Presentation given for **SURF**, Netherland

A participatory design process for learning analytics dashboards

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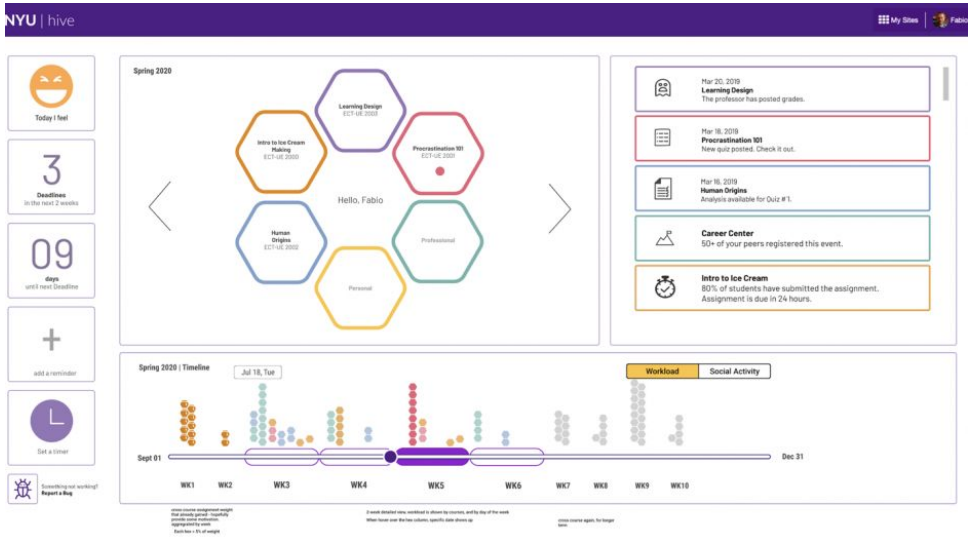
Learning analytics dashboards (LADs)

Visualization tools that combine into single displays different indicators related to the learner(s), the learning process(es) and/or the learning context(s) using one or more visualizations (Schwendimann et al. 2017)

Purpose: report back insights

- gained from a learning analytics process
  - derived from student data
  - to a wide range of educational stakeholders
  - to make sound and timely decisions which significantly impact the learning process



LAD: why a limited adoption

"LAD usage: an increasing interest BUT a **limited adoption**"

(1) Design principles: scarcity of studies

(2) LADs sometimes impose assumptions that do not meet the users' needs

(3) Users often lack experience with LADs and have limited data literacy

(4) Associated decision-making processes: little knowledge of the associated processes of sensemaking, insight-seeking and decision-making

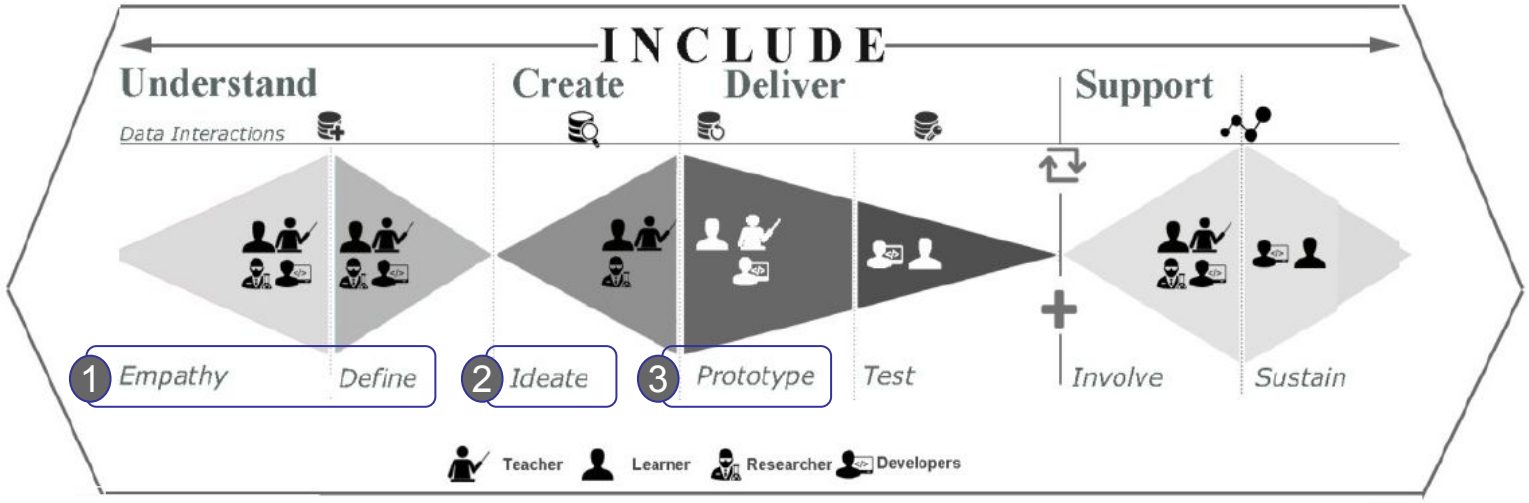
Research: the success of LADs (**acceptance** and **adoption**) depends largely on the degree of stakeholder involvement during the design phase

--> User-Centered Design (UCD) - Human-Centered Learning Analytics (HCLA)

LAD design: towards a participatory approach

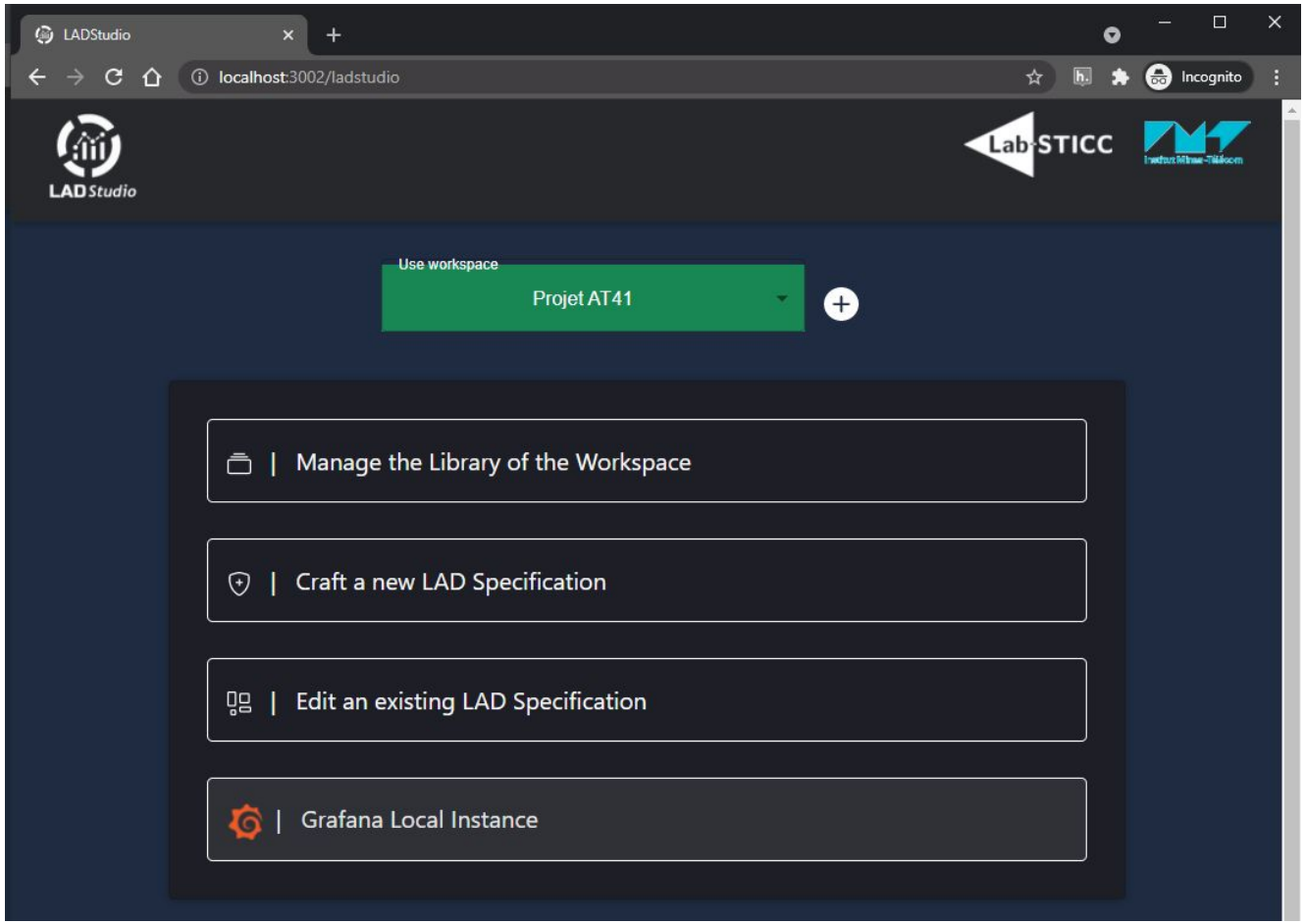
LAD codesign:``an approach where learners, educators, institutions, researchers, developers and designers are all included across different stages of the design process, from exploration to actual implementation" (Prieto-Alvarez, et al. 2018)

1. Meetings with researchers, university teachers & instructional designers
2. PaDLAD: a card-based toolkit for ideation
3. LADStudio: a dashboard prototyping tool



Interaction codesign process and roles for LA (Prieto-Alvarez, et al. 2018)

PaDLAD & LADStudio



PaDLAD: theoretical foundations

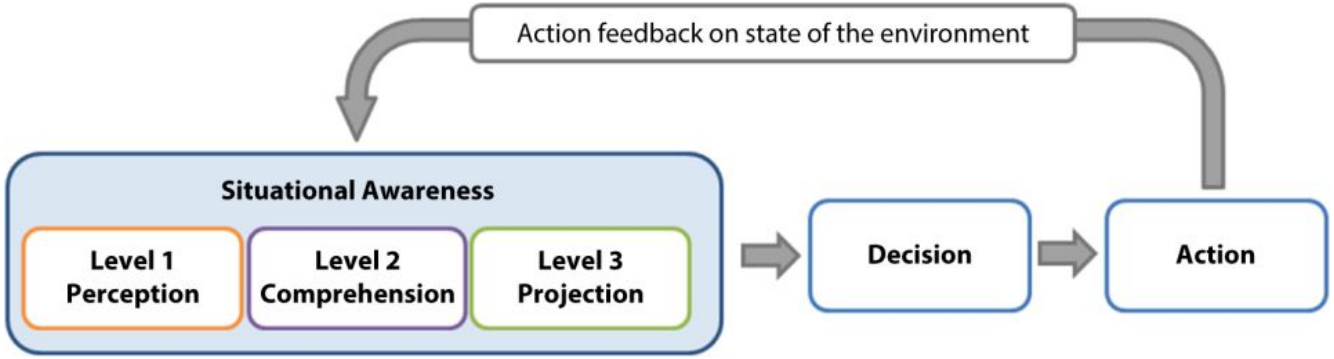
A refined design space

Dimension	Elements	Values
Who ?	Stakeholder	Governance, Institution, Curriculum, Teacher/tutor, Learner
	Circulation	Public, Organizational, Social, Individual
When?	Real-time	Y/N
Why?	Focus	Learning Process (cognitive, outcome-oriented, process-oriented, behavioral, meta-cognitive, social
		Management (people, resources, activities, experience)
	Situation Awareness Level	Perception (or monitoring, or awareness), Comprehension (or analysis, reflection), Projection (or prediction), Action (or decision, intervention, feedback, assessment)
What?	Data	List of relevant data
	Data scope	Classroom, Learning Management Systems, Curriculum, Profile, Other
HoW	Visualization	Type of diagram
	Interaction	Zoom, Filter, Details-on-Demand, Relate, History, Extract

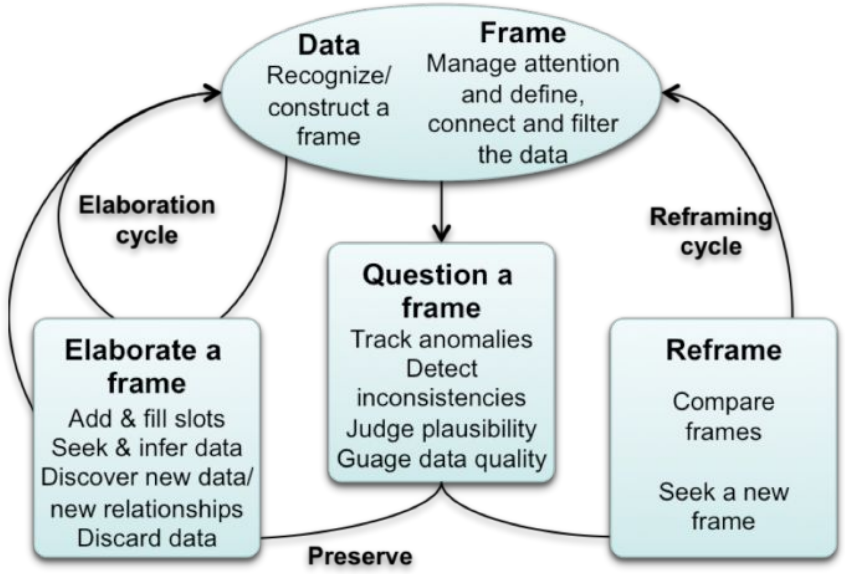
PaDLAD: theoretical foundations

Decision-making: ability to observe the environment, and to understand it (*situational awareness*) by making sense of the observations (*sensemaking*)

Situational Awareness
Model of Endsley (1995)



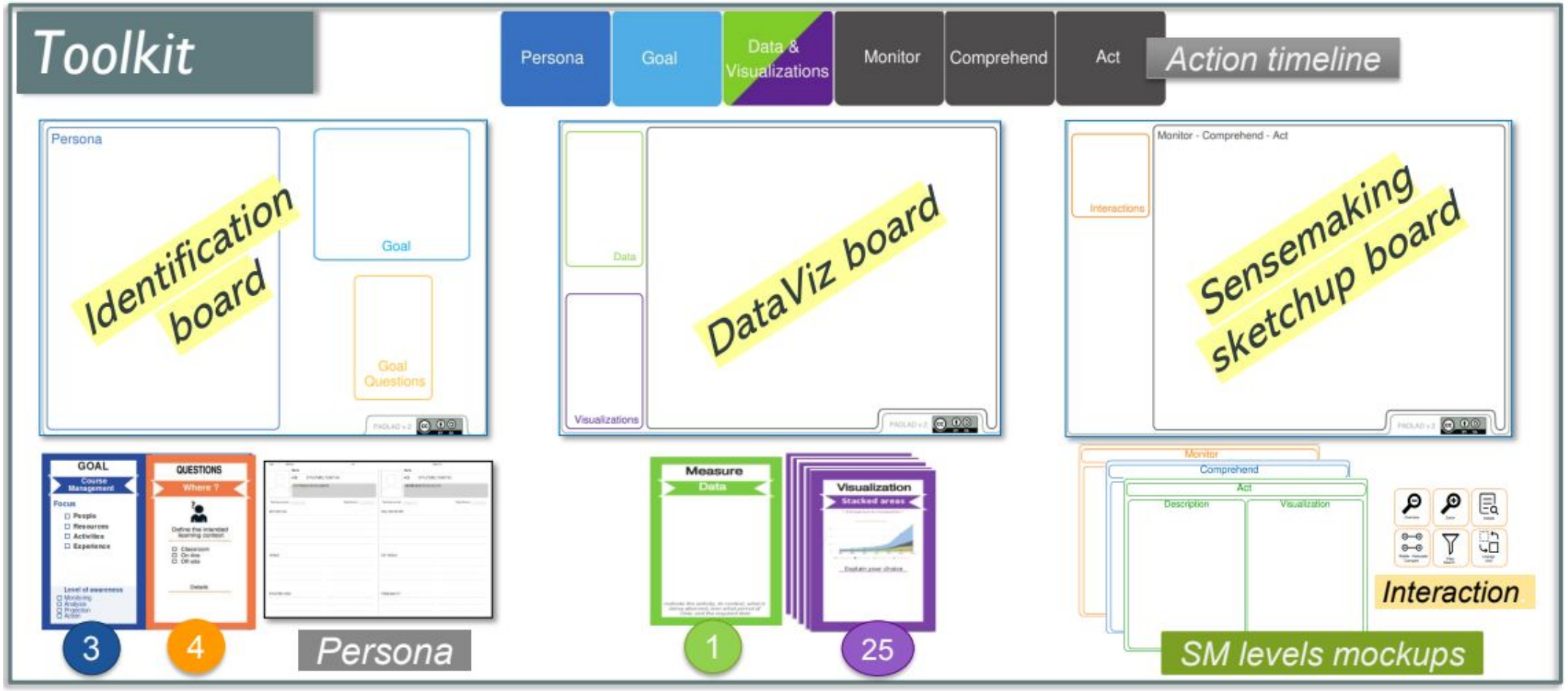
Sensemaking
Data/Frame Model (Klein 2007)



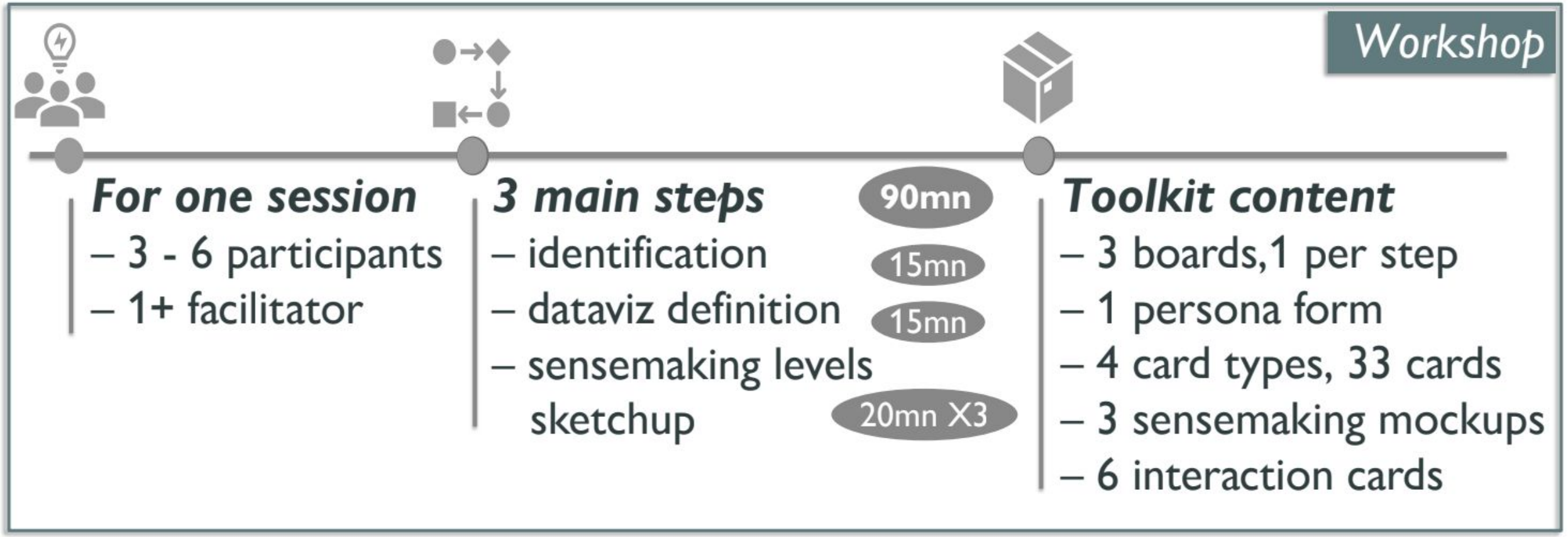
PaDLAD goals, in practice

- Collaboratory answer
  - For whom are we designing the LAD?
  - What is its purpose?
  - In what context will it be used?
  - With what data? What visualizations?
  - What is the usage scenario for decision making

PaDLAD toolkit



PaDLAD in practice

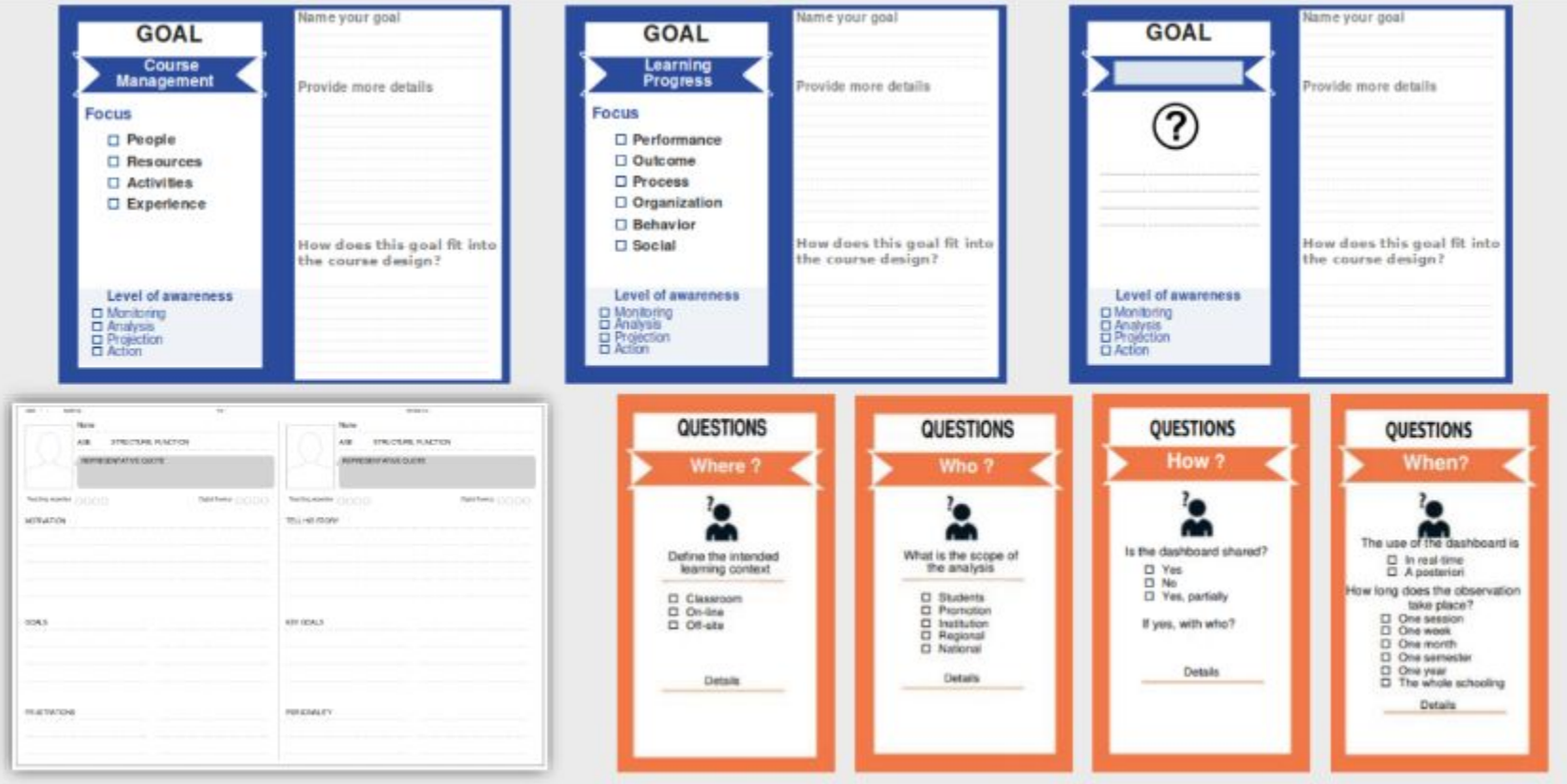


Identification board

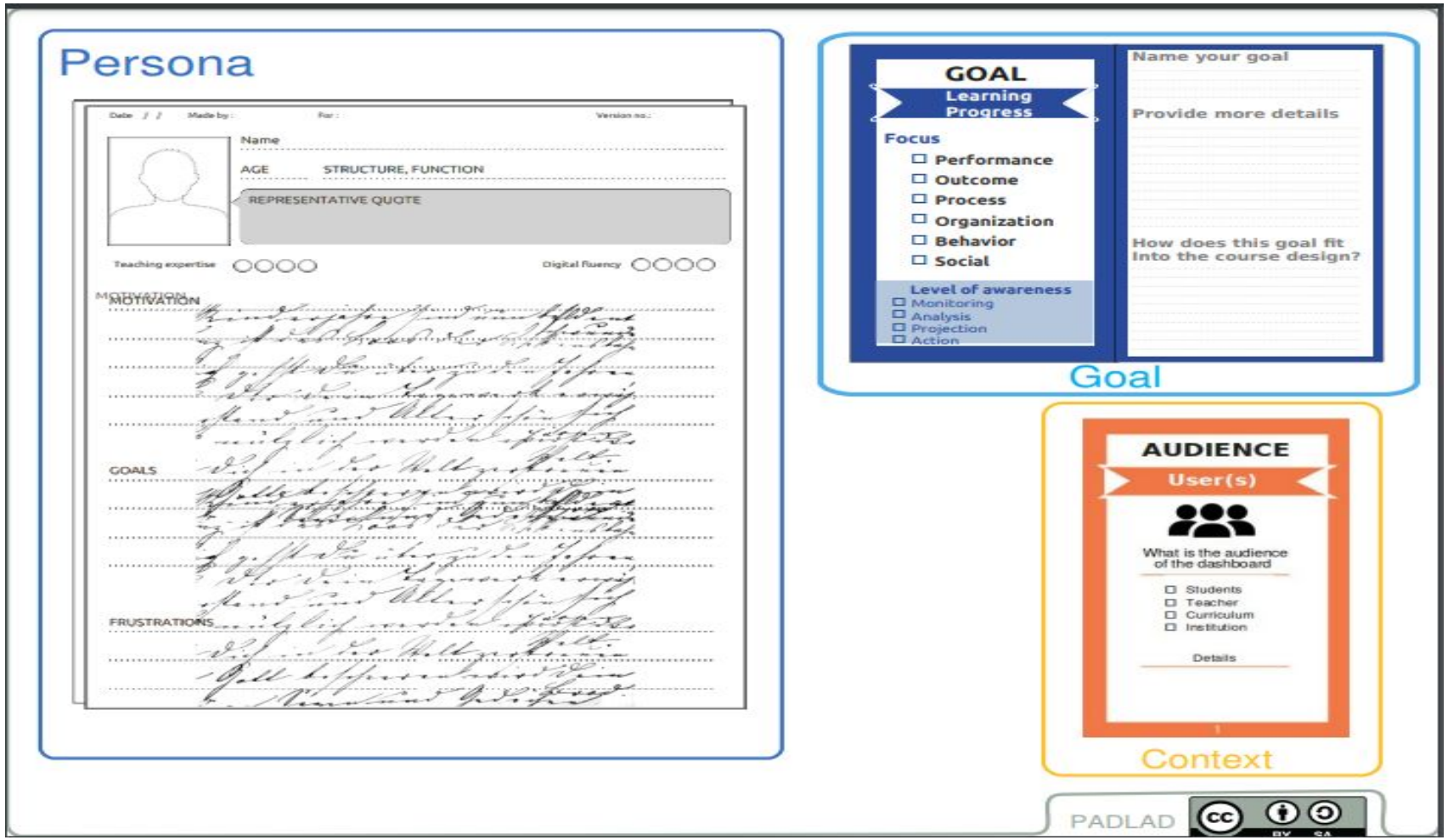
Context identification

15mn

- Negotiate a goal
- Describe the persona
- Define the use context



Identification board



DataViz board

DataViz definition

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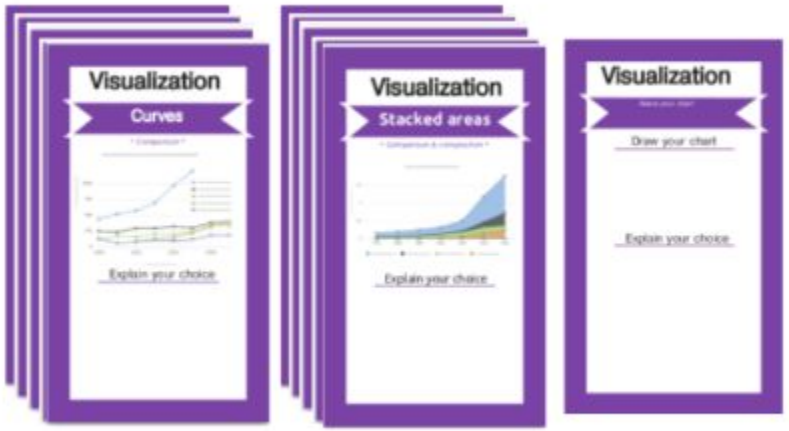
- Determine data to use
- Form dataviz tuples by associating data to visual representations



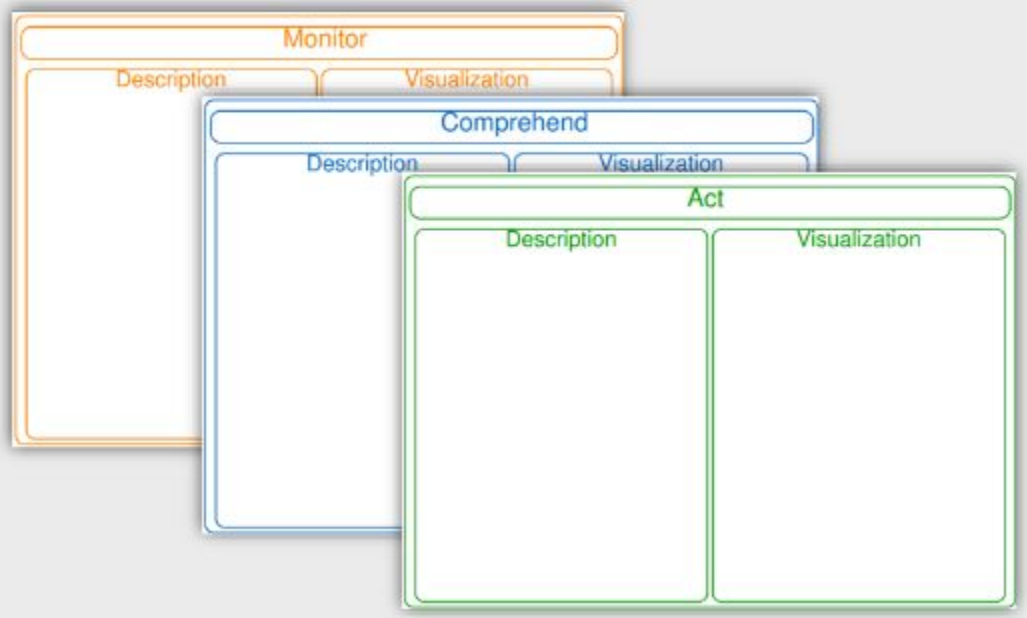
DataViz board

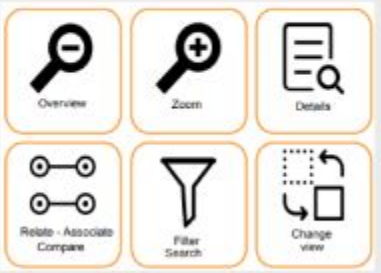
Sketching board

Sensemaking levels sketchup

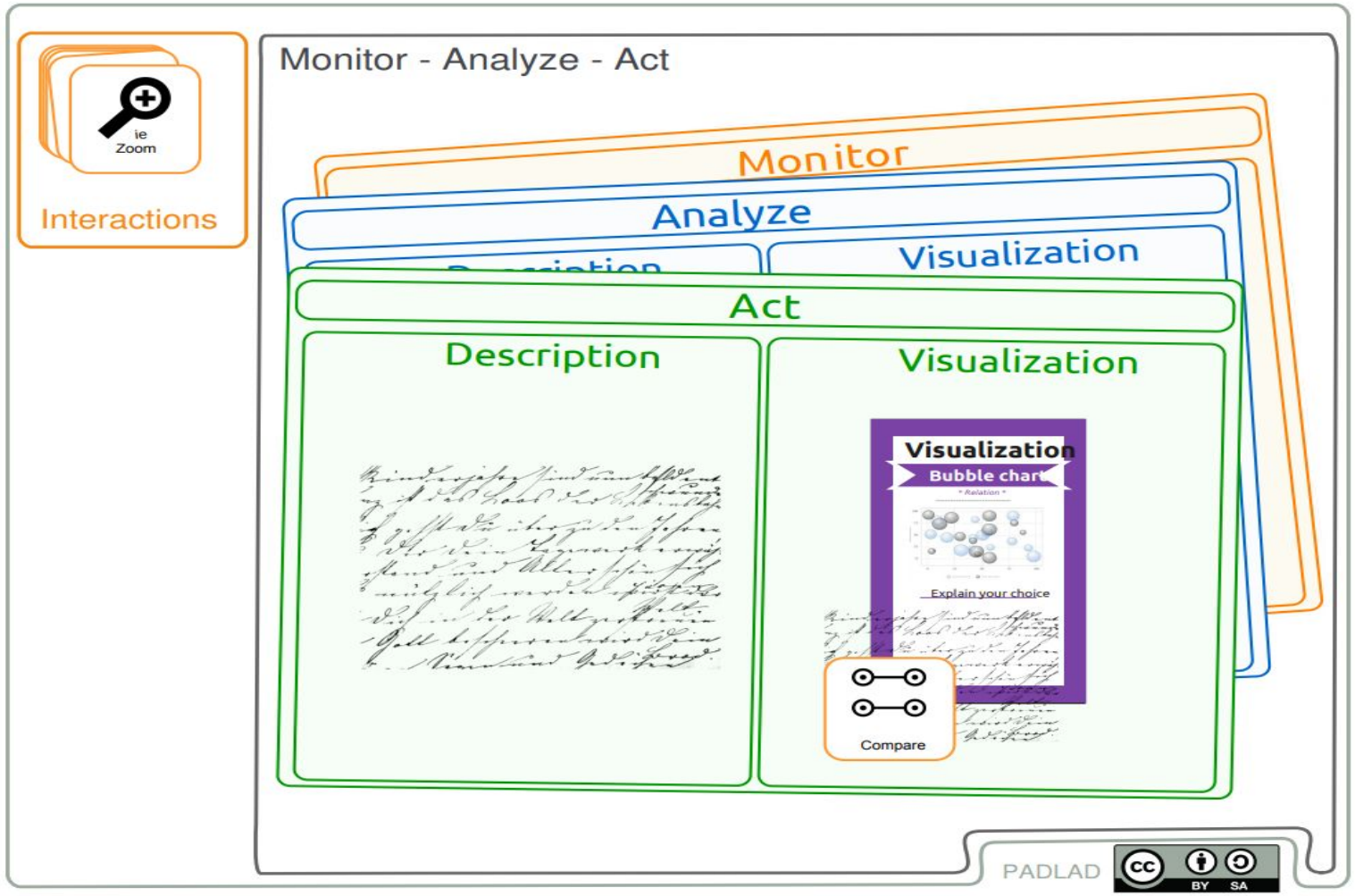
20mn X3

- Associate dataviz tuples to SM levels: *Monitor – Comprehend – Act*
- Add interaction options

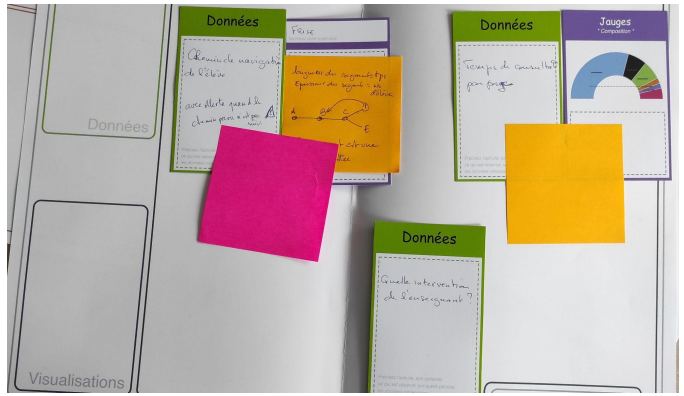


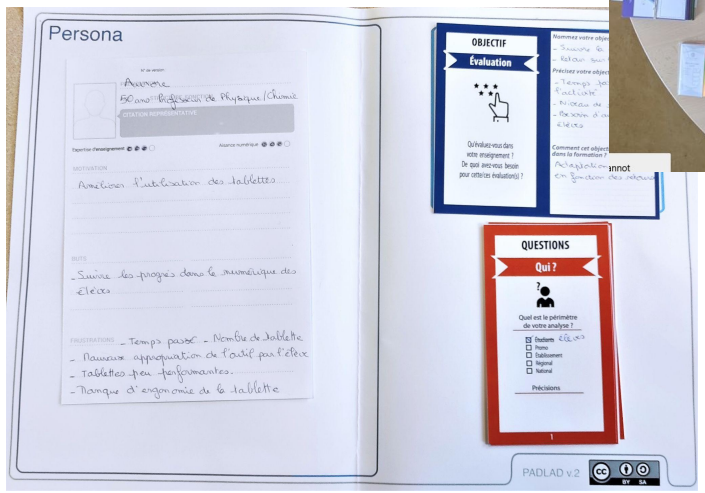


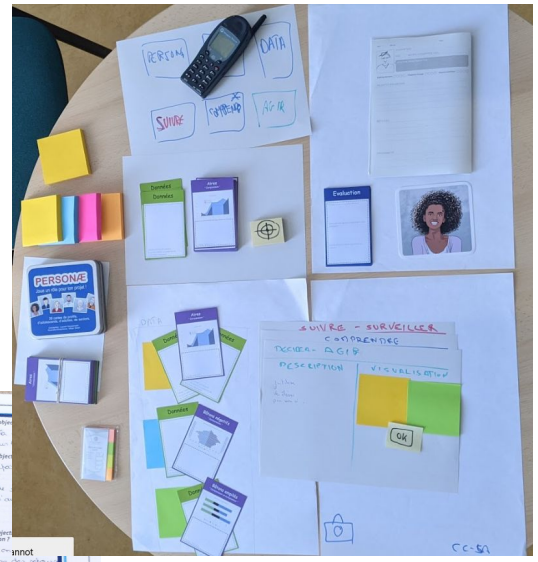
Sketching board



PaDLAD workshops

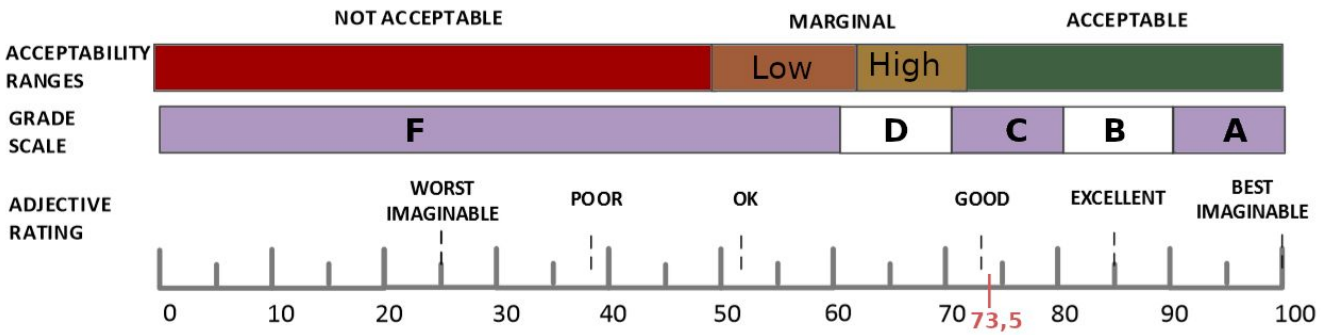






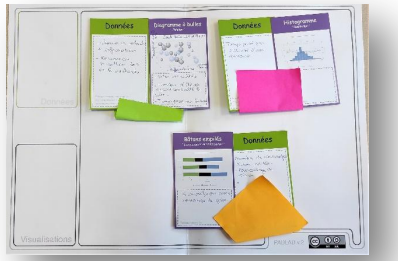
PaDLAD evaluation: 15 participants

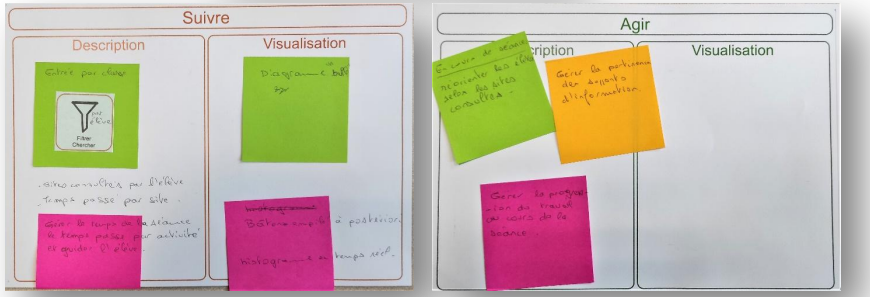
- Usability
  - *System Usability Scale (SUS)*
  - Average SUS score: 73.5
  - Acceptability Range: *High*
  - Grade Scale level: *category C*
  - Adjective Rating: *Good category*.



- Supporting creativity, commitment and collaboration
  - *Self-Report Level of Participation Survey*
  - CD activities: Planning & org., Creative design, Priority-setting, Negotiation, and Reflection and evaluation
  - Scale: 1 = passive , 2 = information sharing, 3 = engagement and mobilization, **4 = collaboration, and 5 = empowerment**

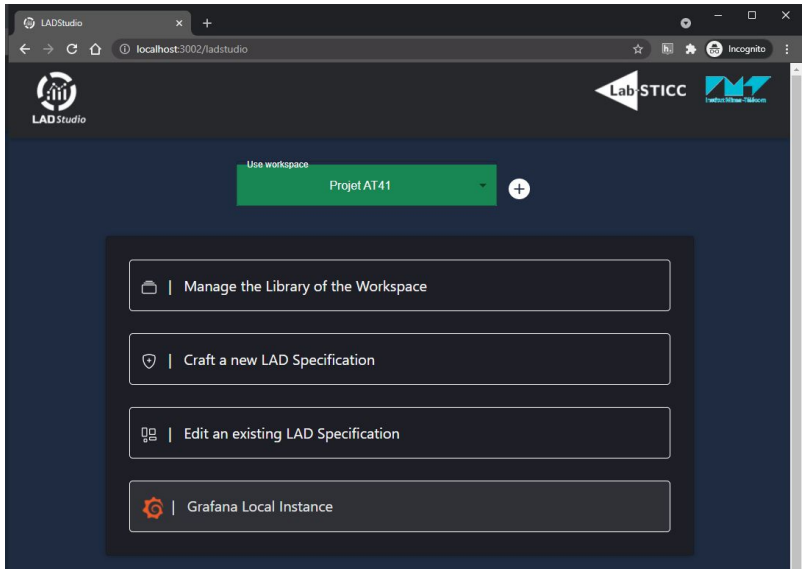
LADStudio: from sketches to prototypes

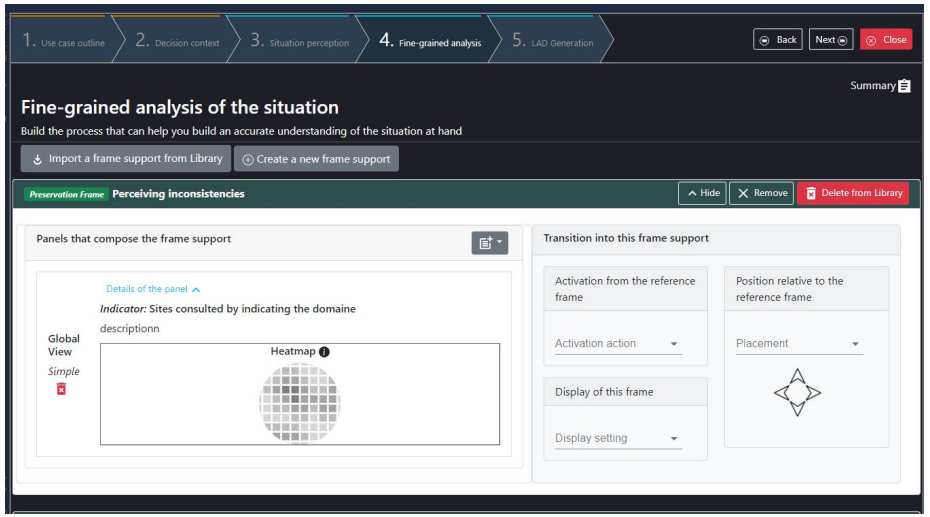


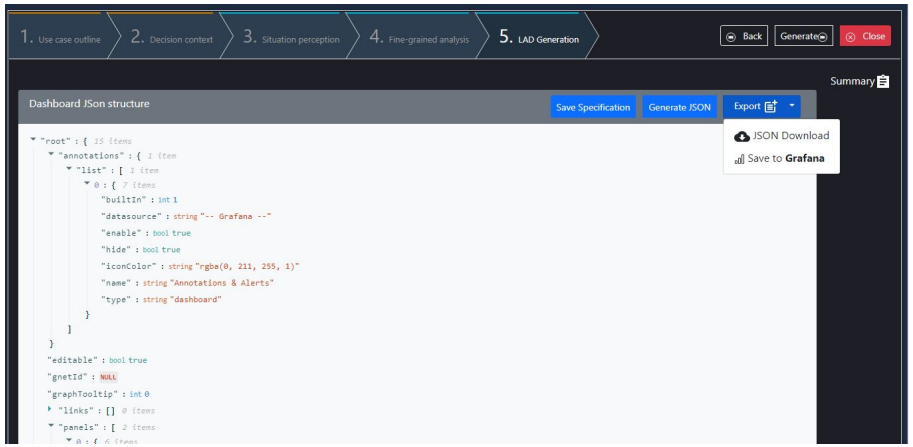


LAD Studio

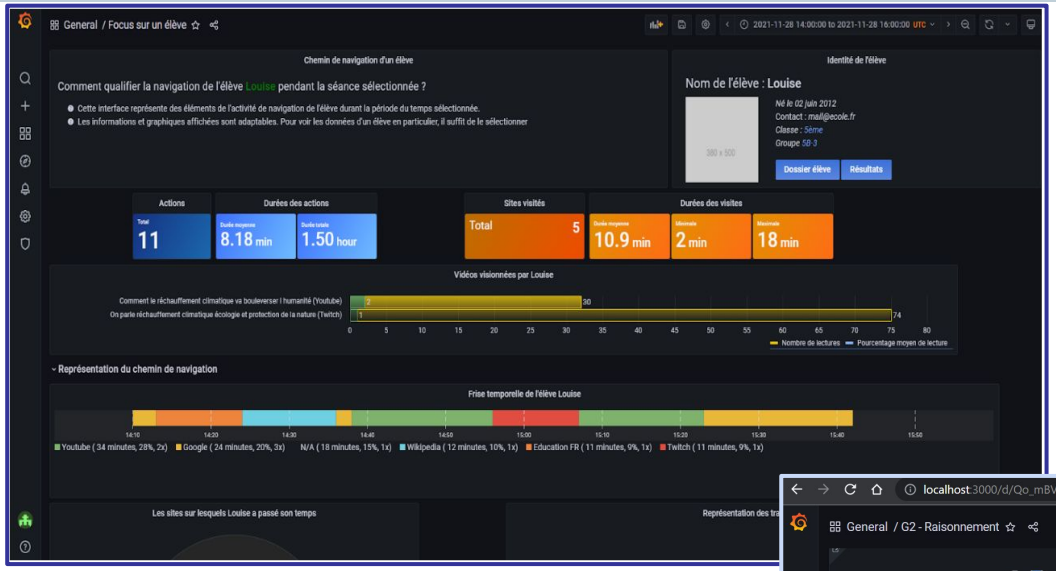
LADStudio: dashboard specification

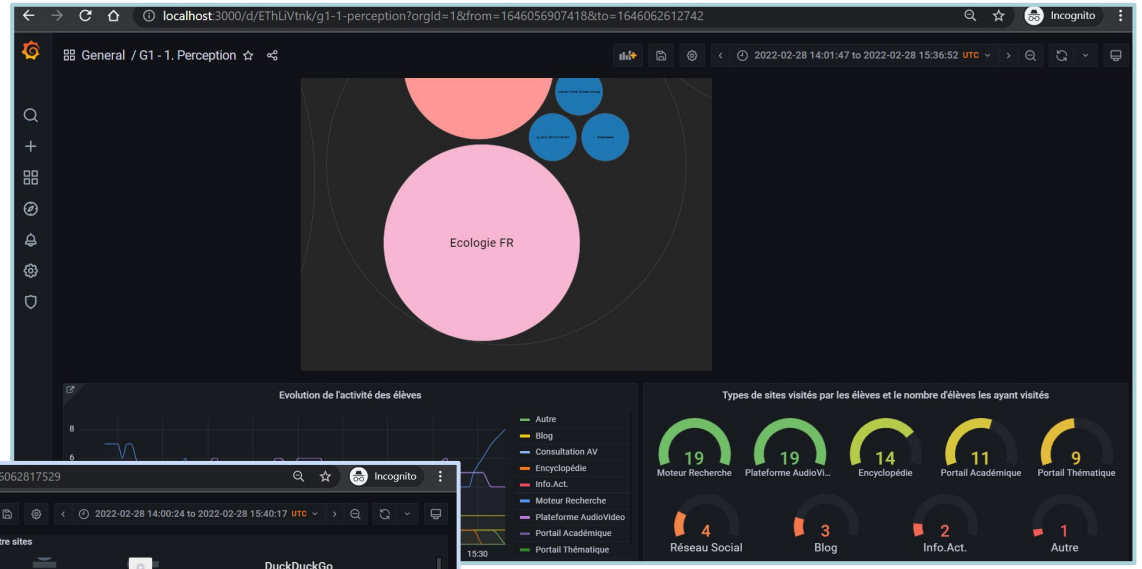


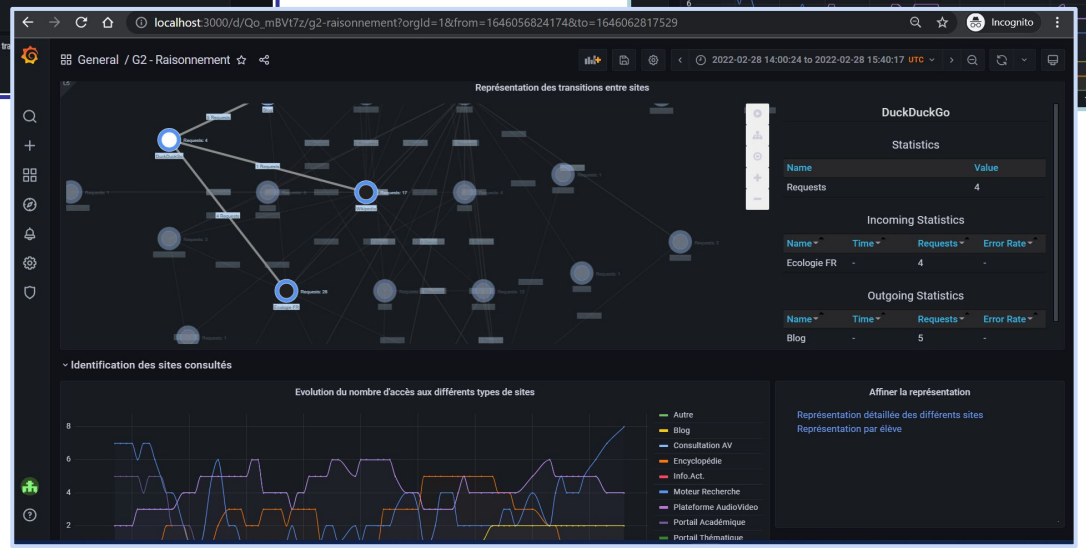




LADStudio: generated Grafana LADs







Conclusion

Lessons learnt

1) Participatory approaches foster adoption by teachers of LA innovations

2) Ideation tools like PaDLAD are useful when they promote a precise description and decomposition of the intended goals

3) Sensemaking dimension is pivotal in the construction of relevant dashboards

Next

- PaDLAD is currently under test in university
  - ePaDLAD to be implemented next year
- LADStudio is in beta-stage. Ongoing development
  - First tests with teachers and instructional designers in mid-january

Thank you for your attention