Information for decision-making is ubiquitous: revisiting the reverse engineering mode in breadmaking technology

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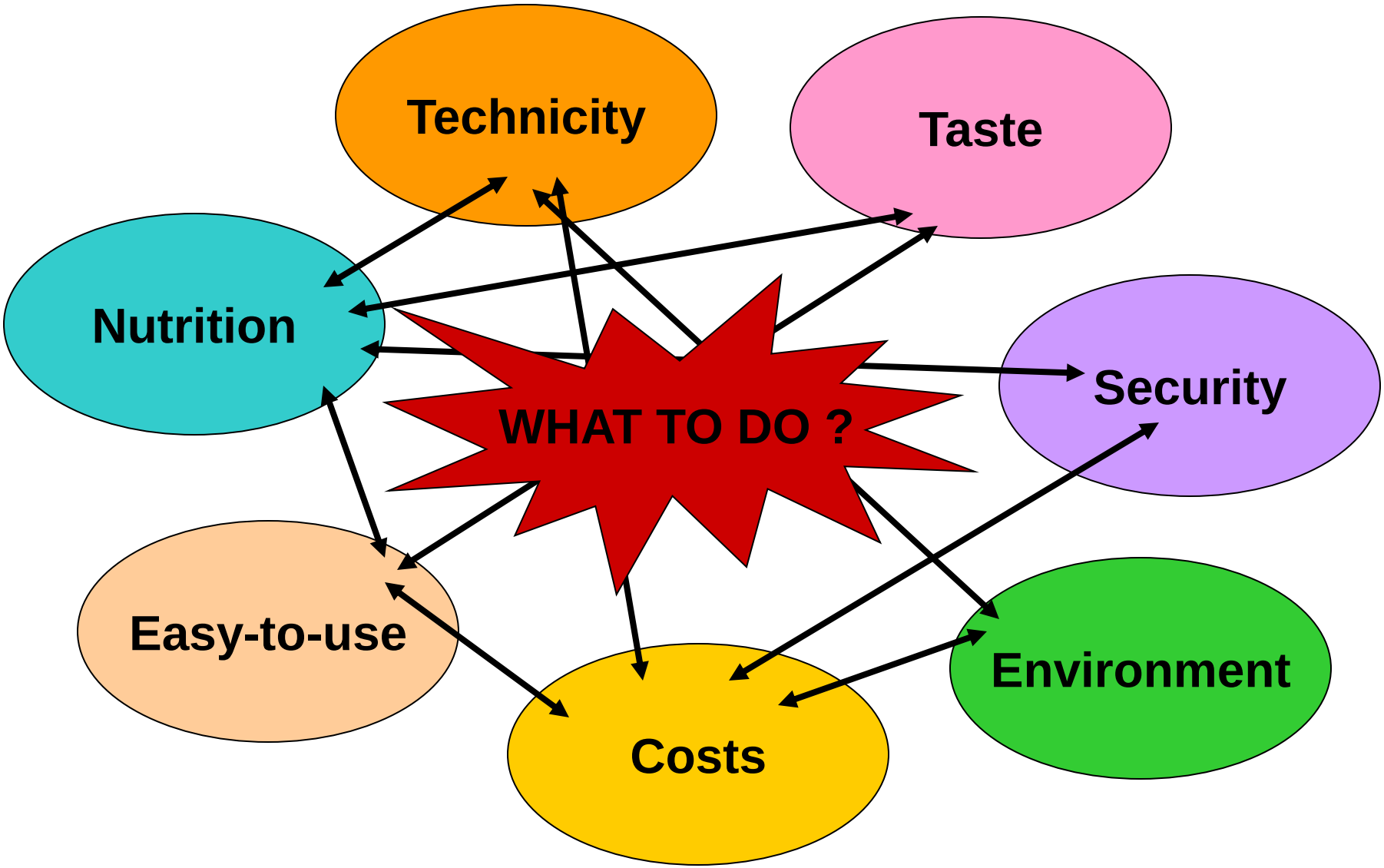
Context


Technicity
Taste
Nutrition
WHAT TO DO ?
Security
Easy-to-use
Environment
Costs

Example

Bread food chain

- Millers
- Bakers
- Consumers
- Nutritionists
- Researchers
- Government (PNNS)

Example

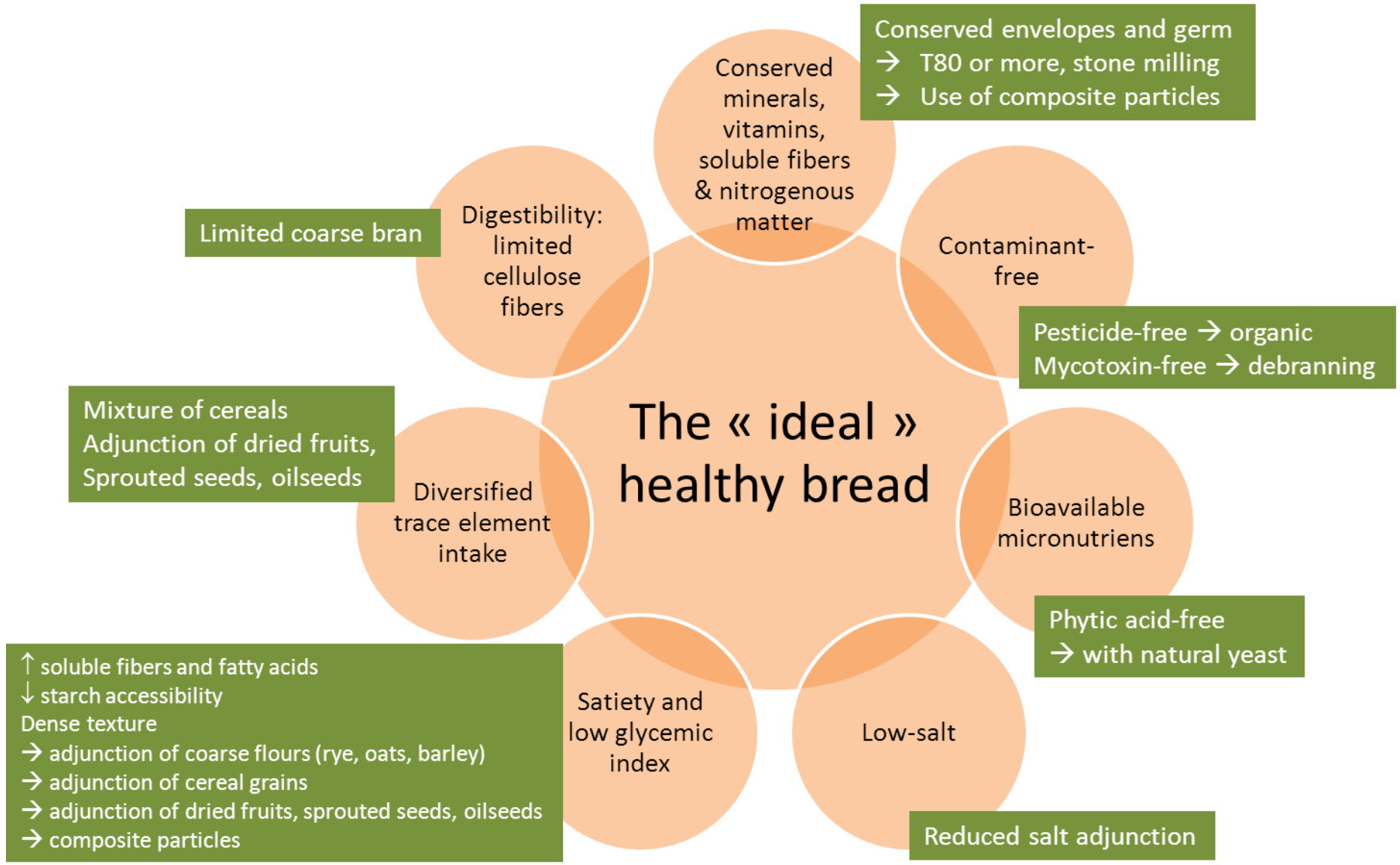
white?

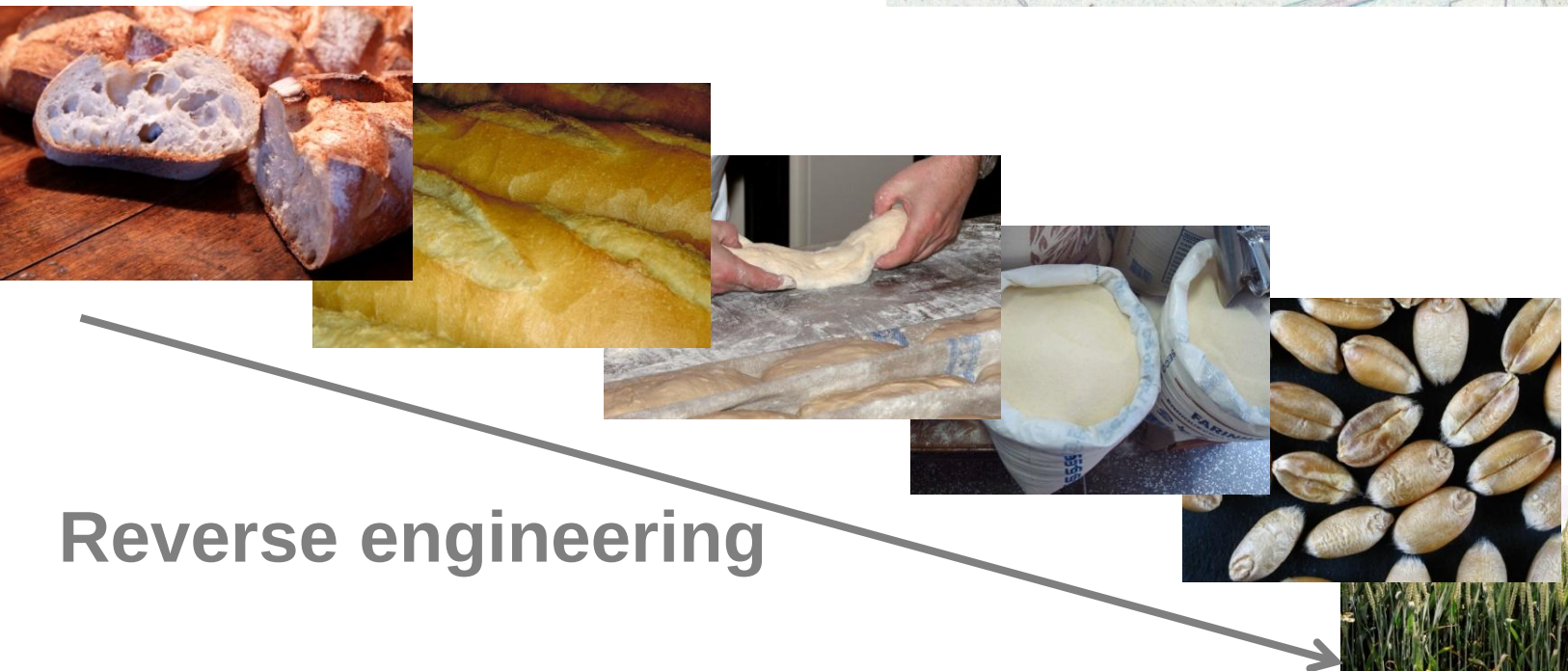
complete?

- Avoiding chemical contamination
- Proposing a consumer-attractive bread
- Limitating irritating fibers
- Avoiding the responsability for consumer security
- Maintaining sells
- Preserving the profession’s technicity

- Increasing nutritional components
- Decreasing costs
- Controling appetite
- Limitating salt consumption
- Reducing costly widespread diseases

Example: nutritional aspects





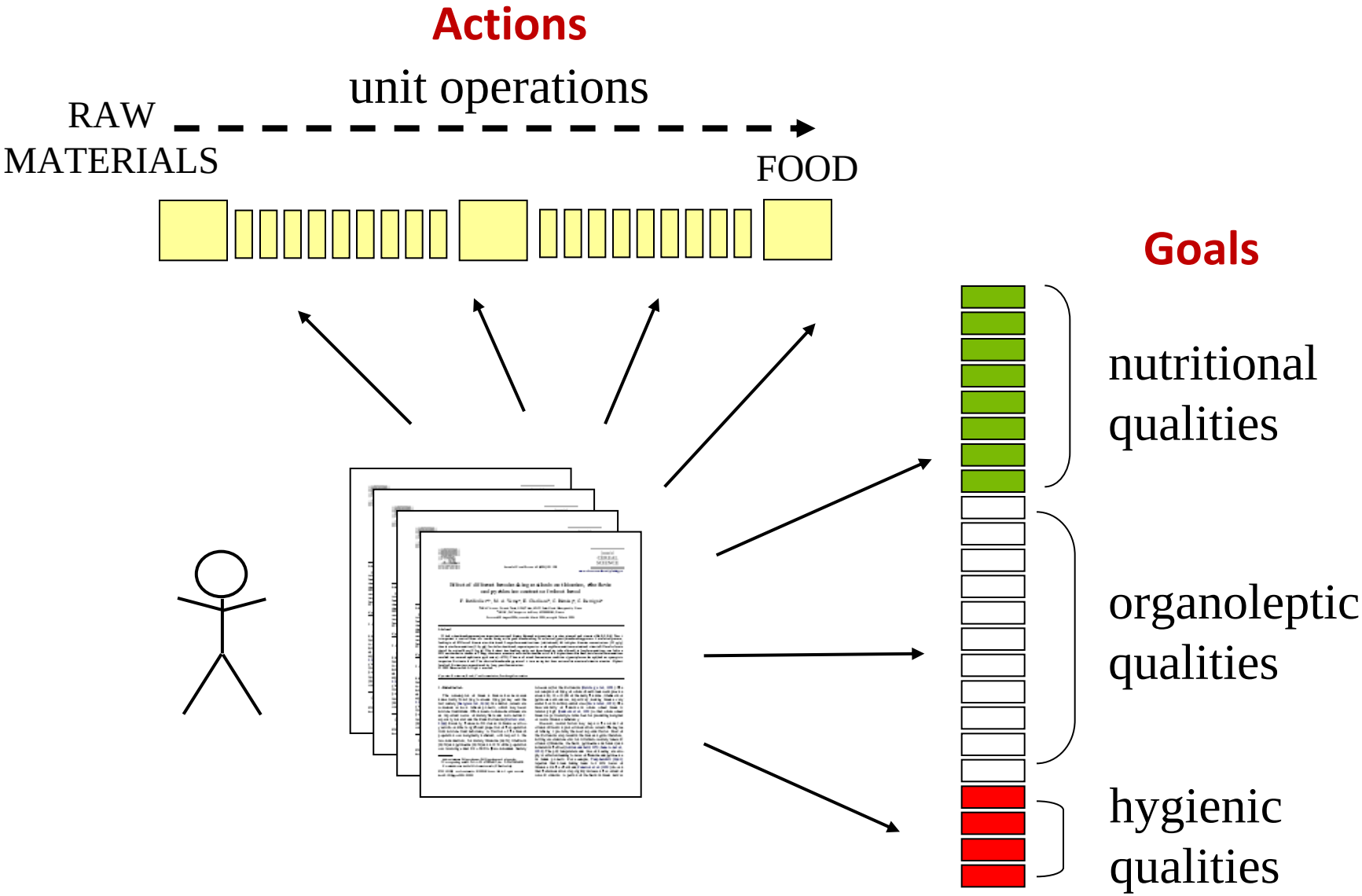
Reverse engineering

Question

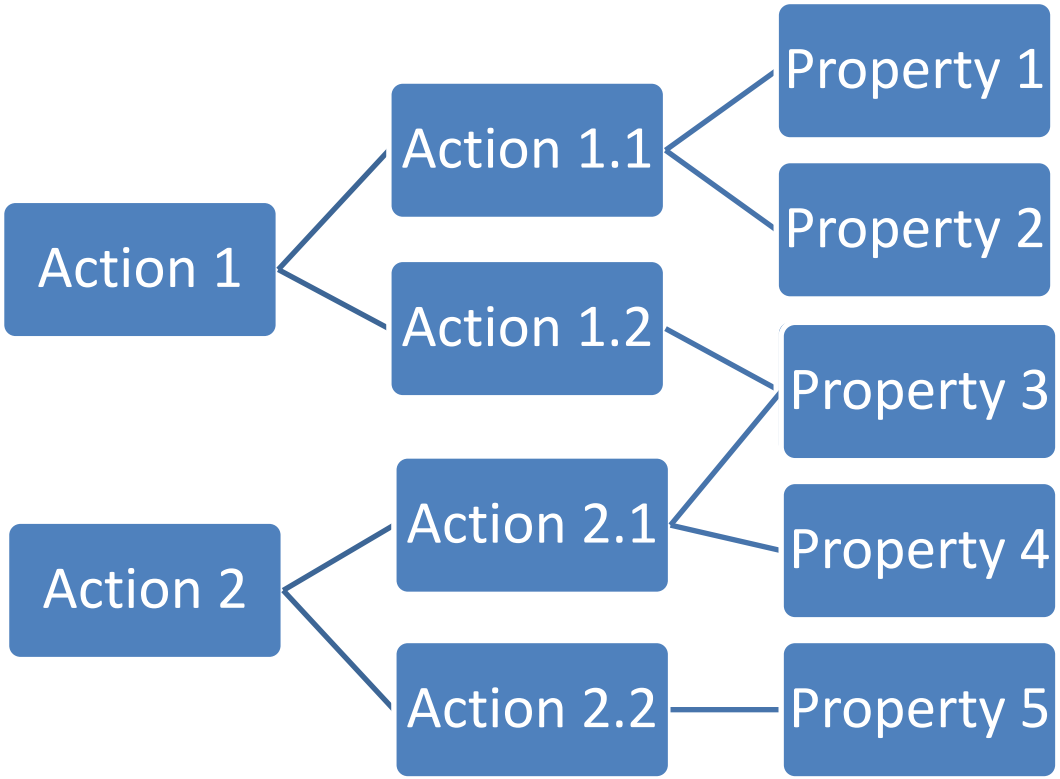
How to suggest possible actions that « best » fulfill the goals expressed?

Reverse engineering

Reverse Engineering



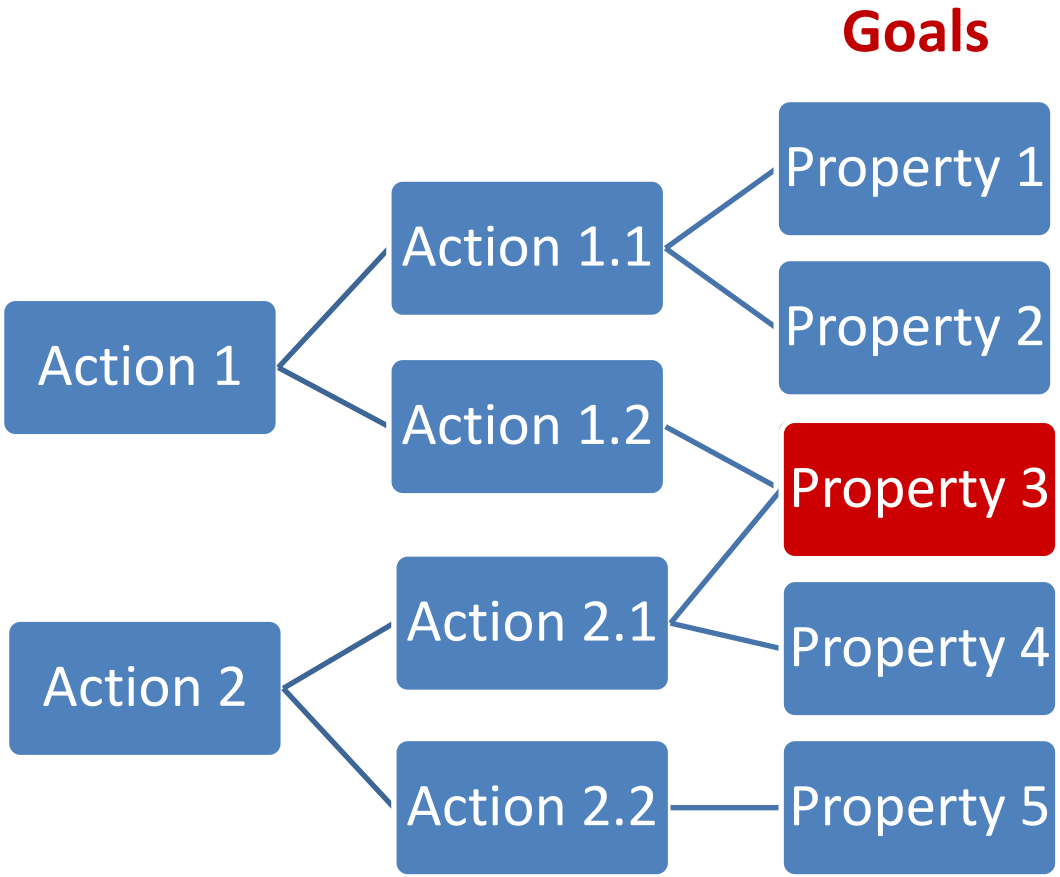
Problem formalisation



$$R_1 = \forall\ x,y\ (Bread(x) \wedge ExtractionRate(y,x) \wedge Decrease(y) \rightarrow Digestible(x))$$

Problem formalisation

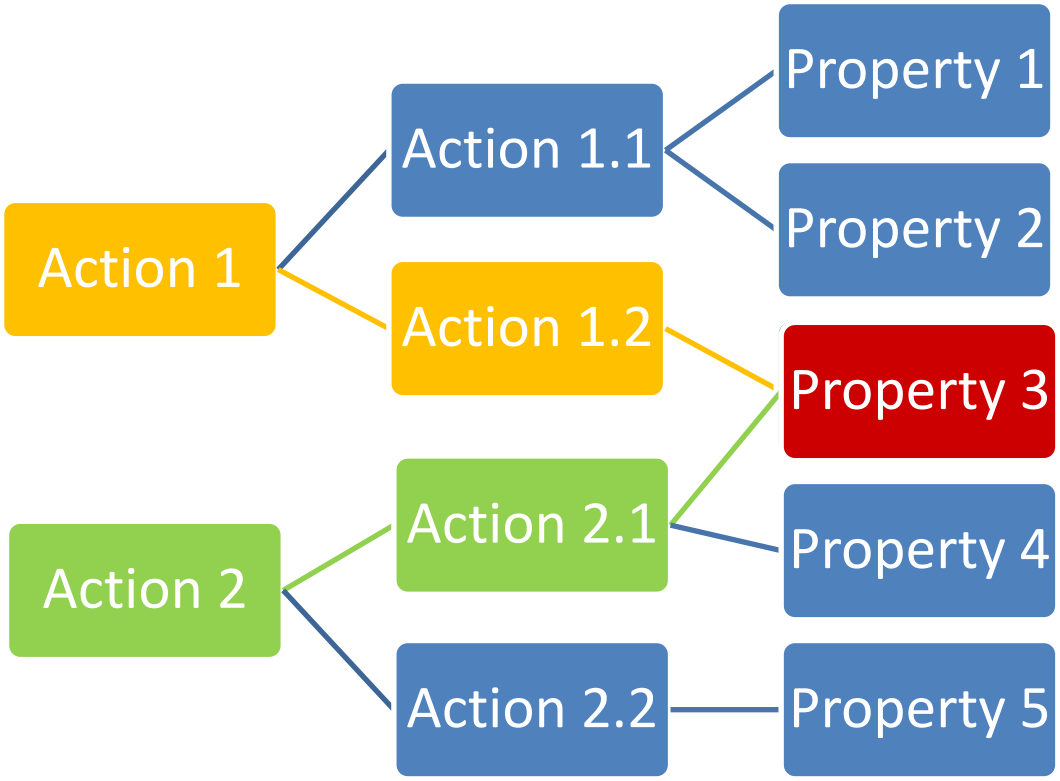
1)



$G_3 = \exists\ p\ (Bread(p) \wedge TraceElementRich(p))$, where $\kappa(G_3) = nutrition$

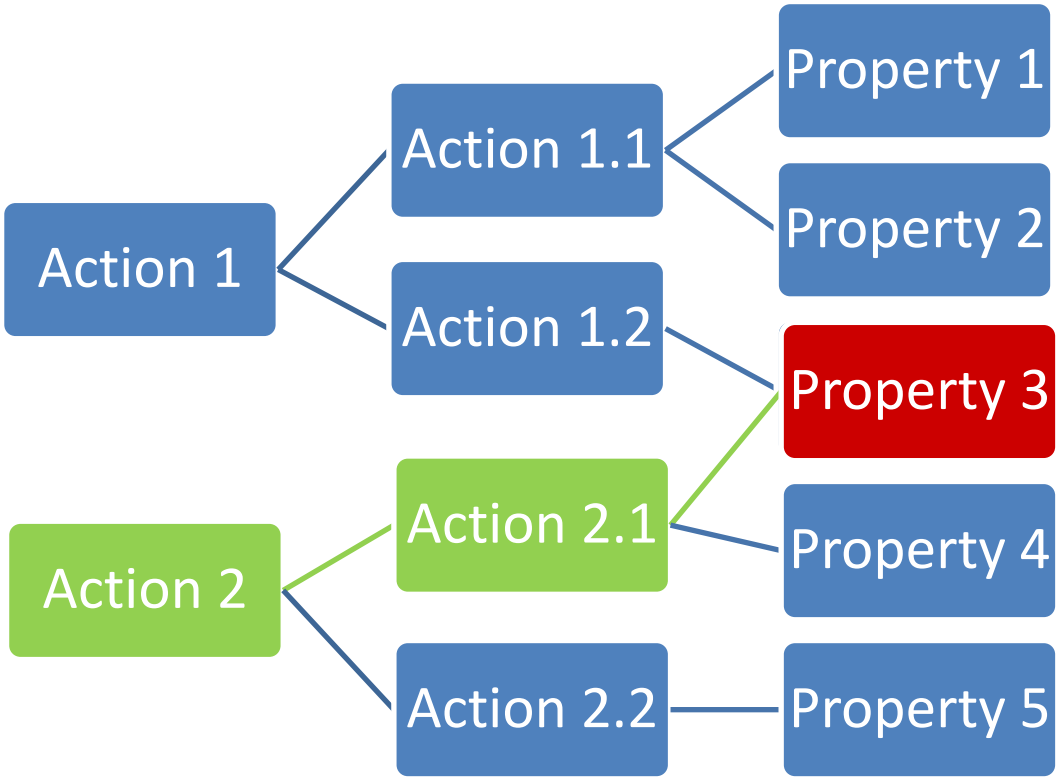
$G_4 = \exists\ p\ (Bread(p) \wedge PesticideFree(p))$, where $\kappa(G_4) = sanitary$.

Problem formalisation

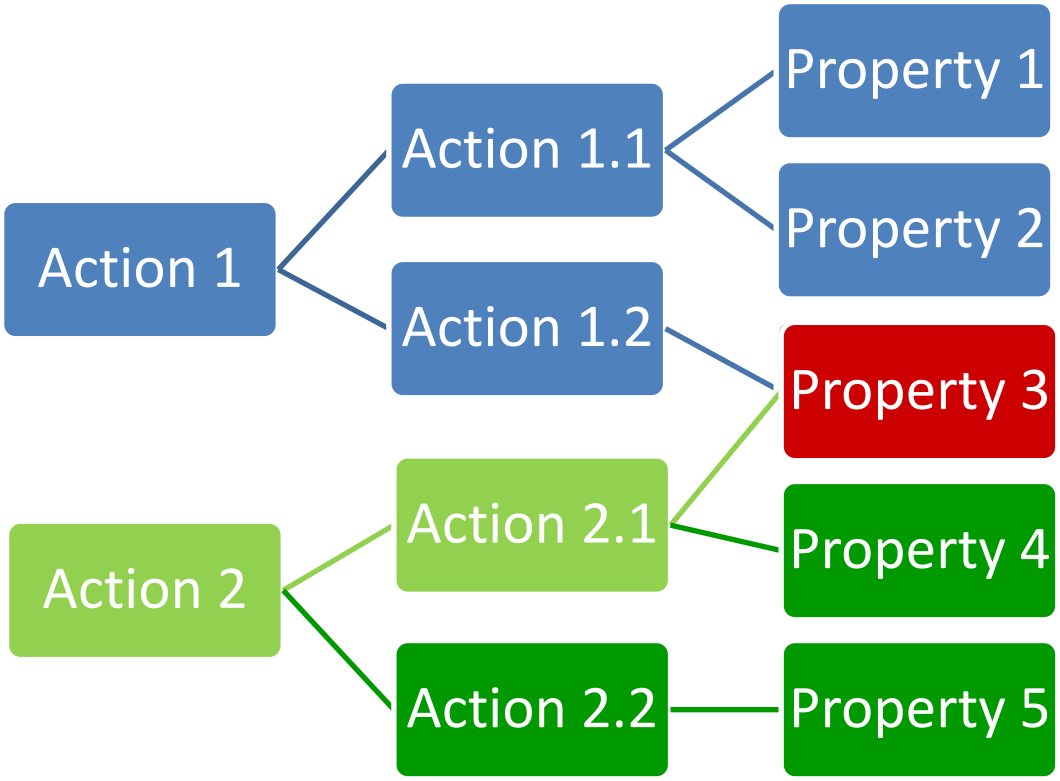


Problem formalisation

2)

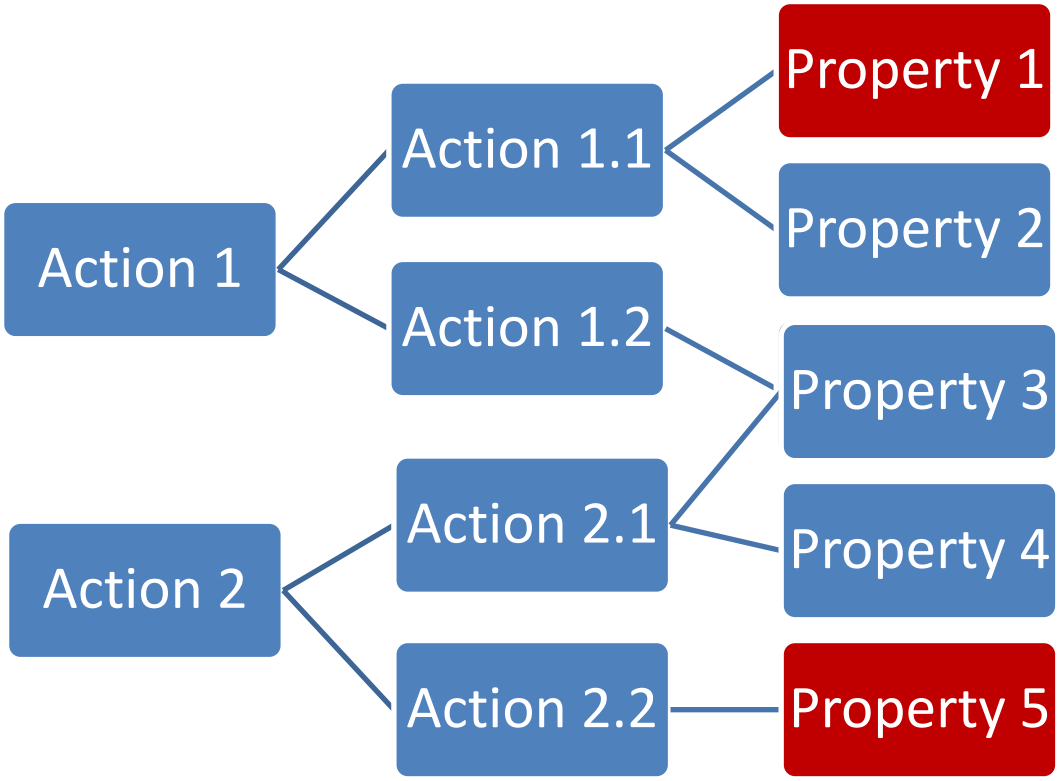


Problem formalisation

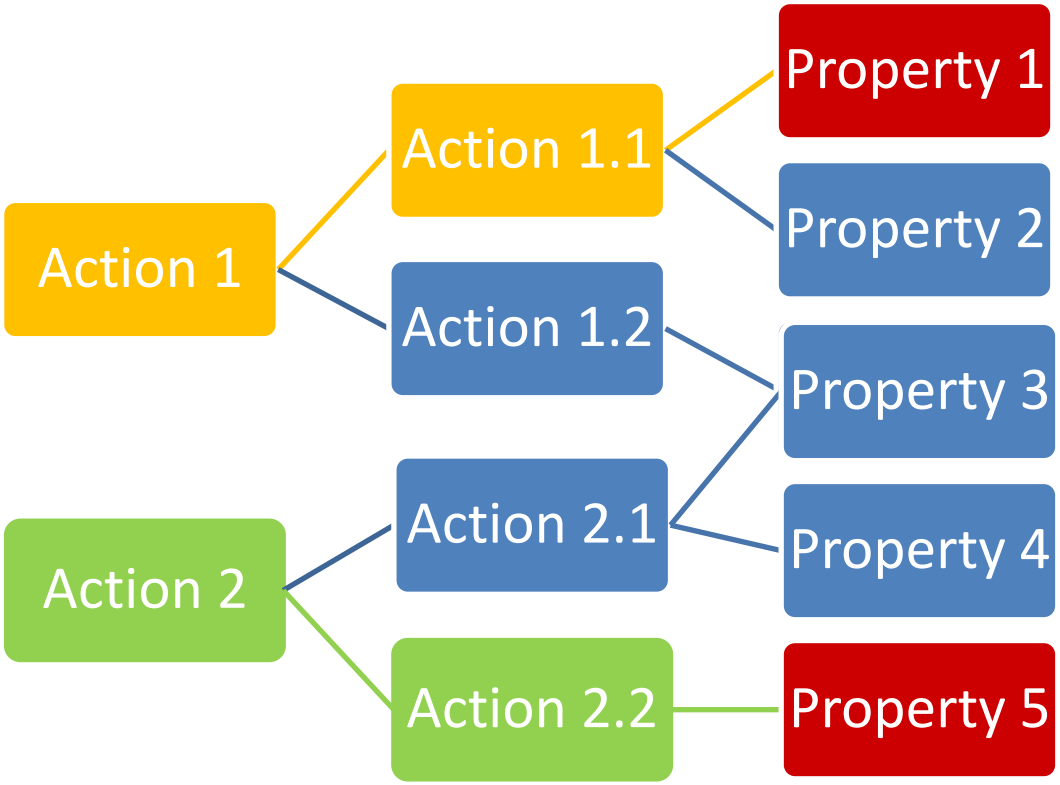


Problem formalisation

3)



Problem formalisation



$$N = \neg(\exists\ x\ (Growth(\bar{x}) \wedge \bar{}\ Decrease(x)))$$

Method

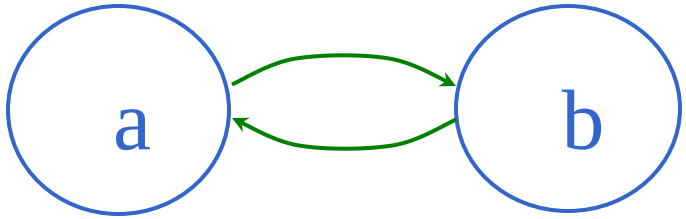
- Logical formalism
- Negative constraints
- Computation of maximal coherent sets of actions, based on « extensions » in argumentation

Argumentation

- Abstract argumentation framework (Dung, 1995)

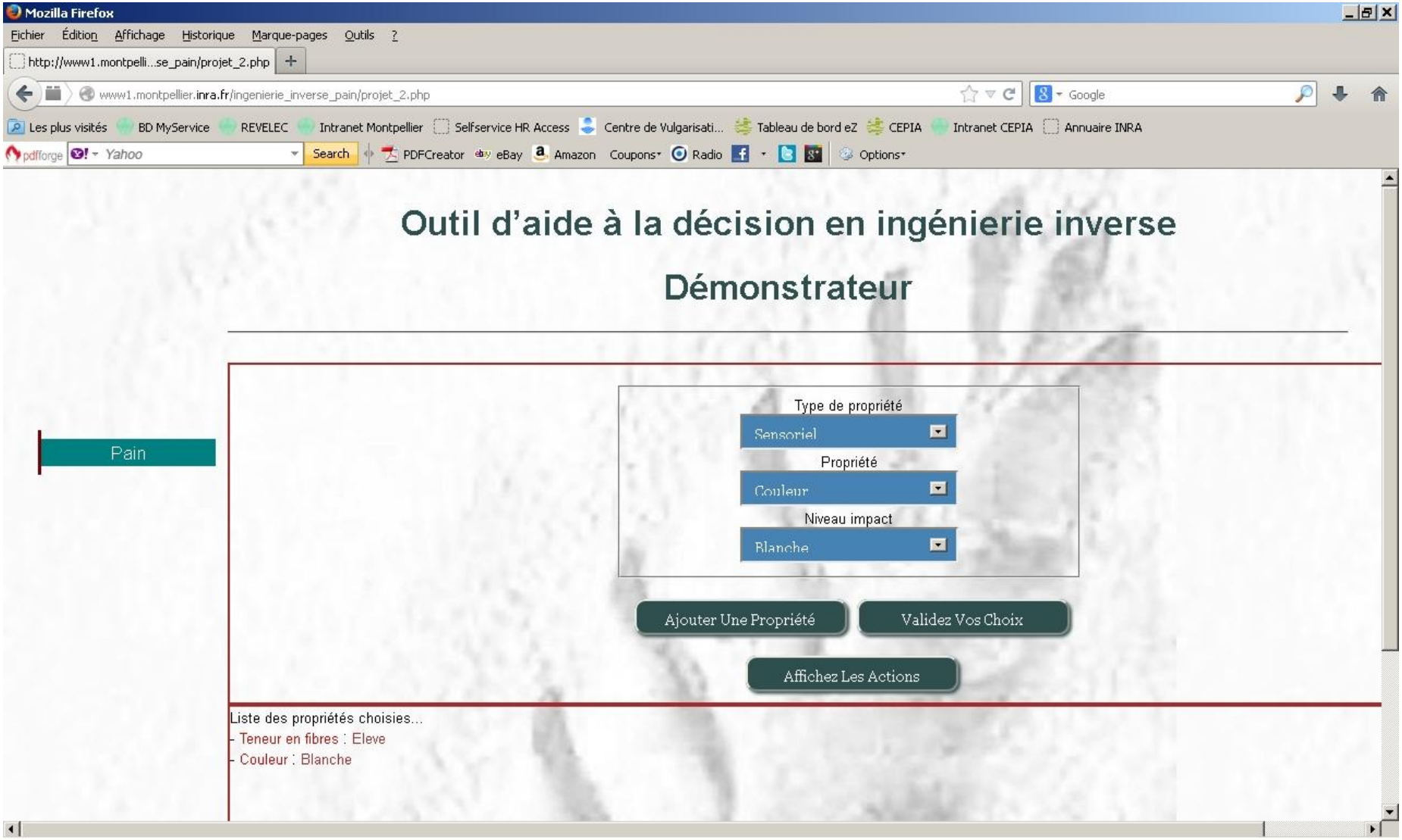
  (A,R) with: - A a set of arguments

  - R an attack relation



- Notion of « extension »
- Several semantics:

  E.g. preferred extension: no conflicts + defense + maximal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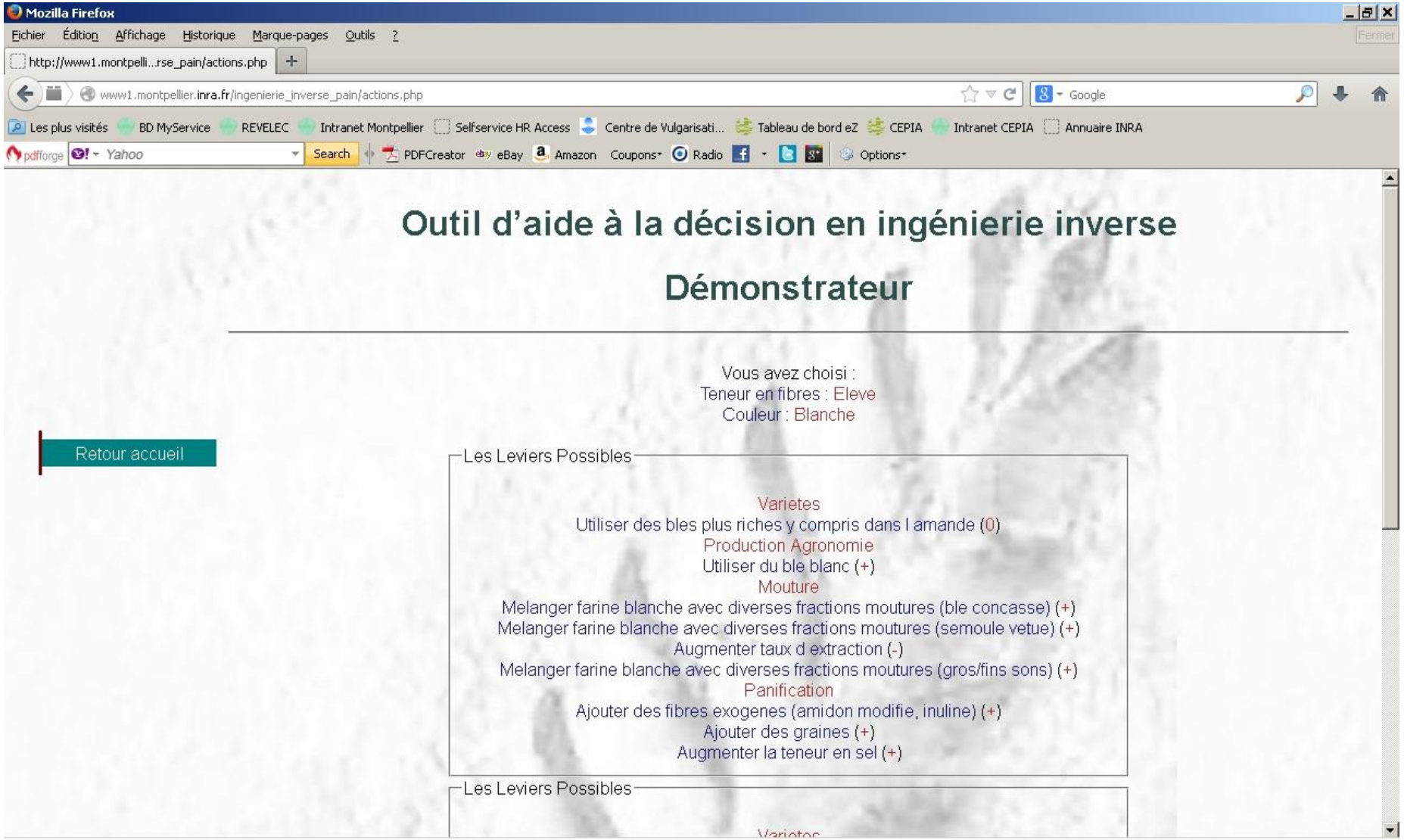
Outil d'aide à la décision en ingénierie inverse
Démonstrateur
Pain
Type de propriété
Sensoriel
Propriété
Couleur
Niveau impact
Blanche
Ajouter Une Propriété
Validez Vos Choix
Affichez Les Actions
Liste des propriétés choisies...
- Teneur en fibres : Eleve
- Couleur : Blanche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Les plus visités BD MyService REVELEC Intranet Montpellier Selfservice HR Access Centre de Vulgarisati... Tableau de bord eZ CEPIA Intranet CEPIA Annuaire INRA
Search PDFCreator eBay Amazon Coupons Radio Options
Outil d'aide à la décision en ingénierie inverse
Démonstrateur
Vous avez choisi :
Teneur en fibres : Eleve
Couleur : Blanche
Retour accueil
Les Leviers Possibles
Varietes
Utiliser des bles plus riches y compris dans l amande (0)
Production Agronomie
Utiliser du ble blanc (+)
Mouture
Melanger farine blanche avec diverses fractions moutures (ble concasse) (+)
Melanger farine blanche avec diverses fractions moutures (semoule vetue) (+)
Augmenter taux d extraction (-)
Melanger farine blanche avec diverses fractions moutures (gros/fins sons) (+)
Panification
Ajouter des fibres exogenes (amidon modifie, inuline) (+)
Ajouter des graines (+)
Augmenter la teneur en sel (+)
Les Leviers Possibles

Conclusion

- Method definition: sets of coherent actions to best fulfill the goals
- Feasability proof on the bread chain
- Demonstrator
- Cognitive feedback:
  - Reverse engineering scenarios
  - Application complexity
- Perspectives:
  - graphical representation
  - links with argumentation-based decision
  - bipolar approach, …