

LABORATORIO DI PENSIERO COMPUTAZIONALE

Problem Posing & Solving

Claudio Giovanni Demartini

Febbraio
2019

Premessa

Cos'è il Pensiero
Computazionale

Pensare come uno Scienziato
del Computer

Jannette Wing

Premessa

Pensiero computazionale e livelli di astrazione

Pensare come uno Scienziato del Computer
significa molto di più della semplice capacità
di programmare il Computer.
Richiede lo sviluppo del pensiero su molteplici
livelli di astrazione

Premessa

Concettualizzazione, non programmazione

Concettualizzazione, non programmazione

Fondamentali ed epistemologia, non semplici abilità

Il modo in cui la donna/l'uomo, non il computer, pensa: il modo
in cui la donna/l'uomo risolve i problemi

Combina il pensiero ingegneristico con quello matematico

Idee, non meccanismi:

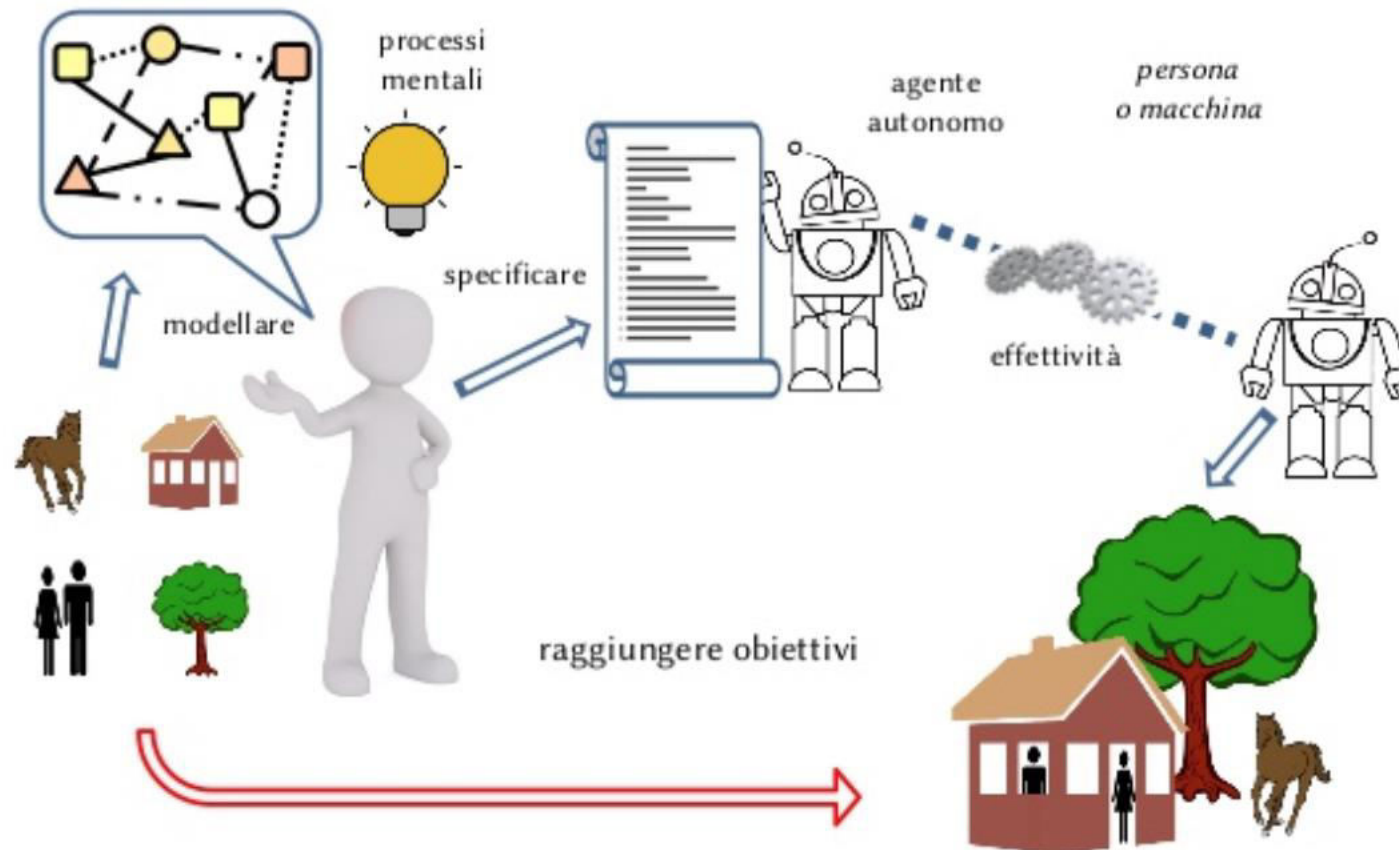


Do We Really Need Computational Thinking?

Enrico Nardelli

Presentazione

Dal risolvere problemi al *far risolvere* problemi



*Abbiamo davvero bisogno del pensiero
computazionale?*, Mondo Digitale, n.72, nov.2017



***“ Un giorno le macchine riusciranno a
risolvere tutti i problemi,
ma mai nessuna di esse potrà porne uno”***

Albert Einstein

COMPUTER SCIENCE

AI

L'intelligenza è definita come l'abilità della mente ad apprendere, comprendere, ragionare, prendere decisioni e formare un'idea di una data realtà.



COMPUTER SCIENCE

AI



Speech
Recognition

COMPUTER SCIENCE

AI

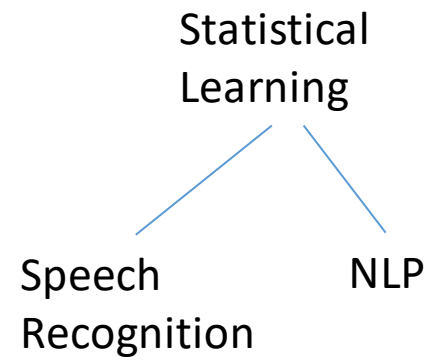
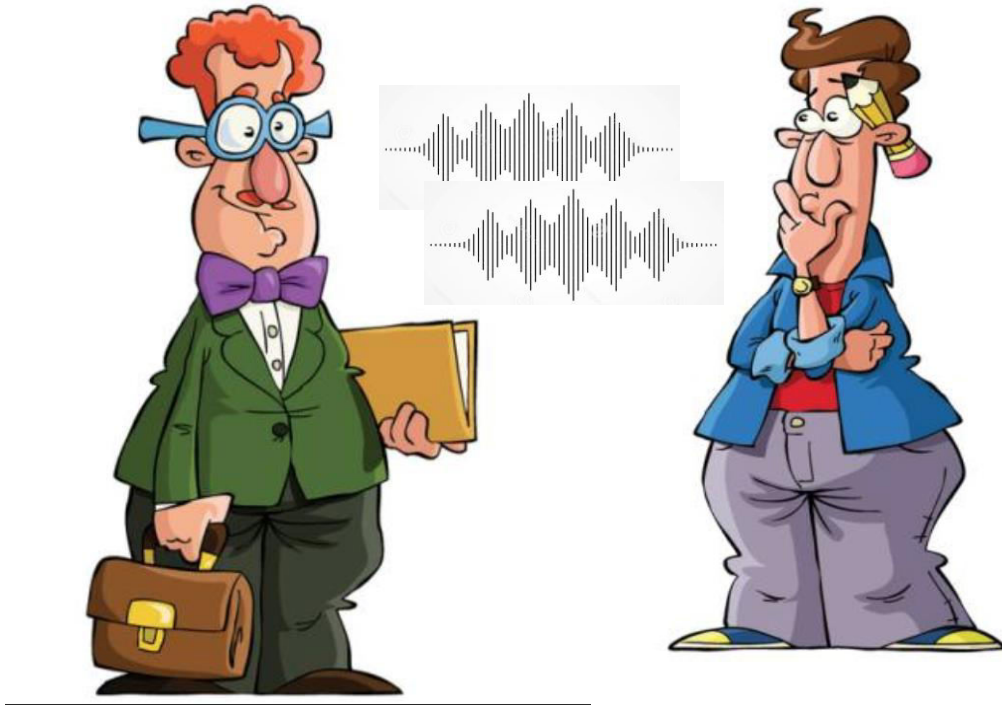


Statistical
Learning

Speech
Recognition

COMPUTER SCIENCE

AI



COMPUTER SCIENCE

AI

Symbolic
Learning

Computer
Vision

Statistical
Learning

Speech
Recognition

NLP

Computer
Vision



COMPUTER SCIENCE

Image
Processing

AI

Symbolic
Learning

Computer
Vision

Statistical
Learning

Speech
Recognition

NLP

Computer
Vision



COMPUTER SCIENCE

Image
Processing

AI

Symbolic
Learning

Computer
Vision

Robotics

Statistical
Learning

Speech
Recognition

NLP

Pattern
Recognition

Computer
Vision



COMPUTER SCIENCE

Image
Processing

AI

**Symbolic
Learning**

**Machine
Learning**

Pattern
Recognition

Computer
Vision

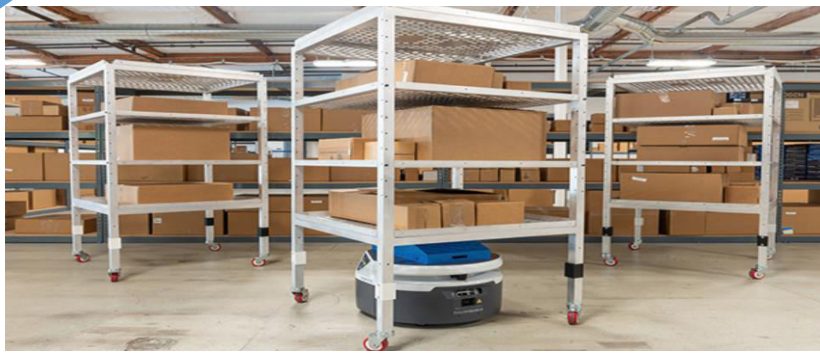
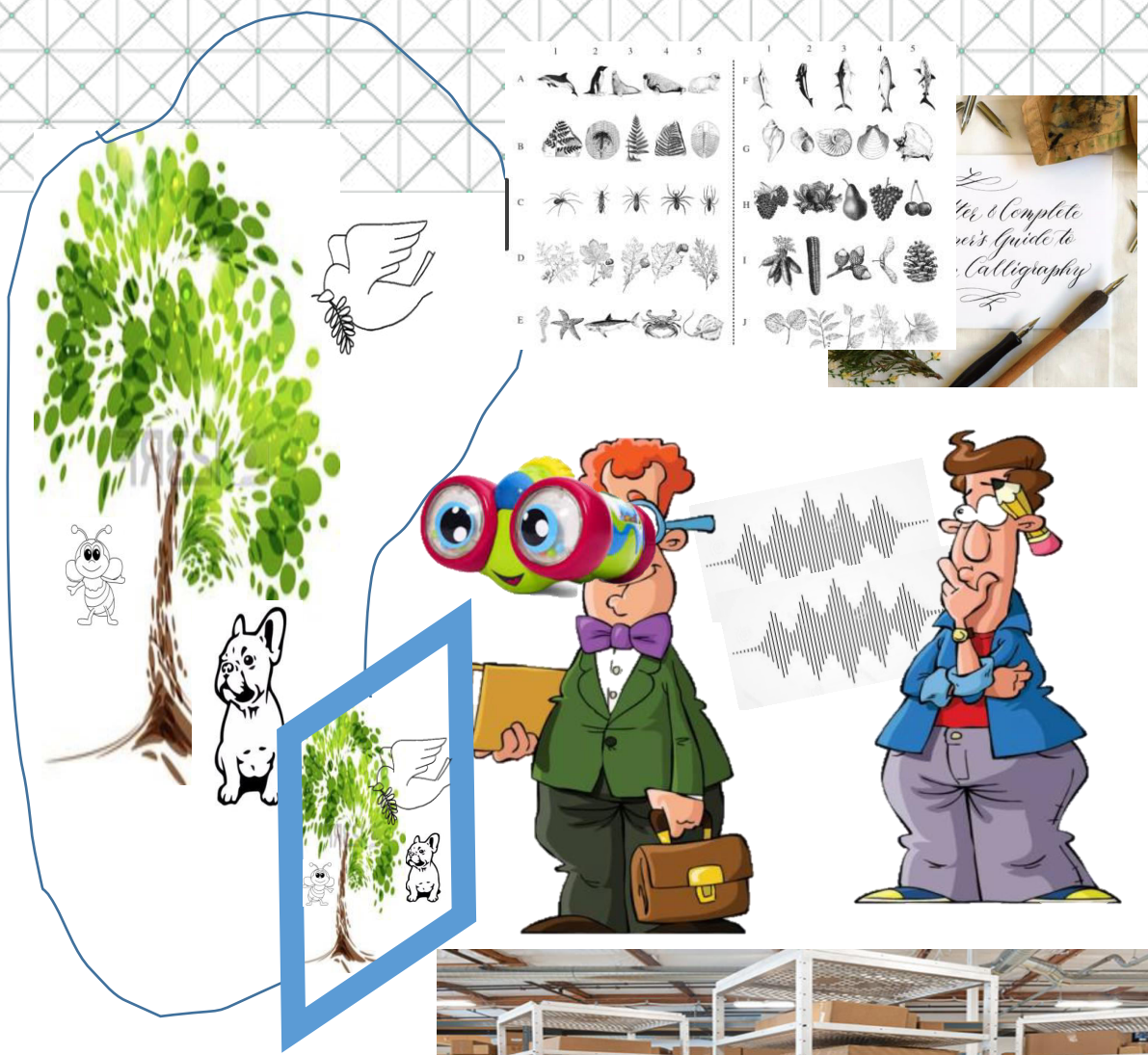
Robotics

Statistical
Learning

Speech
Recognition

NLP

Computer
Vision



COMPUTER SCIENCE

Image
Processing

AI

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Learning**

**Machine
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Recognition

Computer
Vision

Robotics

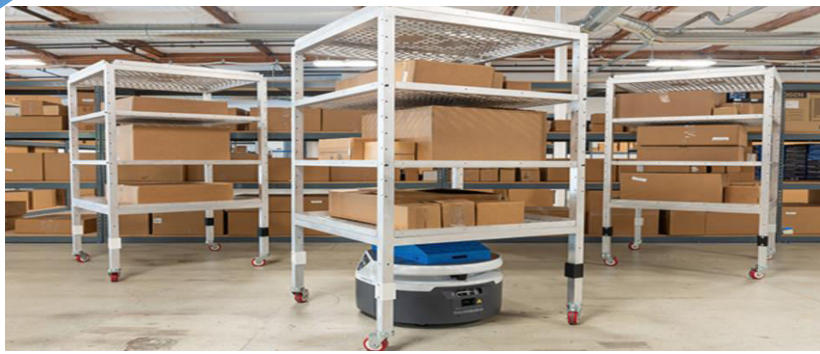
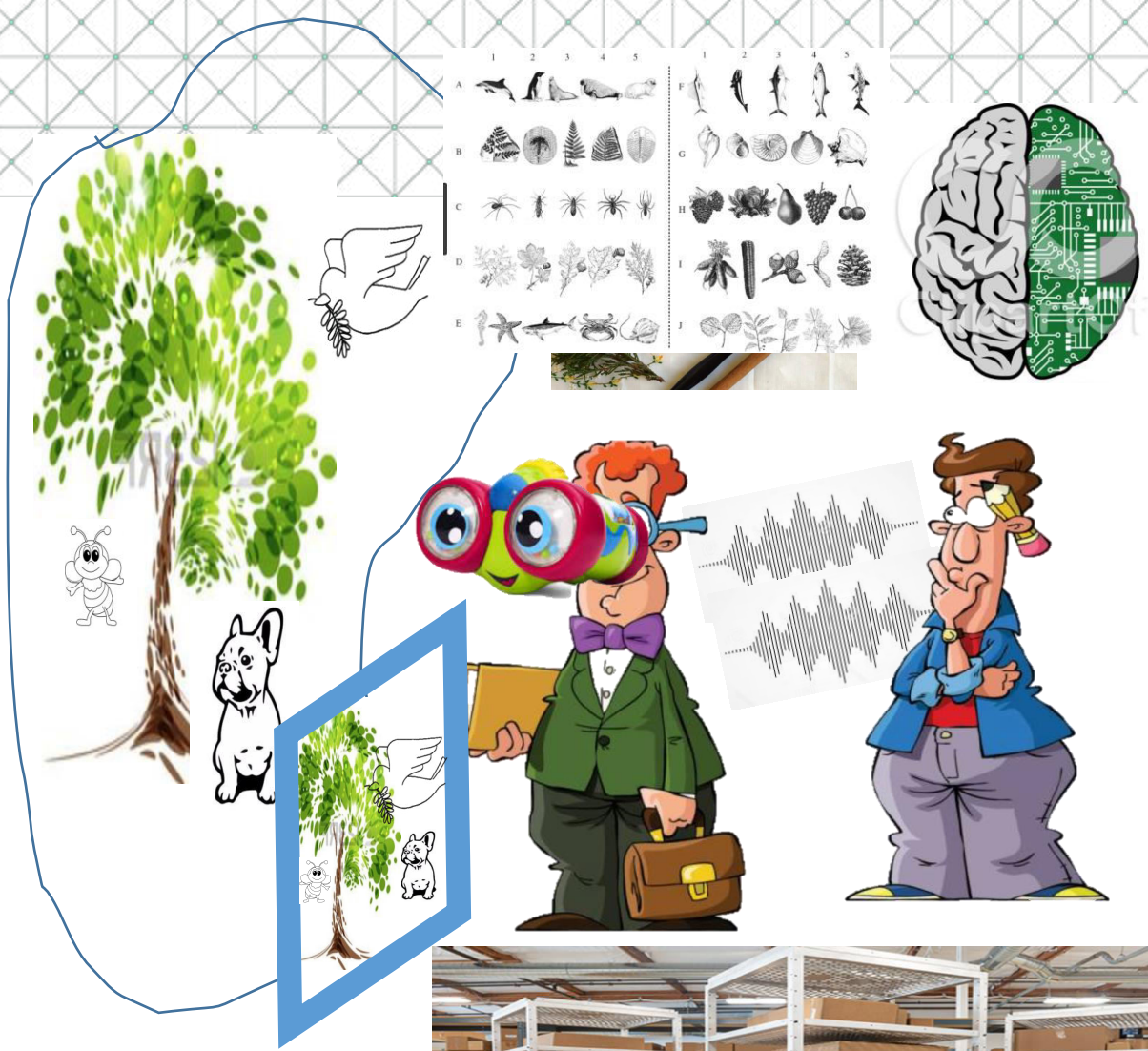
Statistical
Learning

NN

Speech
Recognition

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Computer
Vision



COMPUTER SCIENCE

Image
Processing

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Statistical
Learning

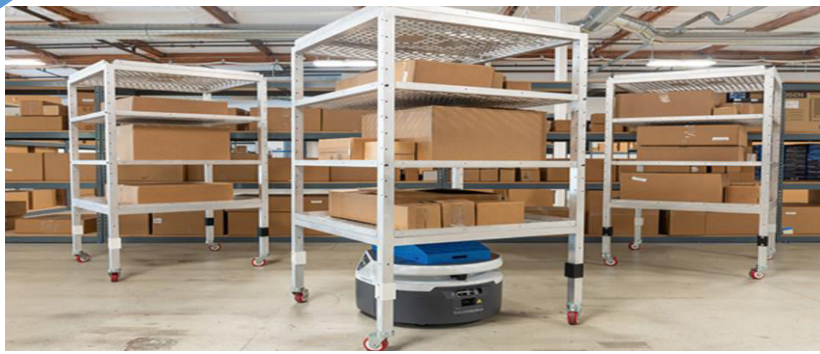
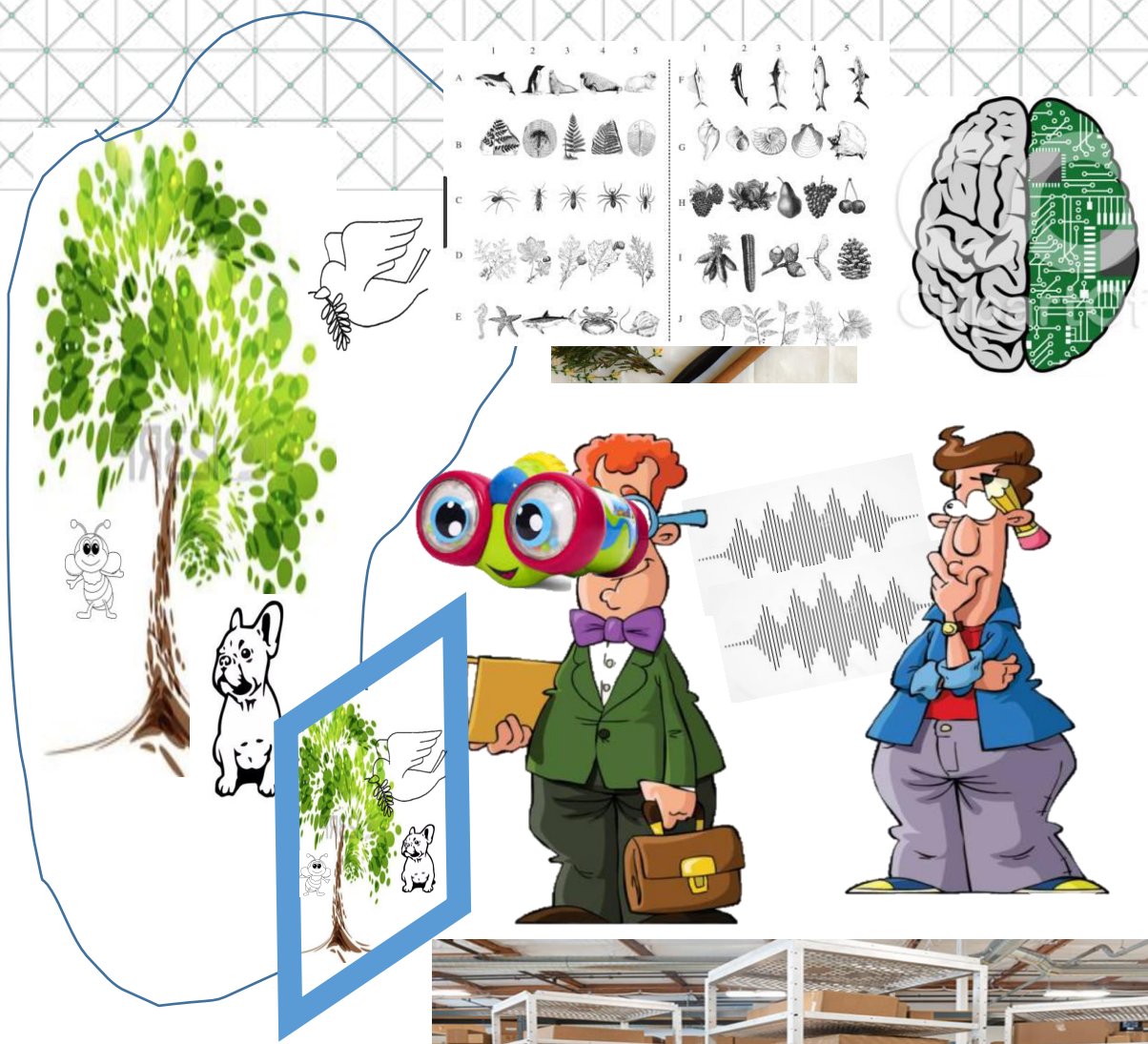
Deep
Learning

NN

Speech
Recognition

NLP

Computer
Vision



COMPUTER SCIENCE

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Processing

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Vision



COMPUTER SCIENCE

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Deep
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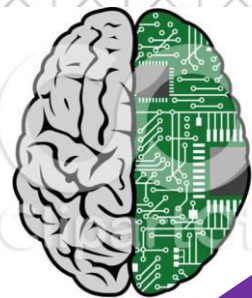
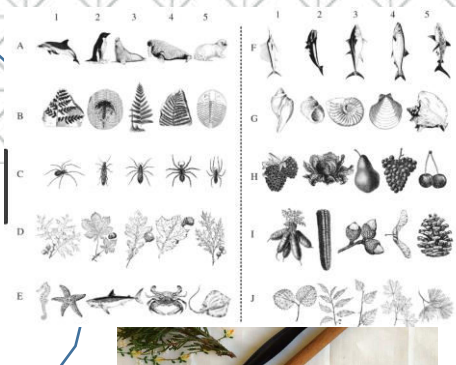
Speech
Recognition

NLP

CNN

Computer
Vision

Object
Recognition



COMPUTER SCIENCE

Image
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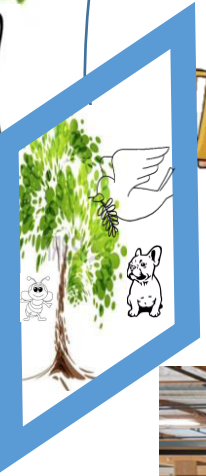
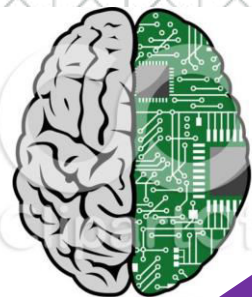
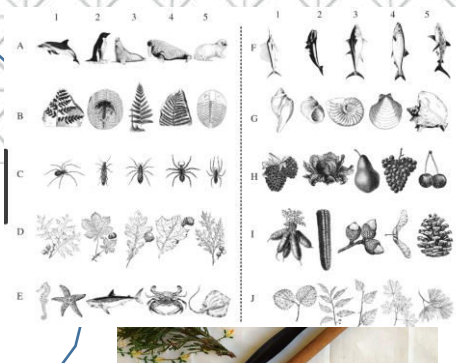
NLP

CNN

RNN

Computer
Vision

Object
Recognition



COMPUTER SCIENCE

Image
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Pattern
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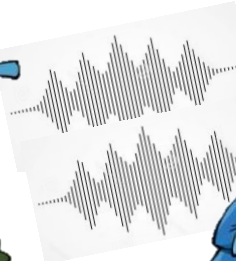
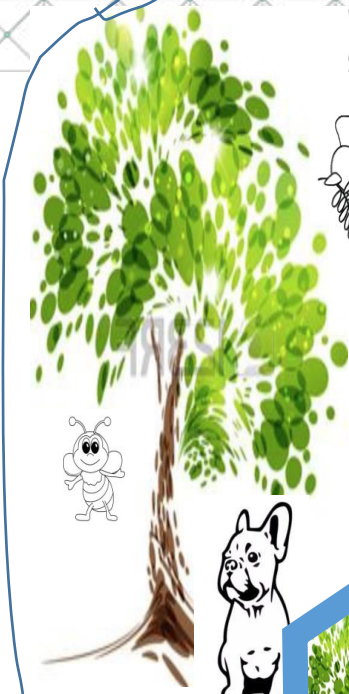
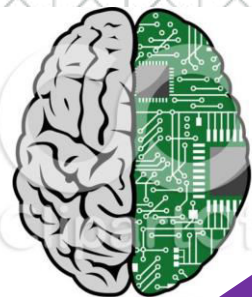
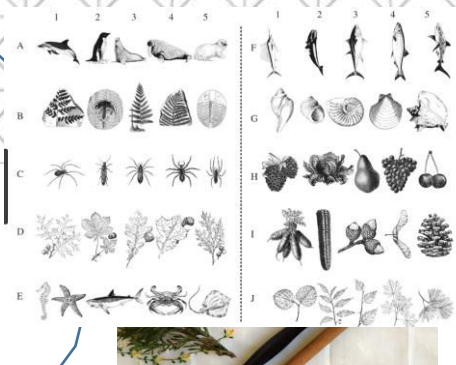
NLP

CNN

RNN

Computer
Vision

Object
Recognition



COMPUTER SCIENCE



Image Processing

AI

Symbolic Learning

Machine Learning

Pattern Recognition

Computer Vision

Robotics

Statistical Learning

Deep Learning

NN

Speech Recognition

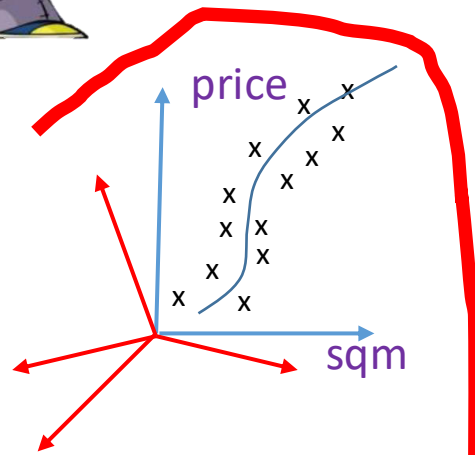
NLP

CNN

RNN

Computer Vision

Object Recognition



COMPUTER SCIENCE

Image
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Symbolic
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Pattern
Recognition

Computer
Vision

Robotics

Statistical
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Deep
Learning

NN

Speech
Recognition

NLP

CNN

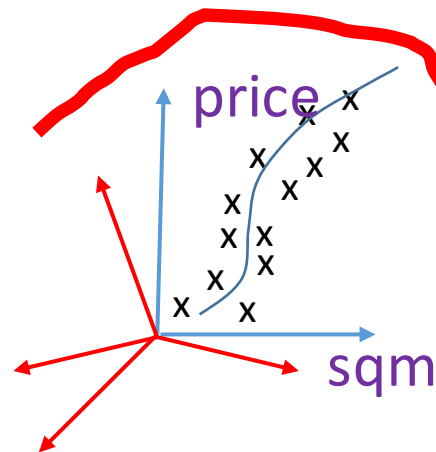
RNN

Object
Recognition

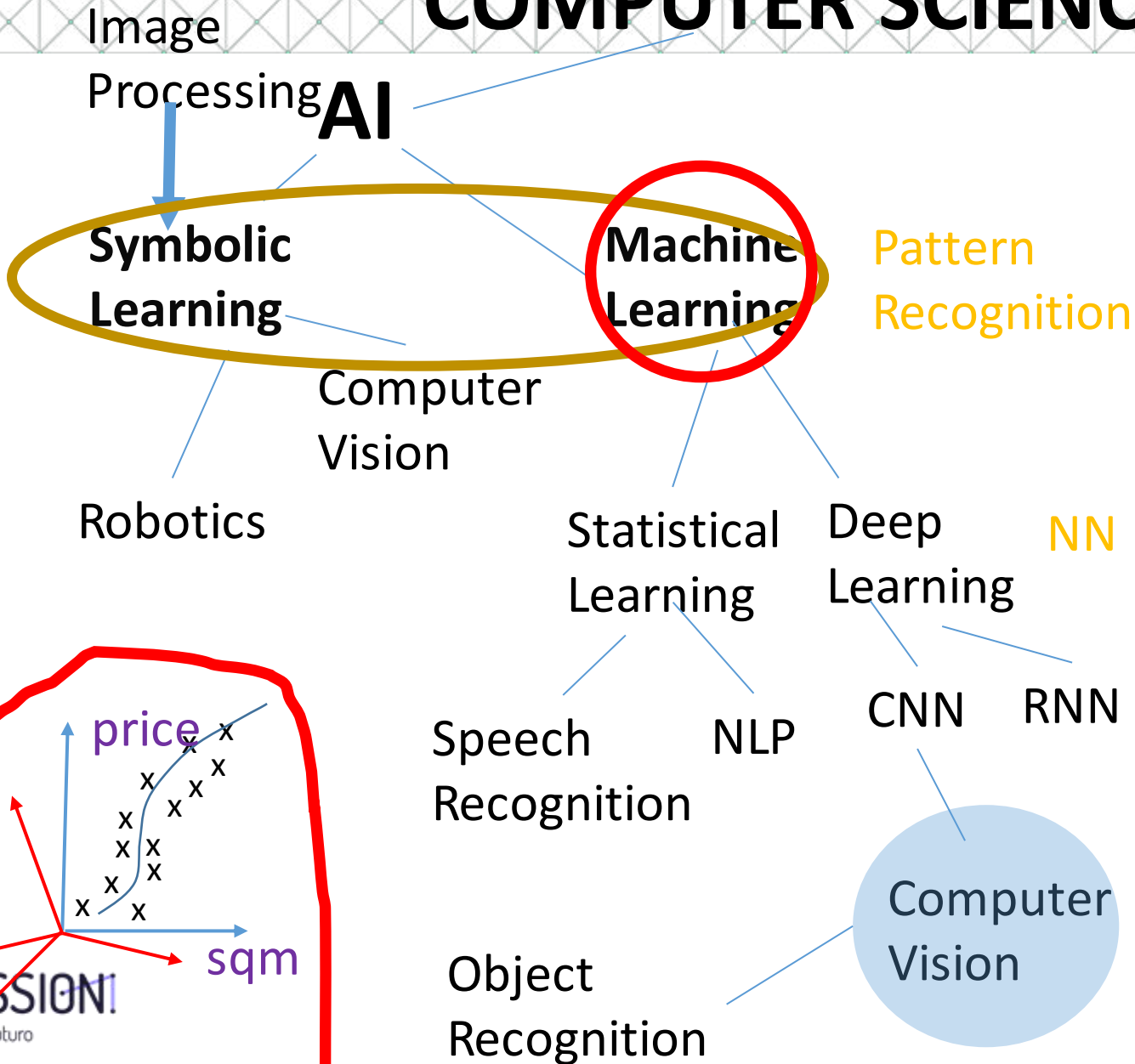
Computer
Vision

Classification

Prediction



COMPUTER SCIENCE



Types of Learning:

-Supervised

-Unsupervised

-Enforced

COMPUTER SCIENCE

**Classification
Prediction**

AI

Image
Processing

**Symbolic
Learning**

**Machine
Learning**

Pattern
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Robotics

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Vision

Statistical
Learning

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NN

Speech
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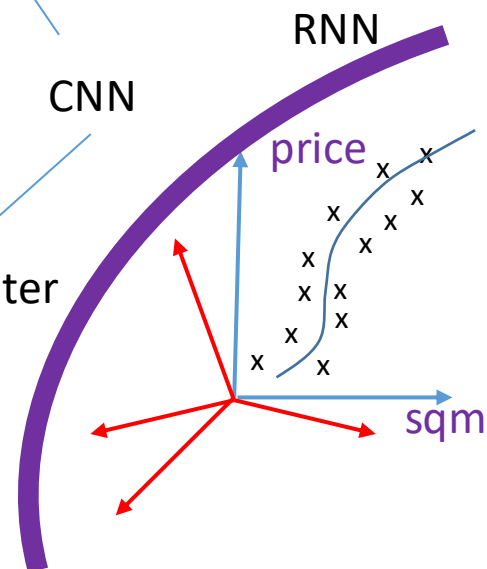
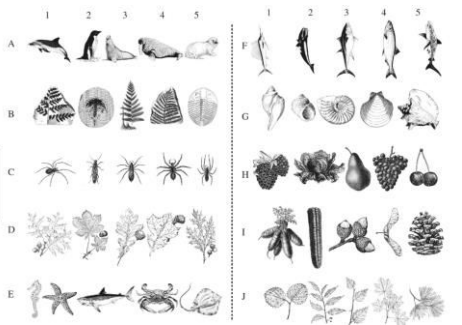
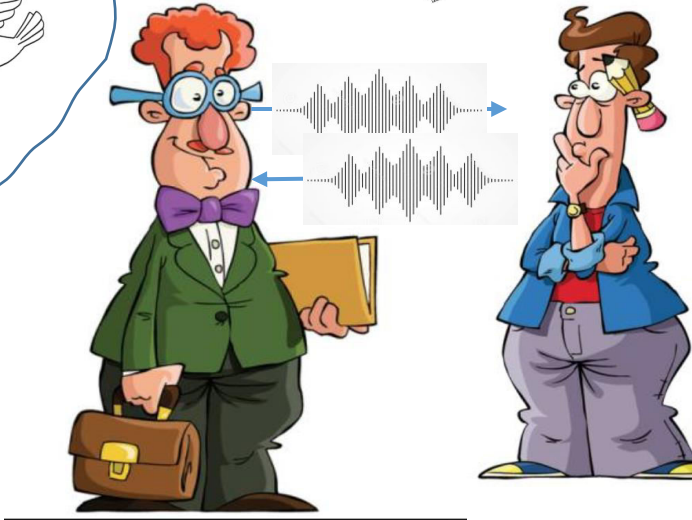
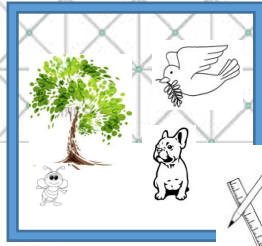
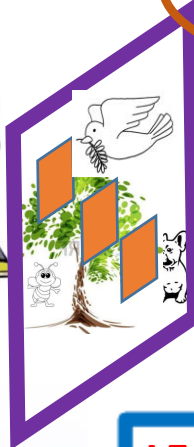
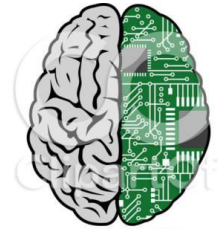
Object
Recognition

LEARNING:

Unsupervised

Supervised

Reinforced



educazione al futuro

SCENARIO E METODO

Scenario e Metodo

Quale futuro?

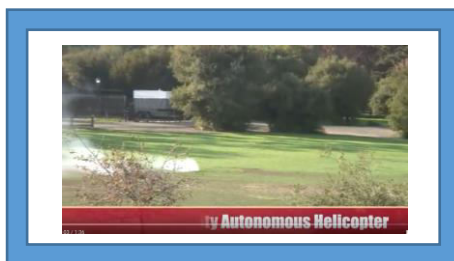
Did You Know that in ...

2028...

...and in ...

2050...

Il Tempo



Ken Robinson



Sugata Mitra



Massimo Banzi



Lo Scenario

Paulo Freire



Simon Sinek



Il Metodo

Problem-posing è un termine coniato da Paulo Freire nel suo libro del 1970: "*Pedagogy of the Oppressed*". Il Problem-posing si riferisce al pensiero critico. Il lavoro di Freire è infatti ispirato al costruttivismo di Jean Piaget e John Dewey.

“ If I were given one hour to save the planet, I would spend 59 minutes defining the problem and one minute resolving it,” .

Albert Einstein

Uno schema da seguire
per descrivere al meglio
Il Problema.

L'Approccio del
Quadro Logico
(pp.57)

Cercare cosa esiste già
in giro e confrontare

La Casa della
Qualità

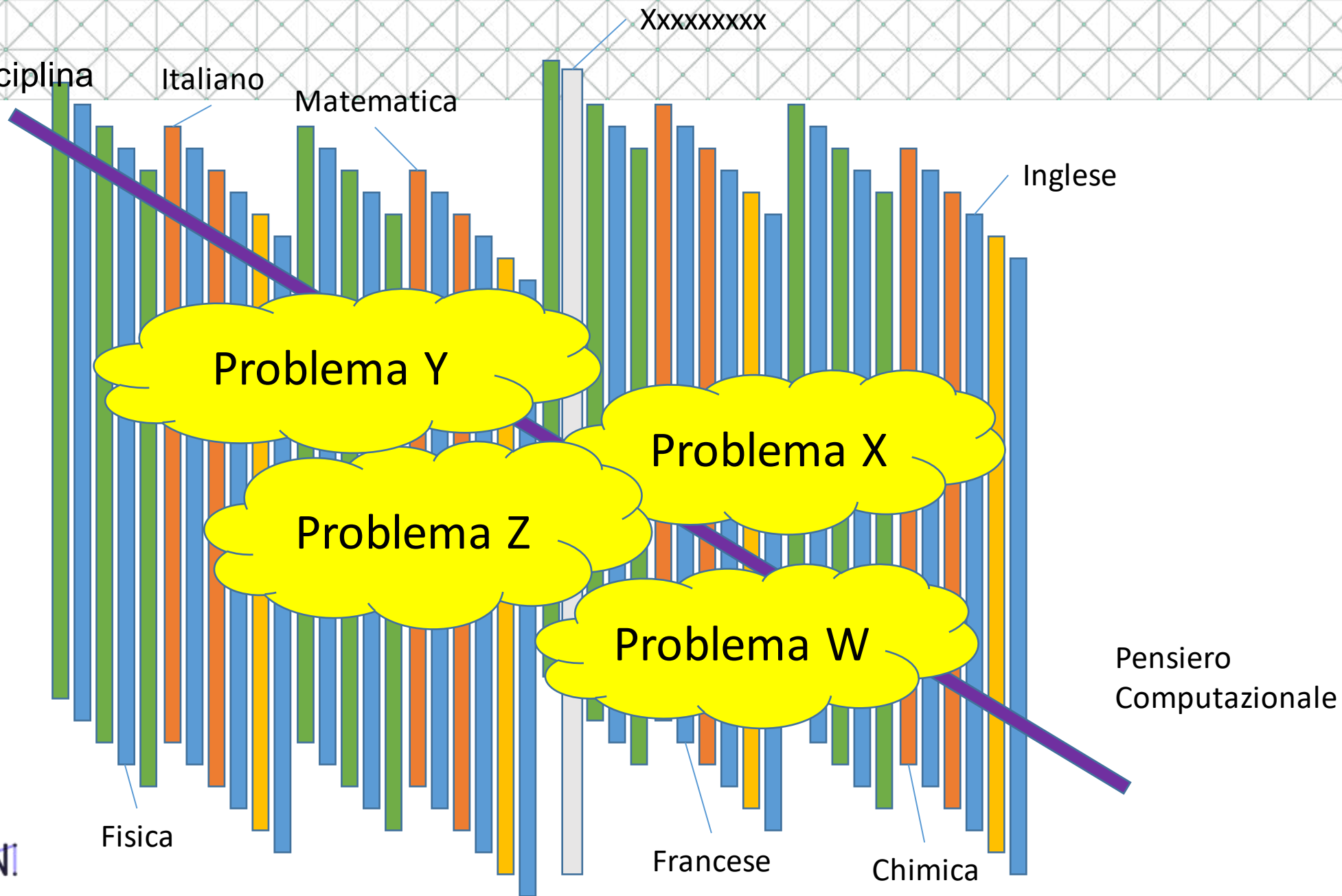
5W2H

Perché
Cosa
Chi
Quando
Dove
Come
Quanto

PEDAGOGIA E MODELLO

PEDAGOGIA E MODELLO

Problema vs Disciplina



Sociologia

Poca Socializzazione a
Scuola

Scienze della Vita

Ridotta Qualità della Vita
per il Paziente Diabetico

Cosmologia

Mancanza della prova
della Teoria sulla
Relatività Generale

Problema: Assenza della dimostrazione della Relatività Generale

Tesi:

Il percorso della luce nel Continuum Spazio-Tempo viene deformata dal Campo Gravitazionale

Dato:

Effetto di una massa come il Sole 1.5 cm su 3 km: 1.75 arcsec

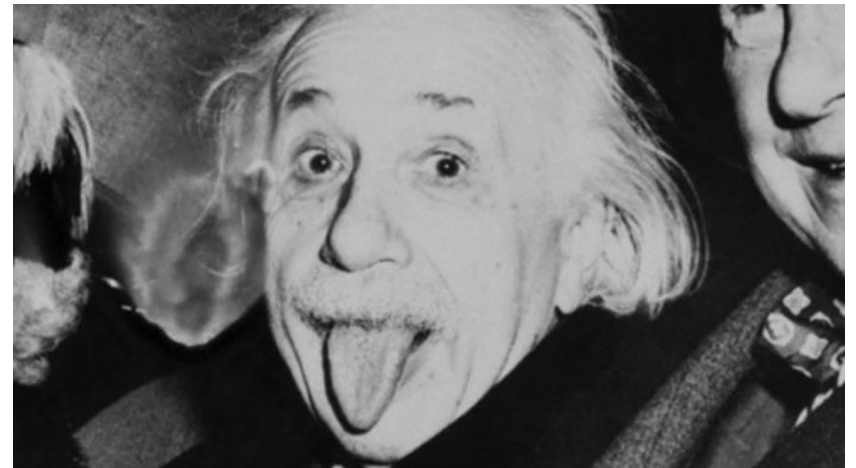
Metodo

Eclissi: Sole, Luna e ammasso aperto a 150 anni luce di distanza (ladi), allineati.

19 maggio 1919

Inventore: Sir Watson Dyson

Sperimentatore: Arthur Eddington



PEDAGOGIA E MODELLO

Il Ciclo di Vita del Progetto

Premessa: Il Modello di Apprendimento

1. Il Problema e il suo Dominio: Formulazione
2. Problem Posing: Quadro Logico e Story Telling
3. Problem Solving: MindMap \leftrightarrow Flow Chart
4. Prototipazione: Scratch, Robot, Python, Maple, Processing, Unplugged
5. Comunicazione: Video Making
6. Valutazione: DigComp2

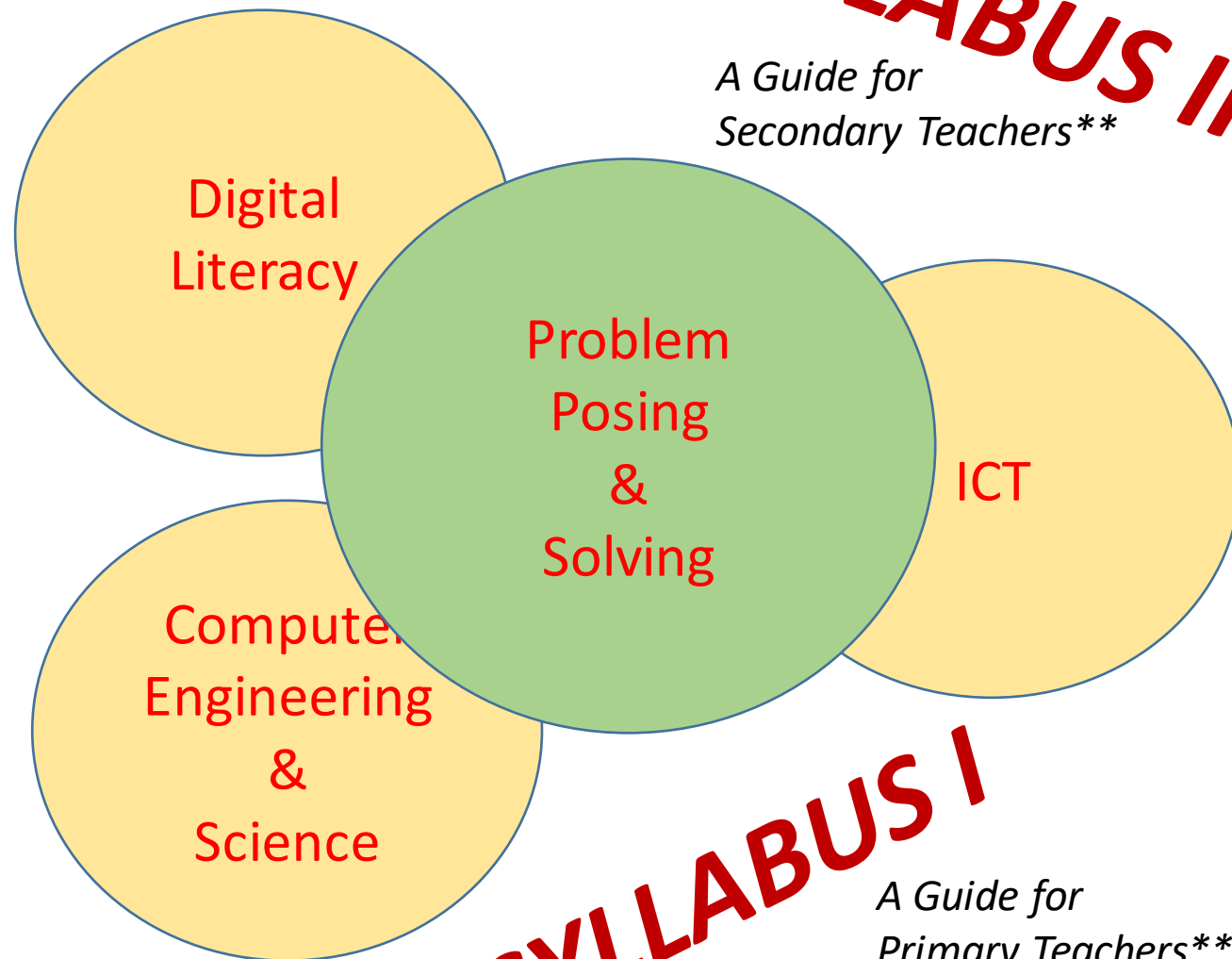


PEDAGOGIA E MODELLO

Pensiero Computazionale e
Coding

*Pensiero
Computazionale*

*Peter
Denning **



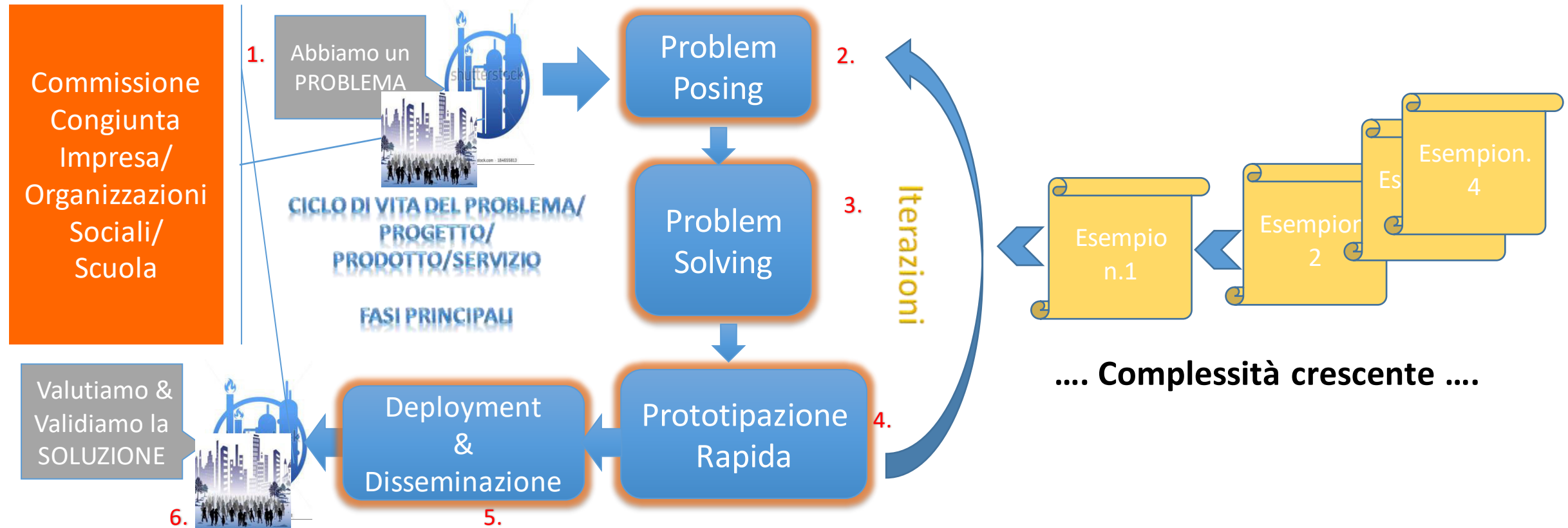
SYLLABUS II
*A Guide for
Secondary Teachers***

SYLLABUS I
*A Guide for
Primary Teachers***

Competenza

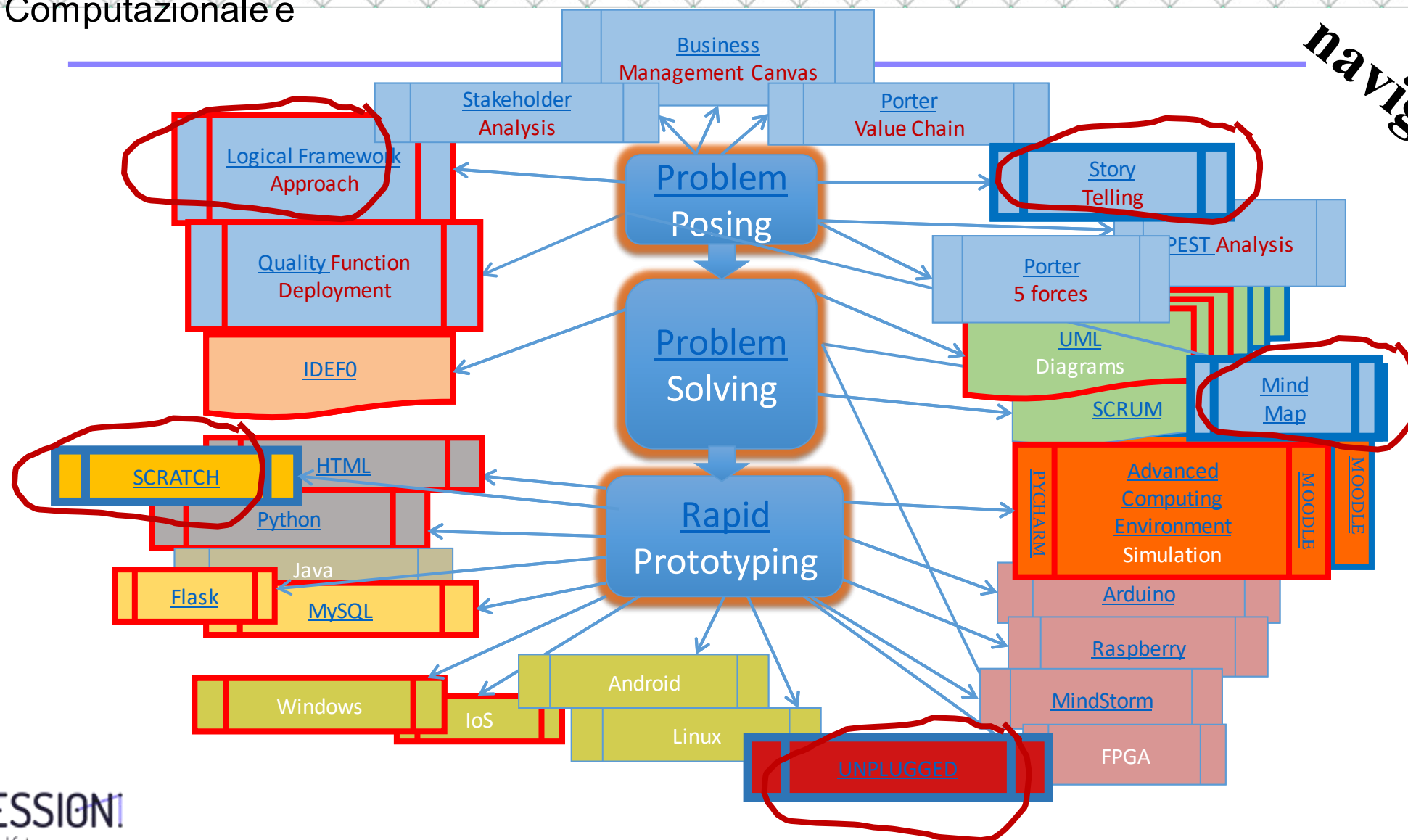
PEDAGOGIA E MODELLO

Pensiero Computazionale e Coding



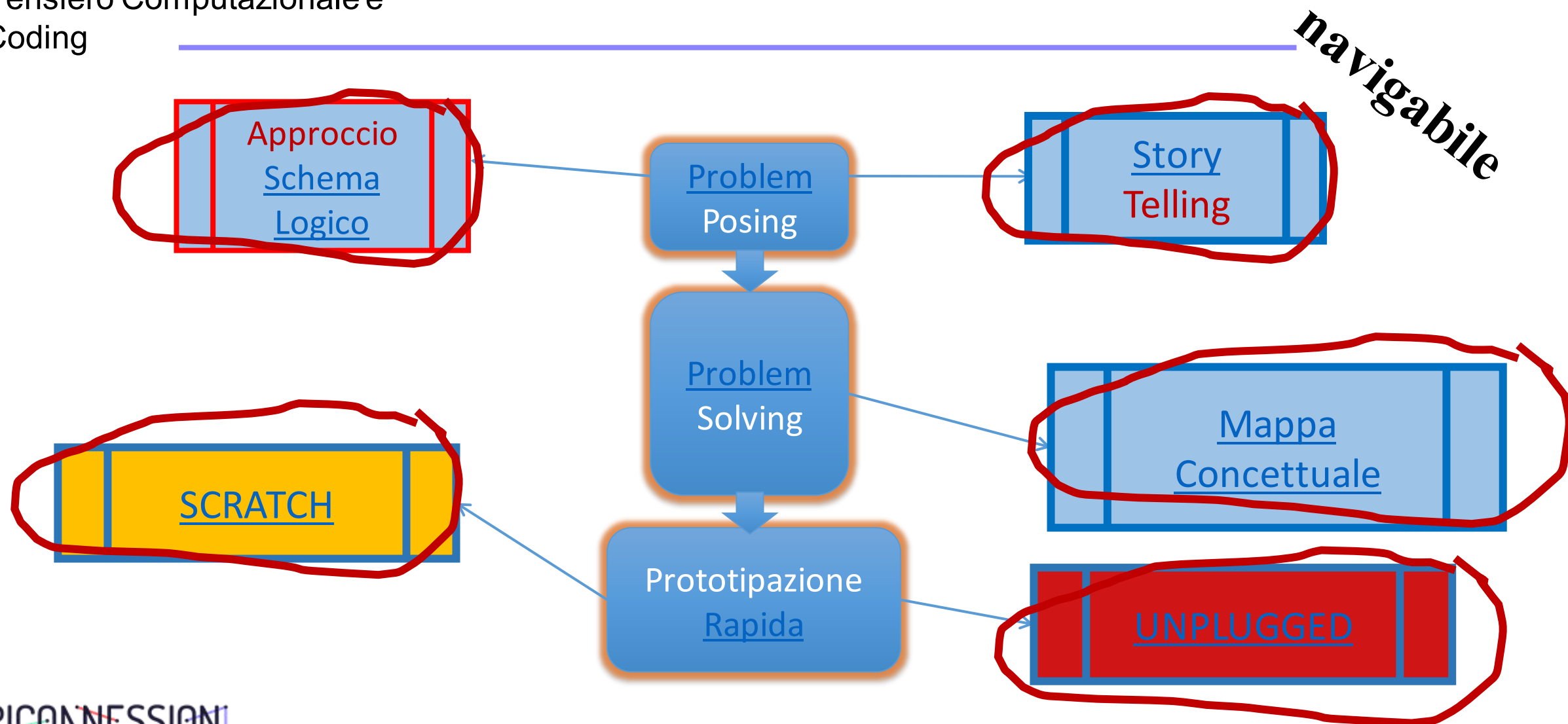
PEDAGOGIA E MODELLO

Pensiero Computazionale e
Coding



PEDAGOGIA E MODELLO

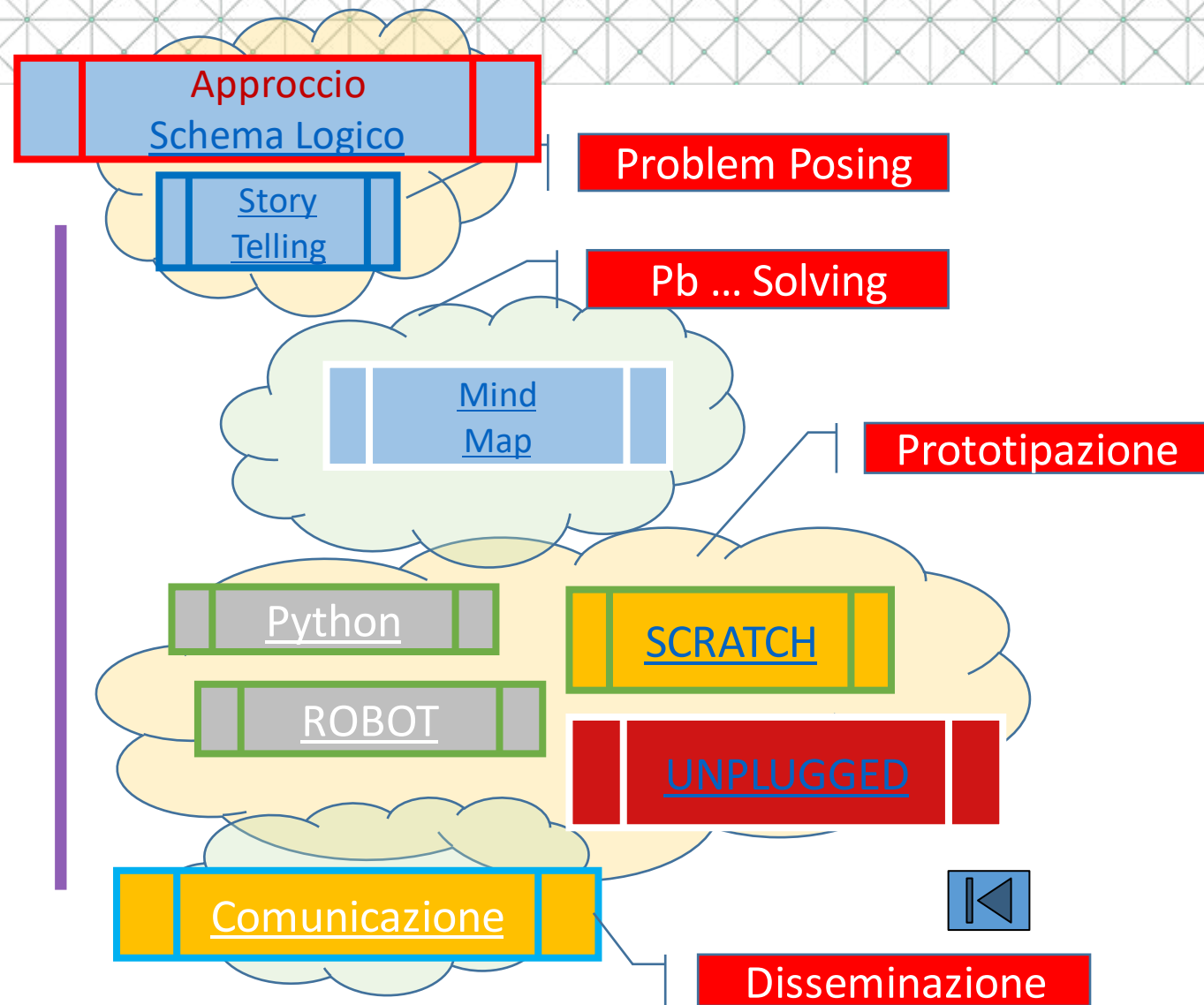
Pensiero Computazionale e
Coding



PEDAGOGIA E MODELLO

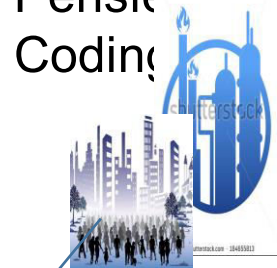
Pensiero Computazionale e Coding

I-III anno Scuola Secondaria Ig

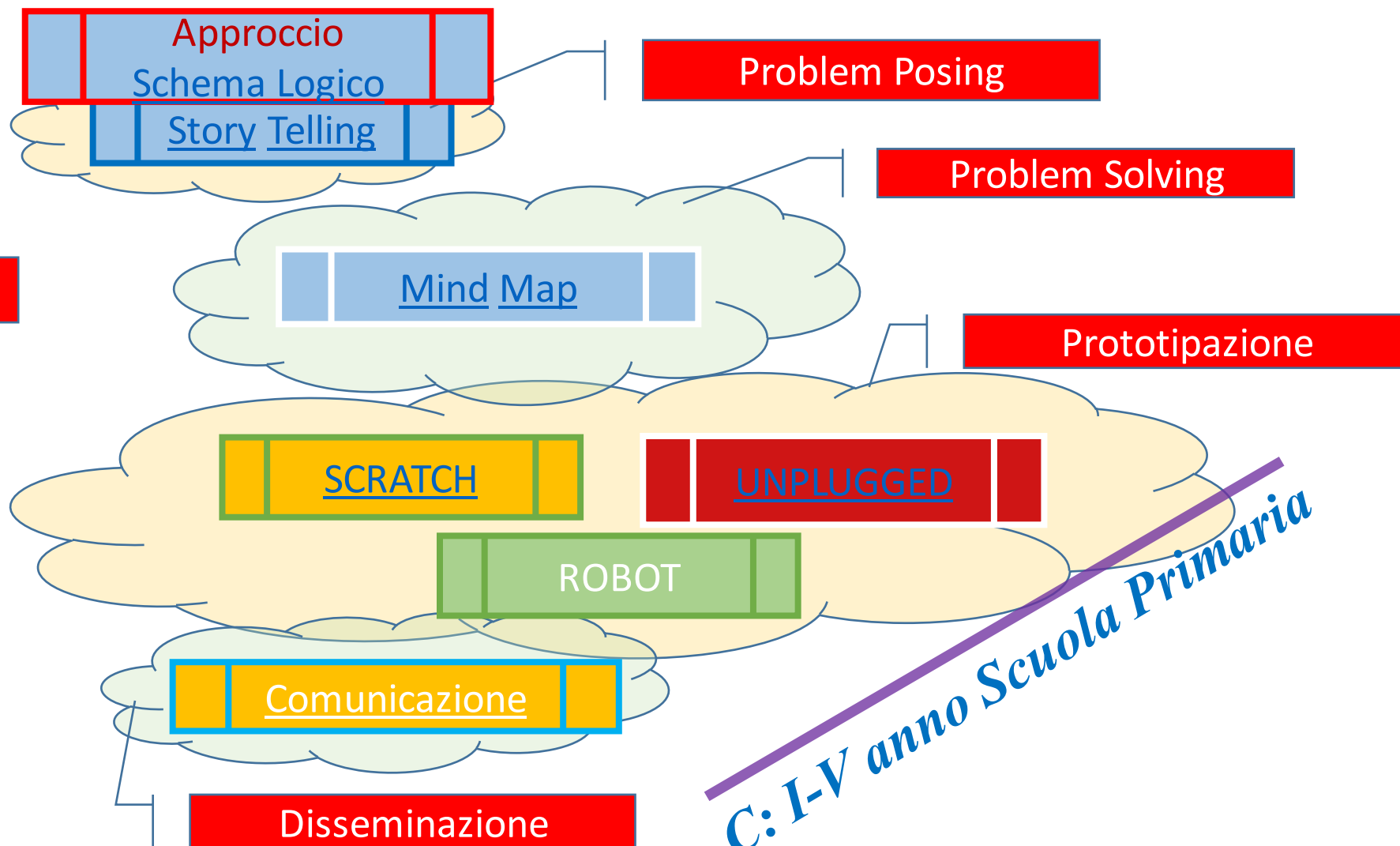


PEDAGOGIA E MODELLO

Pensiero Computazionale e Coding



Problema & Dominio



Valutazione

1. IL PROBLEMA E IL SUO DOMINIO

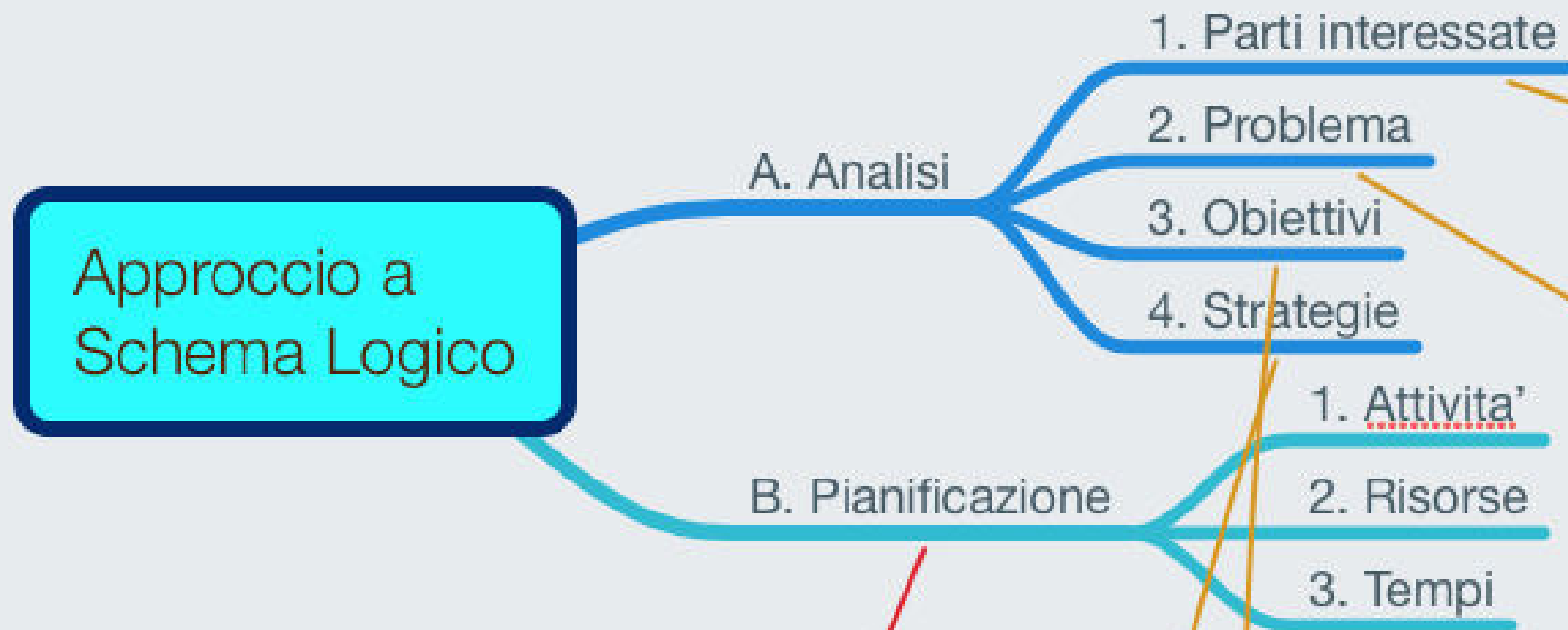
PROBLEMA
POCA SOCIALIZZAZIONE
A SCUOLA

SOLUZIONE
[Game Stop]
(scambio dei giochi)

2. PROBLEM POSING

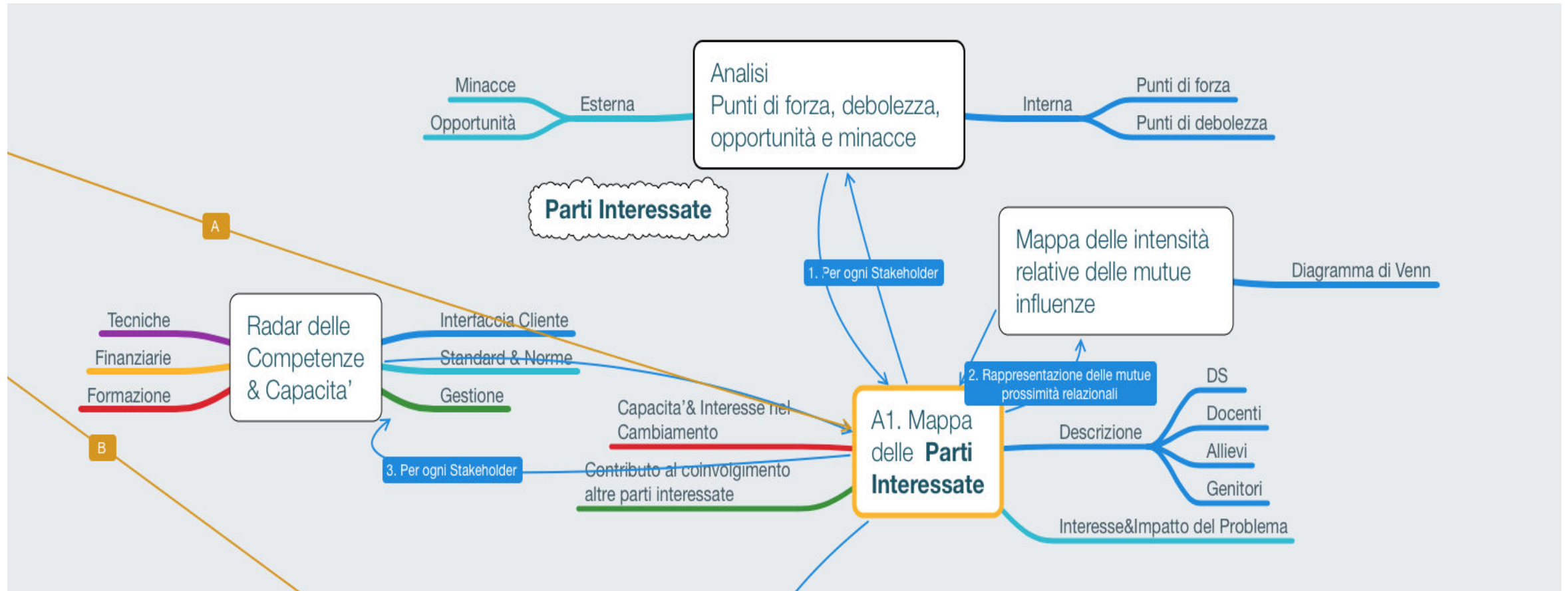
PROBLEM POSING

Approccio a Schema Logico



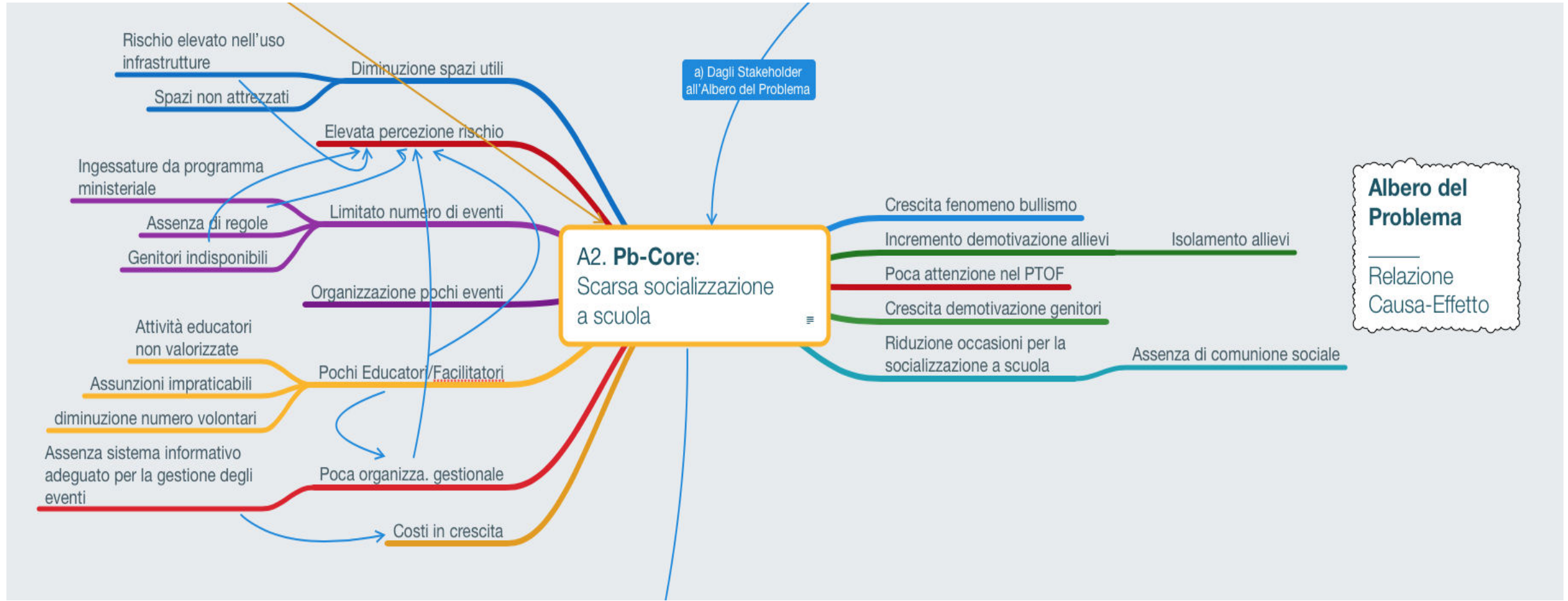
PROBLEM POSING

Le Parti Interessate



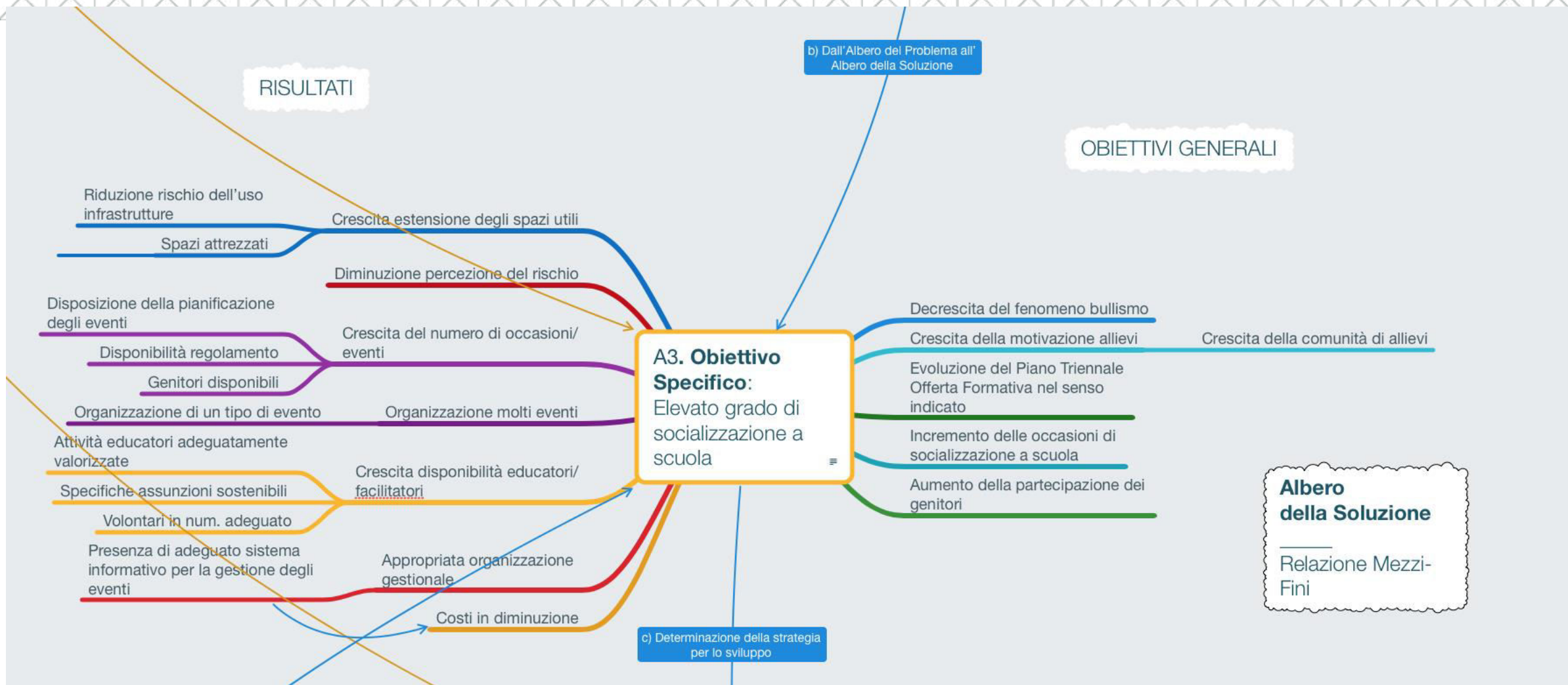
PROBLEM POSING

Albero del Problema



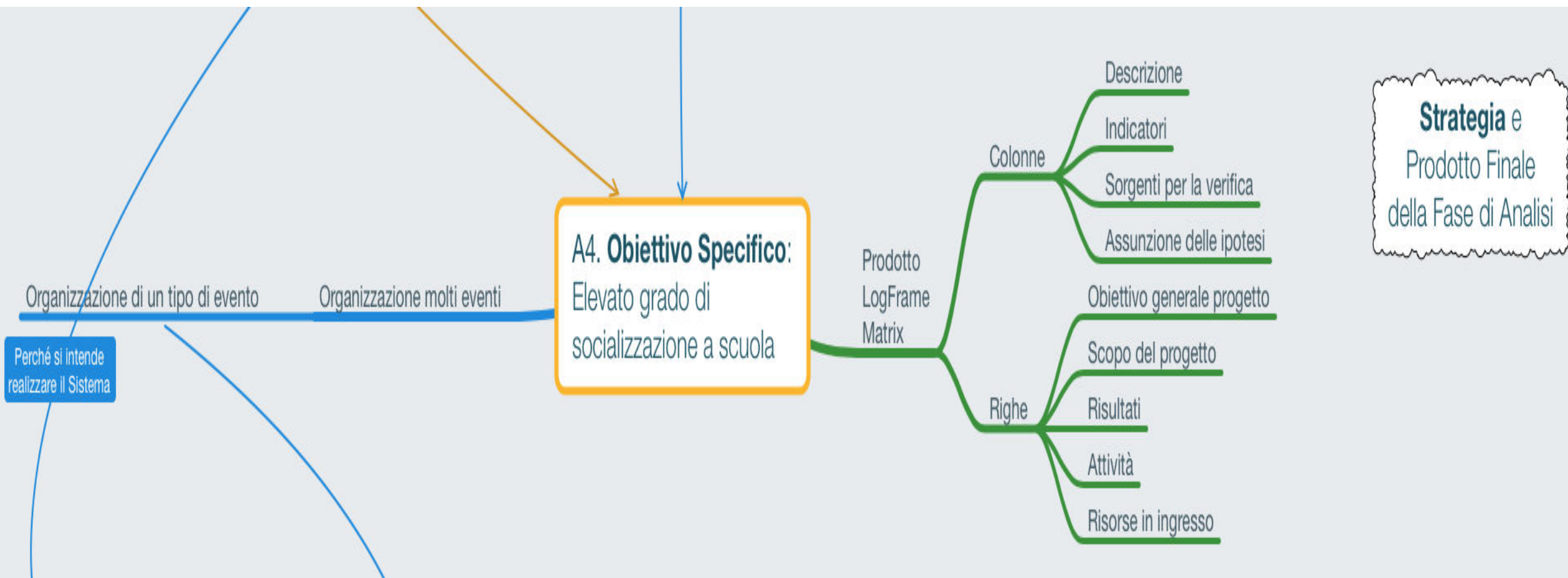
PROBLEM POSING

Albero della Soluzione



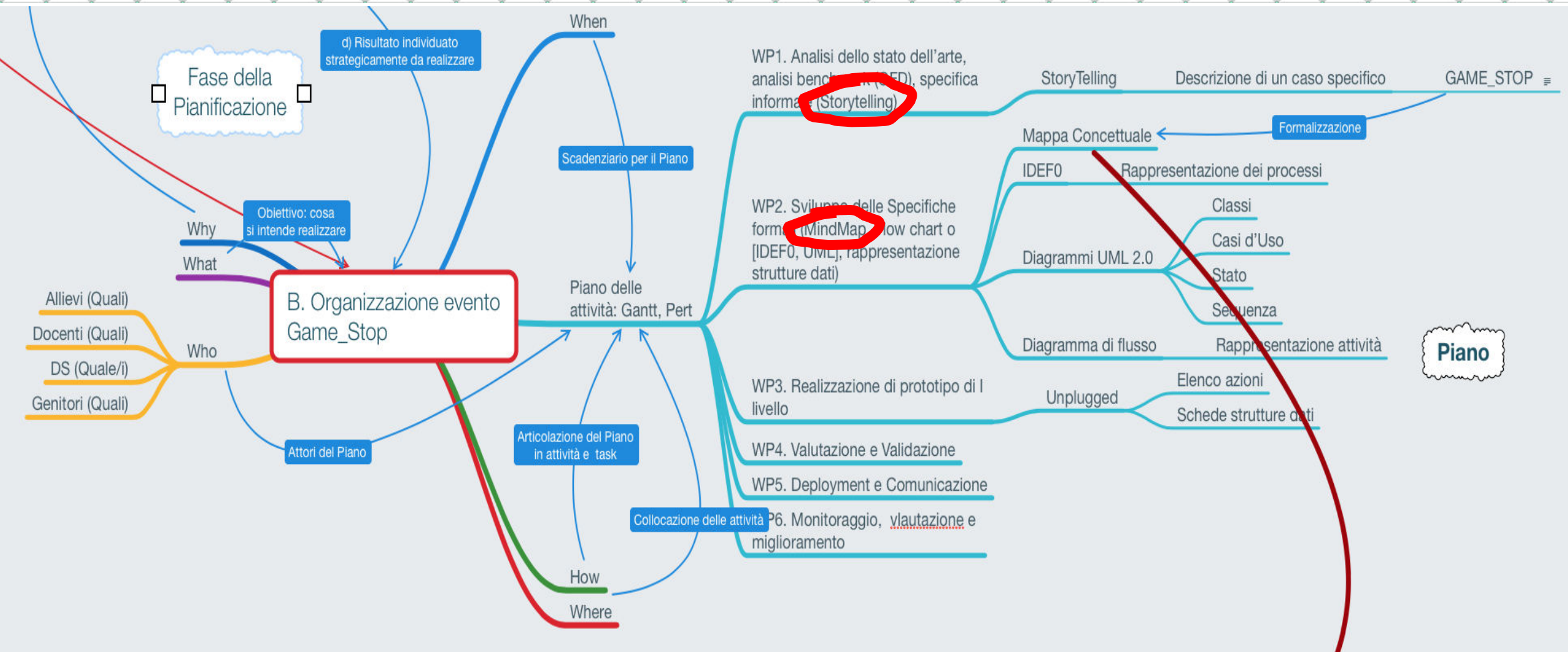
PROBLEM POSING

Scelta della Strategia



PROBLEM POSING

Piano di sviluppo di Game_Stop



2a. Story Telling per Game_Stop

PROBLEM POSING

Story Telling Game_Stop

HOW TO WRITE A SHORT STORY

[Story Telling](#)

1. Brainstorm a scenario

What is your story's who, what, why, where and when?



2. Plan story submission

Think ahead: Find publications that accept similar stories.

3. Find your story's focus

Short stories have less space: make every sentence focused.



4. Plan characters, setting

How might characters and your setting look, feel, change?

5. Choose a point of view

Who narrates? What information do they have/not have?



6. Write a 1-page synopsis

Try writing your story as a single page - you'll find the central events.



7. Create a strong opening

Start with the unusual, unexpected, with mystery or conflict.



8. Create a strong climax

How will it build the situation found at the start to a peak?



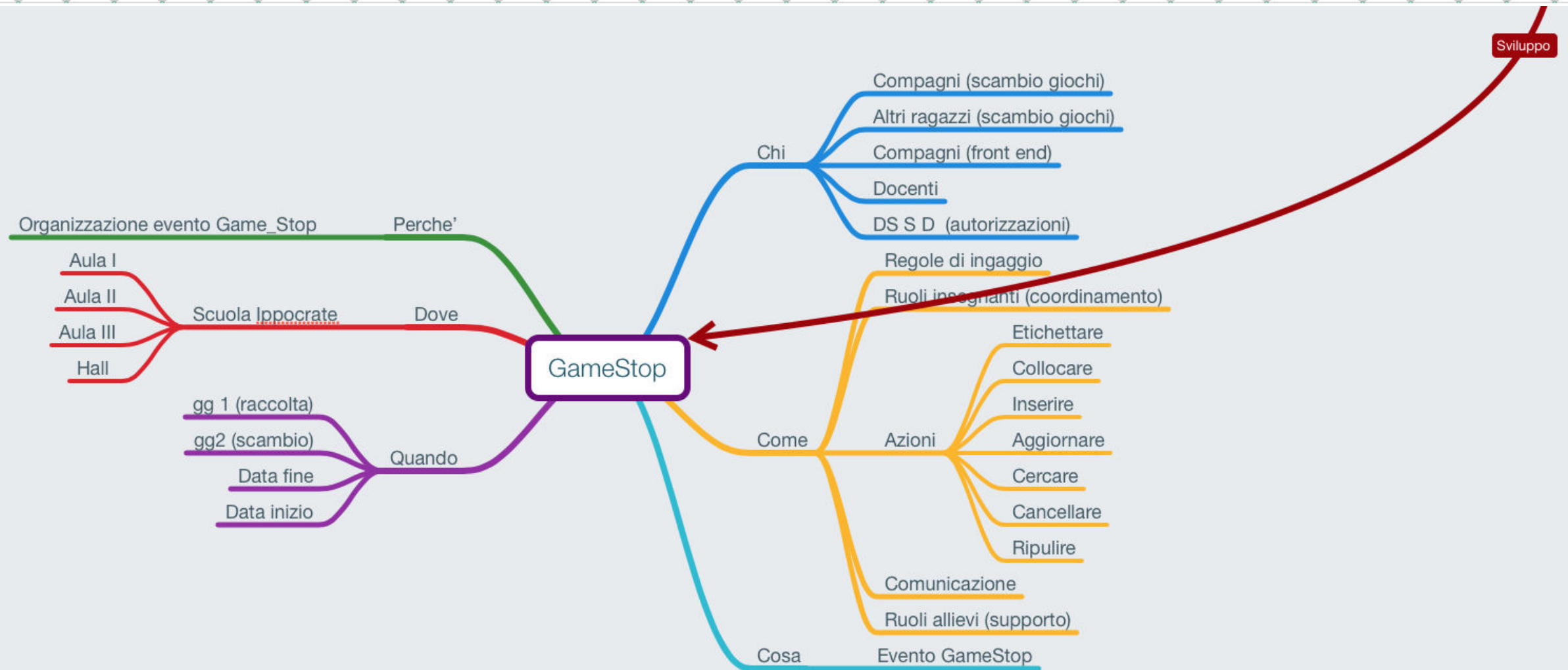
Come scrivere una storia in 10 punti:

- 1: Escogitare uno scenario intrigante
- 2: Individuare e pianificare il tipo di uditorio o lettore
- 3: Individuare il focus della storia
- 4: Tracciare i personaggi e l'ambientazione
- 5: Individuare un punto di vista (uno dei protagonisti, degli attori)
- 6: Scrivere la traccia in una pagina
- 7: Scrivere il primo paragrafo
- 8: Rappresentare l'acme (κλῖμαξ) e le conclusioni della storia

3. PROBLEM SOLVING

PROBLEM SOLVING

Mappa Concettuale - Game_Stop



4. PROTOTIPAZIONE

PROTOTIPAZIONE

Realizzare l'evento Game_Stop – Prototipazione Unplugged - Anagrafica

Allievo

ID_All:
Nome:
Cognome:
Nato a:
Il:
Ruolo:

Docente

ID_Doc:
Nome:
Cognome:
Nato a:
Il:
Ruolo:

Gioco

ID_Gioco:
Desc:
Tipo:
Comprato a:
Il:
ID_POS:
Fk_ID_All_Prop.:
Prezzo (GamEu):

PROTOTIPAZIONE

Realizzare l'evento Game_Stop – Prototipazione Unplugged: Movimentazione

Deposito

IDTransDEP:

IDAllDep.:

IDGioco:

Il:

Alle:

Valut.:

(GamEu)

Prelievo

IDTransPrel:

IDPOS_Gio:

ID_All_Prel.:

Pagato

(GamEu):

Collocazione

IDAula:

IDBanco:

IDCont.

Status:

PROTOTIPAZIONE

Realizzare l'evento Game_Stop – Prototipazione Unplugged



Aula 1: id=Ai

Cont.: id=k



Box Cartellini

1. Unplugged
2. Scratch
3. Robot



5. COMUNICAZIONE

Creare Video



6. VALUTAZIONE

VALUTAZIONE

DigComp 2.0



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BUON LAVORO!**

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