

Design Patterns in Data Comics Prototypes

Table 1 demonstrates the data-comics design-patterns from Bach et al. (2018)¹ represented in each of the prototypes.²

Table 1. Data comics patterns represented in prototypes

	Layout									
	Large Panel	Annotated	Tiled	Grouped	Grid	Parallel	Network	Branched	Linear	Miscellaneous
<i>Learning Scenario</i>			Spatial [Tiled polyptych] Temporal [Moments]			Temporal [Alt Track] Spatial [Parallel polyptych]			Narrative [Exposé] Visual Encoding [Text Legend] Granular [Zoom]	Miscellaneous [Highlighting]
<i>Prioritisation 1</i>	Granular [Overview & Detail]	Granular [Overview & Detail]			Faceting [Multiple Facets]				Narrative [Annotation]	
<i>Prioritisation 2</i>	Visual Encoding [Size of Panels]									Panel Percentage ²
<i>Proximity 1</i>		Granular [Overview & Detail]								
<i>Proximity 2</i>			Spatial [Tiled polyptych]			Spatial [Parallel polyptych]				
<i>Communication Network</i>										Animated
<i>Epistemic Network</i>			Spatial [Tiled polyptych]			Spatial [Parallel polyptych]				

¹ Benjamin Bach, Zezhong Wang, Matteo Farinella, Dave Murray-Rust, and Nathalie Henry Riche. 2018. Design Patterns for Data Comics. In *Proceedings of the 2018 CHI Conference on Human Factors in Computing Systems* (Montreal QC, Canada) (CHI '18). Association for Computing Machinery, New York, NY, USA, 1–12. <https://doi.org/10.1145/3173574.3173612>

² See also: <https://datacomics.github.io/designpatterns.html>

Learning Scenario

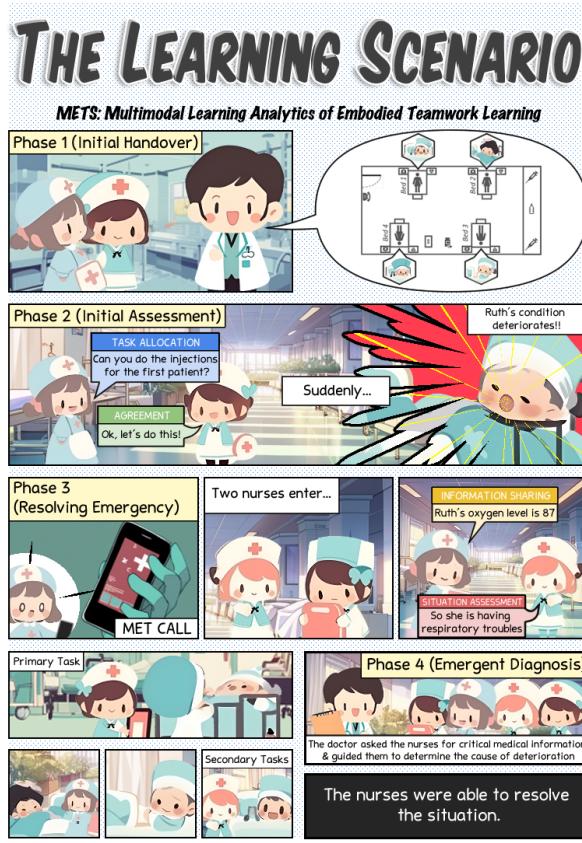
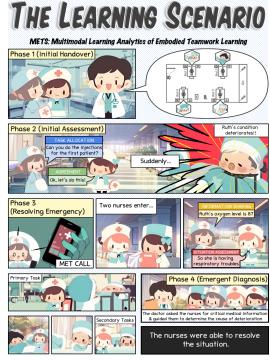
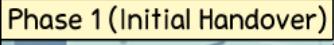


Figure 1. Learning Scenario Prototype

Description:

This comic shows an example of the teamwork focused learning scenario that the nursing students worked through. The information is presented illustratively with contextual information provided using narrator boxes. This prototype most closely resembles the traditional comic format and, unlike the other data comics prototypes presented in this study, does not contain any numbers or conventional data visualisations. The speech bubbles are tagged using the communication codes.

Table 2. Data comics patterns in Learning Scenario Prototype

Pattern	Description	
Layout: Linear/Hybrid Content Relation: Narrative Pattern: Closest to <i>Exposé</i>	<p>The full prototype follows a linear narrative structure to depict the learning scenario (with each phase summarised in marked panels).</p> <p>Relates to the <i>Exposé</i> narrative pattern as this prototype is more illustrative in nature - depicting what is happening at a high level rather than presenting a specific data story.</p>	
Layout: Parallel Content Relation: Temporal Pattern: Closest to <i>Alternative Tracks</i>	<p>Panel placement for the primary and secondary tasks in <i>Phase 3</i> is intended to indicate that these tasks are occurring either concurrently or within a similar timeframe.</p>	
Layout: Linear Content Relation: Visual Encoding Pattern: Text legends	<p>Text legends to contextualise the phase that the panel is showing (or other salient information such as the codes).</p>	
Layout: Linear Content Relation: Narrative/Granular Pattern: Zoom	<p>Used less in a data comics sense (in terms of zooming in on a salient data point) and more to assist in telling the narrative.</p>	
Layout: Tiled/Parallel Content Relation: Tiled/Parallel polyptych Pattern: Polyptych	<p>A consistent background across all the panels alludes to the actions taking place within the same space (i.e., the hospital ward).</p>	
Layout: Misc. Content Relation: Misc. Pattern: Highlighting	<p>The transcript data and topic modelling are combined in a colour-coded speech bubble.</p>	
Layout: Tiled Content Relation: Temporal Pattern: Moments	<p>Many of the panels within this prototype represent a different moment within the learning scenario.</p>	

Prioritisation 1

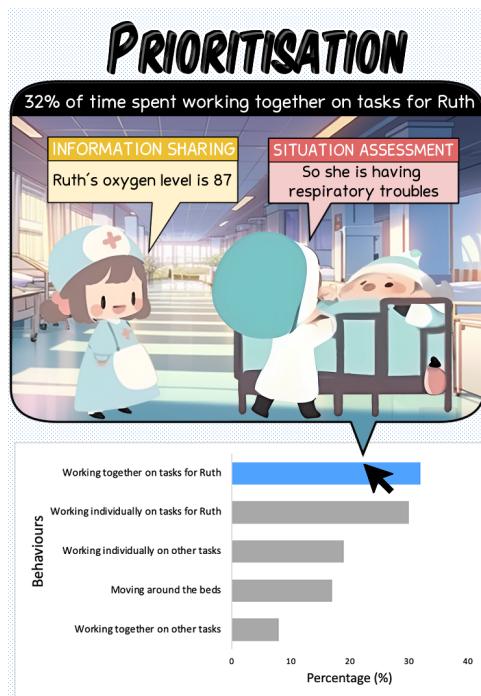


Figure 2. Prioritisation Prototype 1

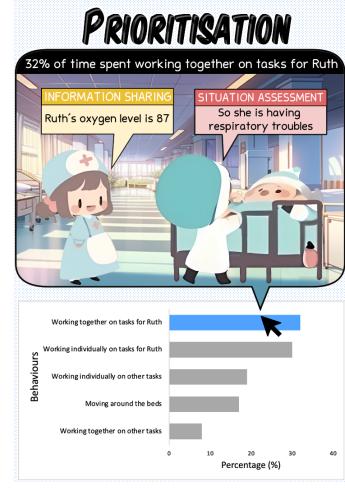
Description:

Integrates the *Prioritisation Bar* visualisation from the Learning Analytics dashboard with the data comic serving to (i) provide information that is not immediately clear from the bar chart (i.e., the percentage of time spent on the specific behaviour); and (ii) provide a visual representation of what the specific task looks like by leveraging the cartoon nurse avatars.

This prototype also incorporates the Data Storytelling³ principle of *Highlighting Important Data Points* so that it is clear at a glance which bar is being depicted in the image.

³ Cole Nussbaumer Knaflic. 2015. *Storytelling with Data: A Data Visualization Guide for Business Professionals*. John Wiley & Sons, Inc., Hoboken, New Jersey.

Table 3. Data comics patterns in Prioritisation 1

Pattern	Description	
Layout: Large Panel Content Relation: Granular Pattern: Overview & Detail	Complements the original bar chart visualisation by showing the data story within a speech bubble	
Layout: Grid Content Relation: Faceting Pattern: Multiple Facets	Depicts different aspects of the same data (i.e., the prioritised behaviours) via the bar chart that shows the proportion of time spent engaging in that behaviour and the data comic that gives an illustrative representation of the behaviour (as well as an annotation that details the findings from the bar chart).	

Prioritisation 2

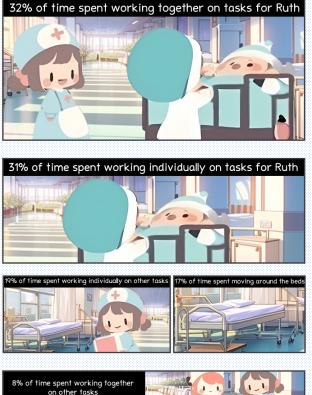


Figure 3. Prioritisation Prototype 2

Description:

Instead of using the *Prioritisation Bar* visualisation in the data comic, the proportions of the bars are used to size the panels.

Table 4. Data comics patterns in Prioritisation 2

Pattern	Description
Layout: Large Panel Content Relation: Visual Encoding/Miscellaneous Pattern: Percentage Panel	<p>The size of the panels corresponds to the size of the bar chart from the LA dashboard visualisation.</p> 

Proximity 1

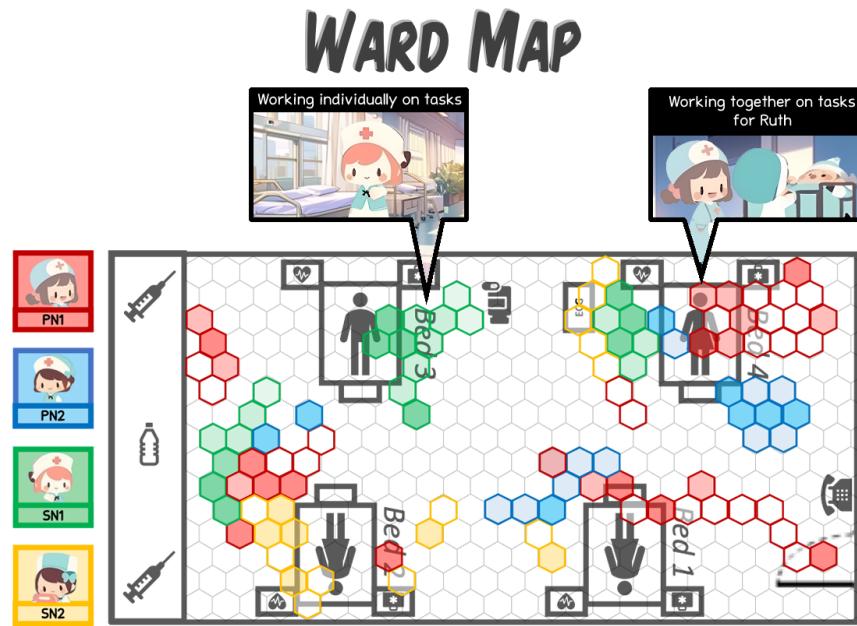
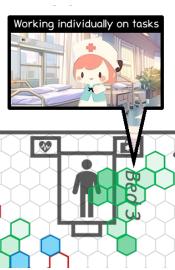


Figure 4. Proximity 1 Prototype

Description:

The visualisation is mainly the ward map from the LA dashboards however particular parts on the map are highlighted using a data comic panel (contained within a speech bubble).

Table 5. Data comics patterns in Proximity 1

Pattern	Description	
Layout: Large Panel Content Relation: Granular Pattern: Overview & Detail	The ward map provides the overall view of the hospital ward at any one time while the data comics illustrate what is happening at each hexagon cluster	
Layout: Large Panel Content Relation: Visual Encoding Pattern: Legend	The colour of the hexagons on the ward grid is mapped to the characters from the data comics.	

Proximity 2

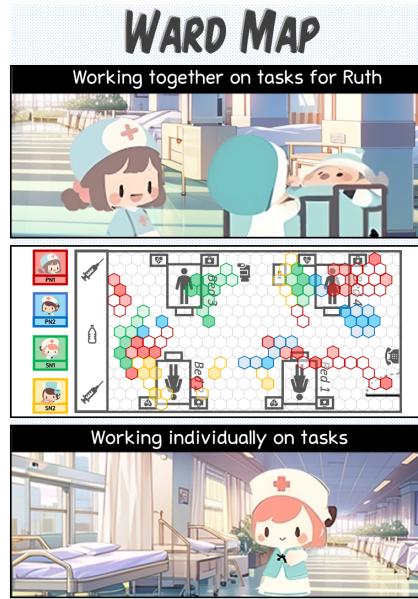


Figure 5. Proximity 2 Prototype

Description:

Displays similar information to the *Proximity 1* prototype, however, instead of using speech bubbles the two most important/prioritised tasks that are occurring in parallel are shown in the top and bottom panels.

Table 6. Data comics patterns in Proximity 2

Pattern	Description	
Layout: Tiled/Parallel Content Relation: Tiled/Parallel polyptych Pattern: Polyptych	A consistent background across all of the panels alludes to the actions taking place within the same space (i.e., the hospital ward).	

Communication Network

COMMUNICATION NETWORK

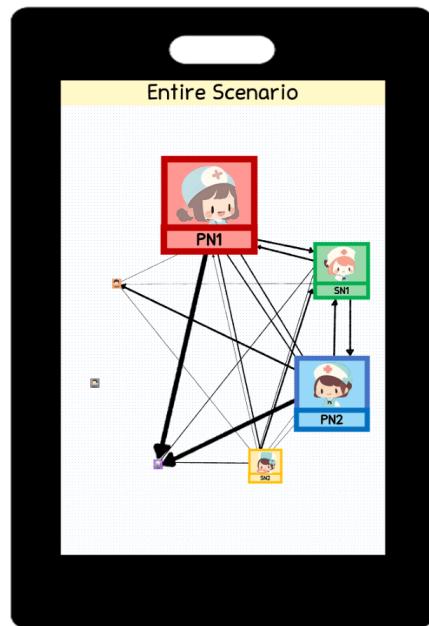


Figure 6. Communication Network Prototype

Description:

Inspired by the idea of animated data comics⁴, the design of this prototype is similar to the visualisation shown in the Learning Analytics dashboard but leverages animated transitions to indicate how the communication changed between the phases of the simulation.

⁴ Zezhong Wang, Hugo Romat, Fanny Chevalier, Nathalie Henry Riche, Dave Murray-Rust, and Benjamin Bach. 2022. Interactive Data Comics. *IEEE Transactions on Visualization and Computer Graphics* 28, 1 (Jan 2022), 944–954. <https://doi.org/10.1109/TVCG.2021.3114849>

Epistemic Network

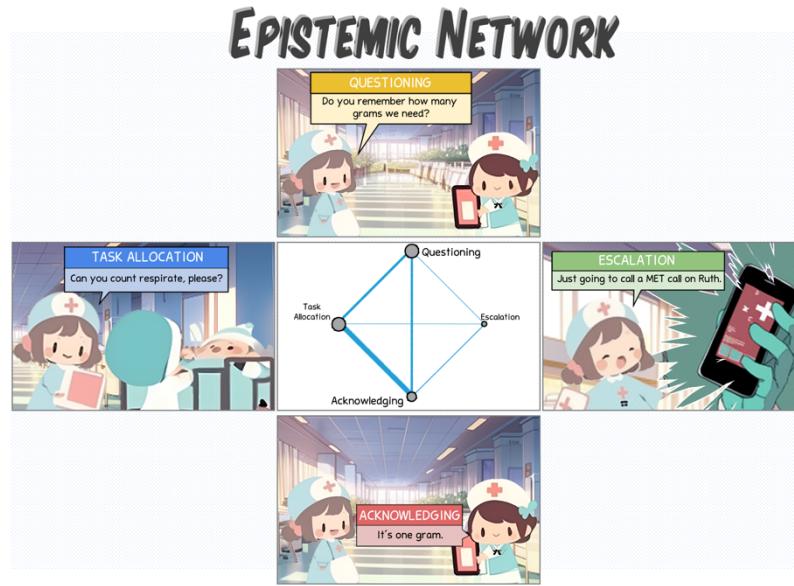


Figure 6. Epistemic Network Prototype

Description:

The central figure of this data comic is the *Epistemic Network* from the Learning Analytics Dashboard. The comic panels branch out to provide an illustrated example of what constitutes “Questioning”, “Escalation”, “Acknowledging”, and “Task Allocation”.

Table 7. Data comics patterns in Epistemic Network prototype

Pattern	Description	
Layout: Large Panel Content Relation: Granular Pattern: Overview & Detail	The Epistemic Network in the centre depicts the overall data while the individual comic panels serve to clarify what the labels in the Epistemic Network mean.	
Layout: Tiled/Parallel Content Relation: Tiled/Parallel polyptych Pattern: Polyptych	A consistent background between the panels indicates that the actions are taking place within the same space.	