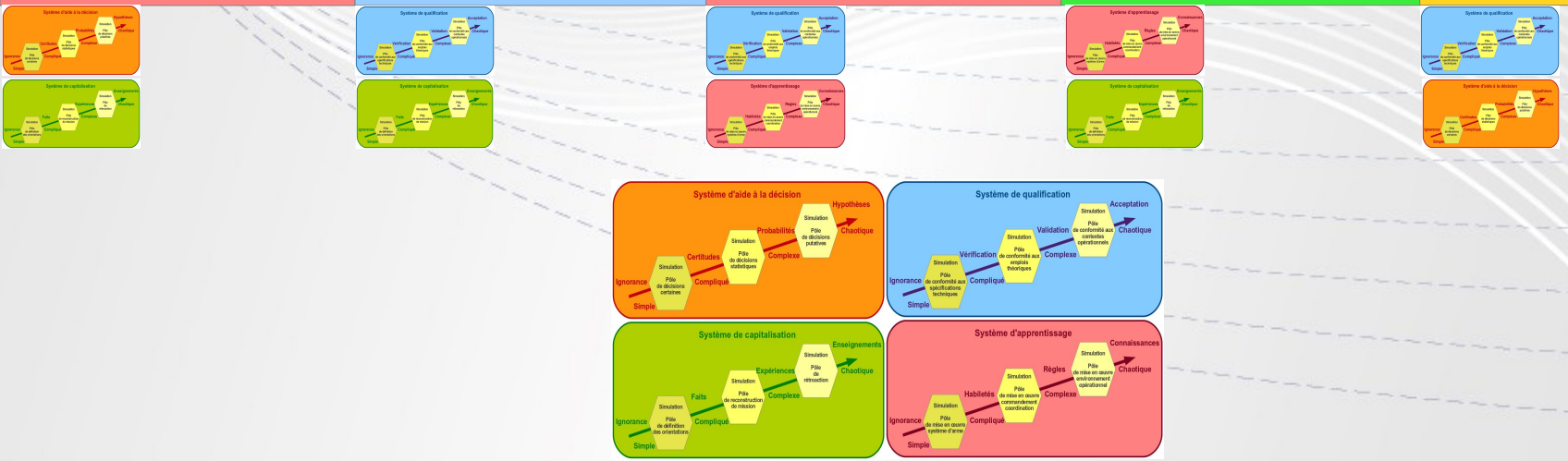
Préparation de l'avenir	Préparation des forces	Appui aux opérations	Aide à l'acquisition

Soutien à la réalisation d'outils

The M&S operational application areas

NMSG : NATO M&S Group

Support to operations	Capability development	Mission rehearsal	Training and education	Procurement



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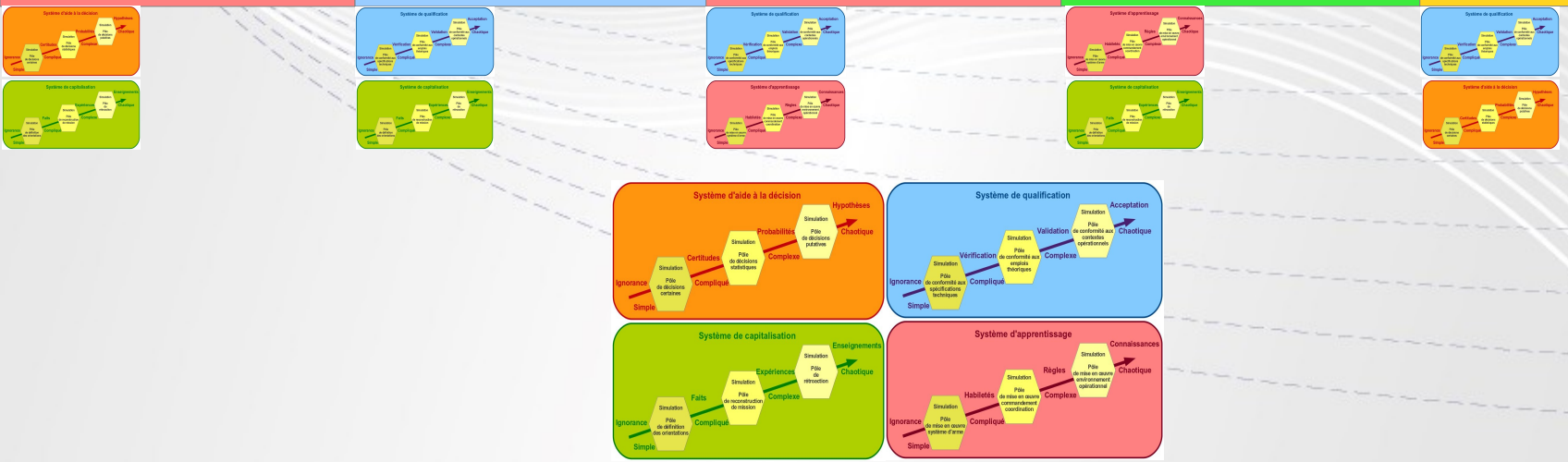

Appui à la préparation capacitaire	Appui à la préparation des forces	Appui à l'emploi des forces	Aide à l'acquisition

Soutien à la réalisation d'outils

Conclusions :

1. Simulations do support real activities like operations, training, etc. and don't produce any real effects.

2. Customers don't need simulation.

3. Information systems shall be present in every operational systems.

4. Simulations shall be present in every information systems.

5. Real activities may be realized without simulation but will be more expensive and less efficient.

Theorem of hypomochlion

or finally know what is simulation

how to use simulation

why to use simulation

where to use simulation