

Creativity Support Systems (CSS)

Support for Individuals, Groups, and
Organizations

Any Question
Regarding Last
Lecture?

CSS Basics

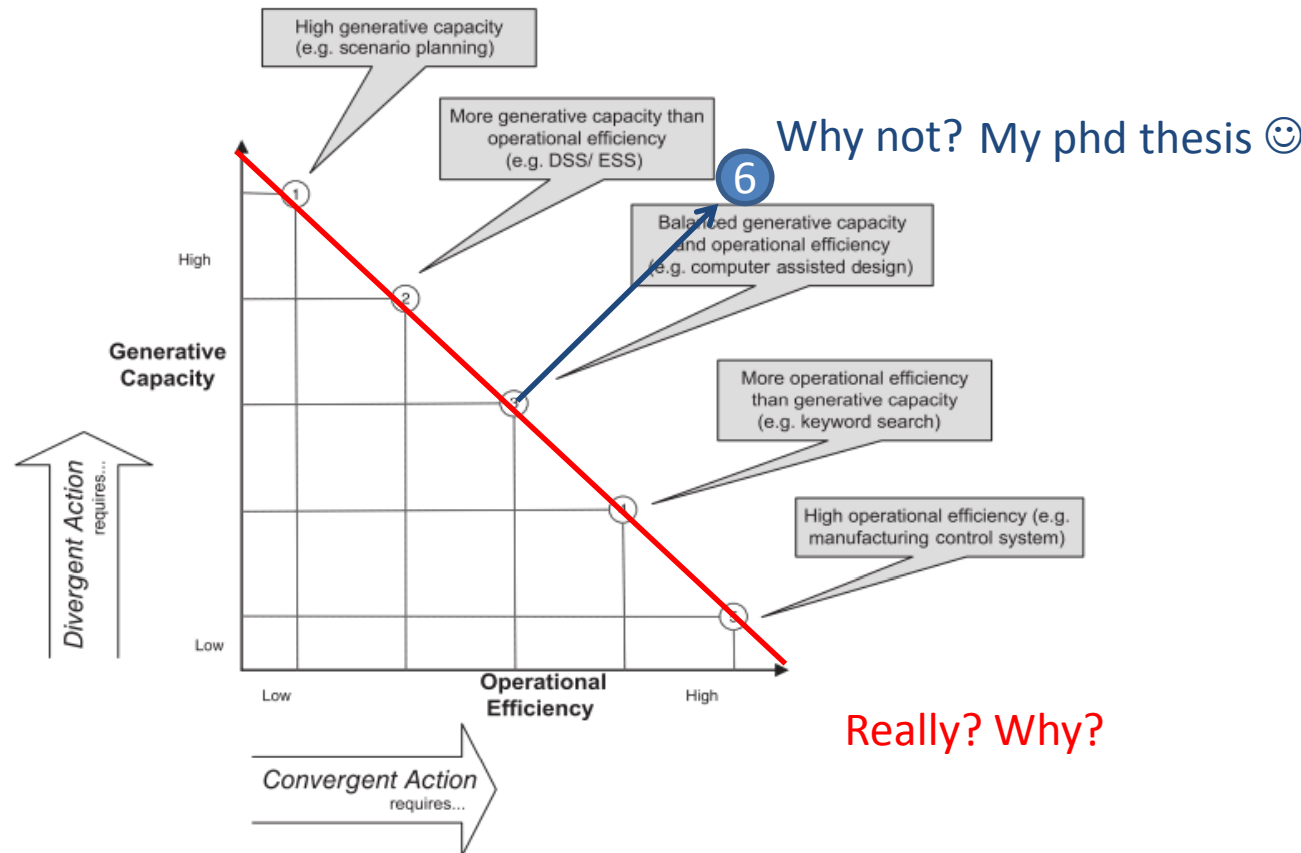
Taxonomy of CSS

	Divergent	Convergent
Individual	Individual CSS	
	Generative Individual CSS	Explorative Individual CSS
Group	Group CSS	
	Generative Group CSS	Explorative Group CSS
Organizational	Organizational CSS	

Think of Tools You Know...

	Divergent	Convergent
Individual		
Group		
Organizational		

Types of Information Systems



Avital, M., & Te'eni, D. (2009). From generative fit to generative capacity: exploring an emerging dimension of information systems design and task performance. *Information Systems Journal*, 19(4), 345–367.

Before we talk about CSS Design...

Empirical Findings on Individual CSS

The Value of Creativity Support Systems for Idea Generation

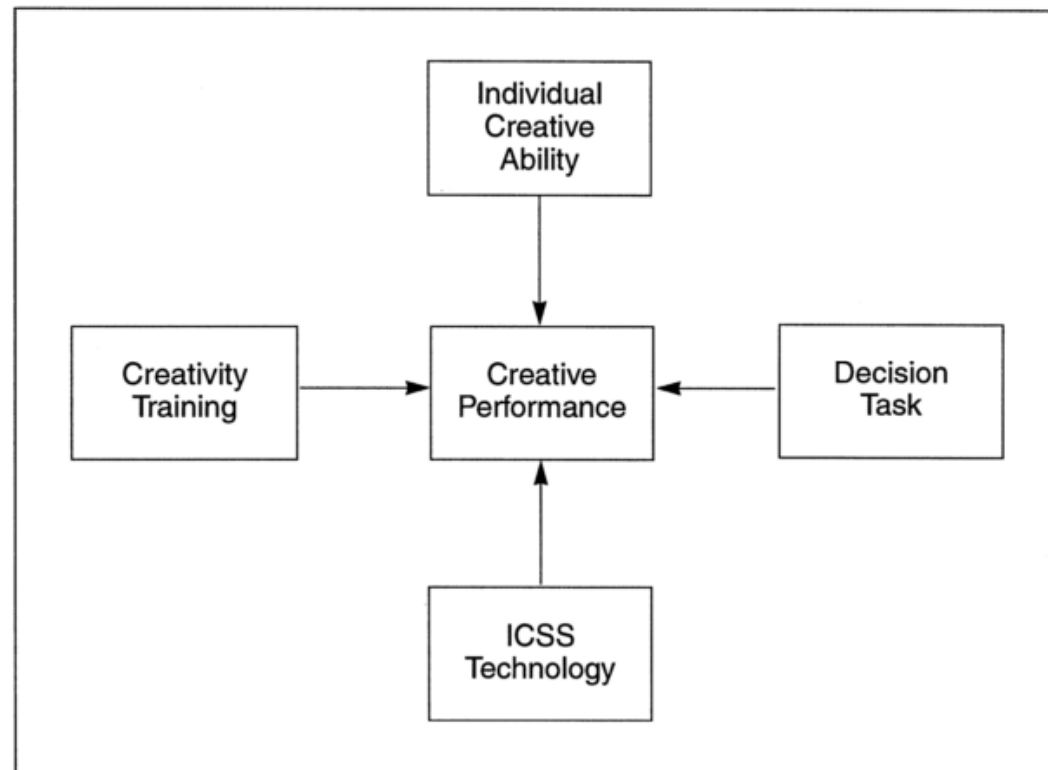


Figure 1. Theoretical Model of the Relationship Between Individual Creativity Support Systems and Creative Performance

Massetti, B. (1996). An Empirical Examination of the Value of Creativity Support Systems on Idea Generation. *MIS Quarterly*, 20(1), 83–97.

Hypothesis

- “H1: Use of **ICSS technology** will result in a **greater number of ideas** being produced for a given decision task than use of conventional software support **or** no software support.”
- “H2: Use of **ICSS technology** will result in **more creative ideas** being produced for a given decision task than use of conventional software support **or** no software support.”

Masseti, B. (1996). An Empirical Examination of the Value of Creativity Support Systems on Idea Generation. *MIS Quarterly*, 20(1), 83–97.

Hypothesis

- “H3: Use of a **generative ICSS** application will produce ideas for a given decision task that are more novel than those produced by an exploratory less, conventional software support, or no software support. “
- “H4: Use of an **exploratory ICSS** application will produce ideas for a given decision task that are more valuable than those produced by a generative less, conventional software support, or no software support.”

Masseti, B. (1996). An Empirical Examination of the Value of Creativity Support Systems on Idea Generation. *MIS Quarterly*, 20(1), 83–97.

Treatments and Controls

- The experiment entailed a 1 x 4 design where subjects completed the same task using one of four treatments: generative ICSS, exploratory ICSS, conventional software, and no software.
- Creativity training was held constant, and individual ability was monitored through testing before and after experimentation.

Masseti, B. (1996). An Empirical Examination of the Value of Creativity Support Systems on Idea Generation. *MIS Quarterly*, 20(1), 83–97.

Software

- One, **IdeaFisher**, was selected to represent an ICSS with a generative focus.
- The second, **Ideatree**, was selected to represent an ICSS with an exploratory focus.
- The third, **Harvard Graphics**, was used as a software control mechanism for any impacts that may result simply from computer use and not creativity support.

Masseti, B. (1996). An Empirical Examination of the Value of Creativity Support Systems on Idea Generation. *MIS Quarterly*, 20(1), 83–97.

Results – Idea Fluency

Table 2. Means and Standard Deviations of Creativity Inventory Scores and Number of Ideas Generated

Instrument/ Group	n	Creativity Preinventory	Creativity Post-Inventory	Number of Ideas
Control	9	45.89 (8.30)	46.44 (5.25)	2.22 (1.13)
Generative	11	43.09 (5.17)	44.82 (7.29)	3.73 (2.53)
Exploratory	11	43.82 (7.80)	44.82 (5.25)	3.91 (1.44)
Conventional	12	45.92 (7.91)	42.50 (9.47)	3.25 (1.48)
Overall	43	44.65 (7.22)	44.51 (7.07)	3.30 (1.65)

Notes: All measures are means except where noted. Standard deviations appear in parentheses. The higher the value, the more the individual is predisposed to perform creatively.

Masseti, B. (1996). An Empirical Examination of the Value of Creativity Support Systems on Idea Generation. *MIS Quarterly*, 20(1), 83–97.

Results – Creative Quality

Dependent Measure/ Independent Factor	n	Creativity	Novelty	Value
Control				
High Fluency	2	14.69*	13.47*	16.59*
Low Fluency	7	7.94	6.46	9.86
Treatment Total	9	11.31**	9.69***	13.14**
Generative				
High Fluency	5	24.20*	24.13*	24.62*
Low Fluency	6	8.61	7.18	9.80
Treatment Total	11	16.40	15.66	17.21
Exploratory				
High Fluency	6	23.36*	19.95*	27.22*
Low Fluency	5	12.33	11.11	13.94
Treatment Total	11	17.85	15.53	20.58
Conventional				
High Fluency	4	21.17*	18.18*	24.16*
Low Fluency	8	9.74	8.13	11.73
Treatment Total	12	15.45	13.16	17.95
Overall				
High Fluency	17	20.85*	18.93*	23.15*
Low Fluency	26	9.65	8.22	11.29
Sample Total	43	15.25	13.58	17.22

Notes: All measures are means except where noted. Higher scores represent better performance.

* High fluency outperformed Low fluency at a .01 probability level.

** The Computer groups outperformed the Control group at a .01 probability level.

*** The Computer groups outperformed the Control group at a .02 probability level.

Massetti, B. (1996). An Empirical Examination of the Value of Creativity Support Systems on Idea Generation. *MIS Quarterly*, 20(1), 83–97.

Discussion

- “Although [...], an indication that software support directly enhances an individual's creative performance was noted.”
- “However, because performance did not differ between the software conditions, this experiment cannot explain exactly **how** the software enhanced creative performance.”
- “Moreover, because low ratings on likability and usability did not appear to negatively affect performance, further study of the impact of **ICSS design** on creative performance seems to be appropriate.”

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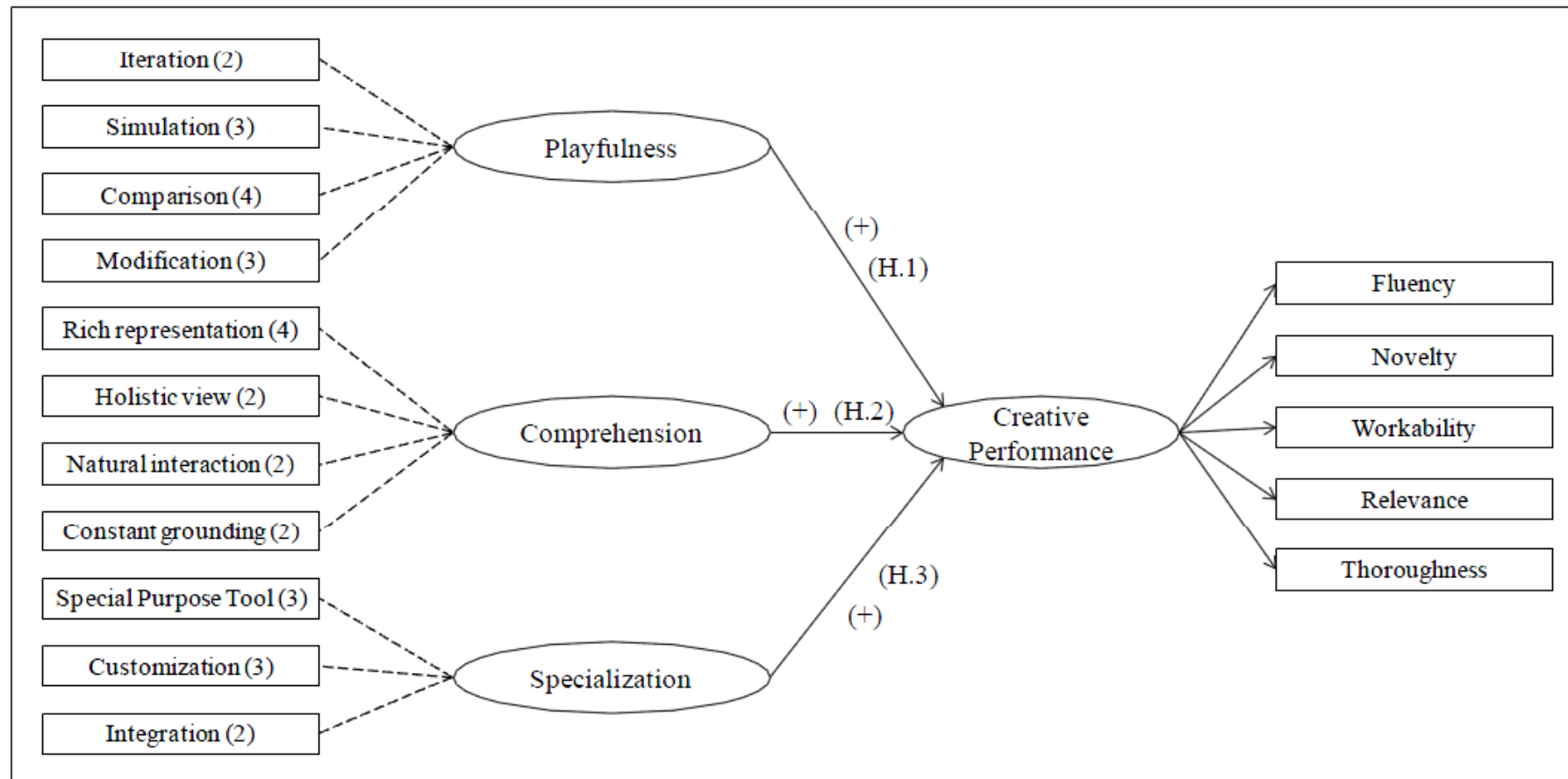
Design of Individual CSS

Aggregated Design Principles

- *LV-1: Playfulness* is the property of a tool to encourage unfettered trialability in design, helping the user to push intermediate solutions to final results iteratively.
- *LV-2: Comprehension* is the property of a tool to foster a rapid and clear understanding of the artifacts employed for idea development.
- *LV-3: Specialization* is the property of a tool to provide the user with task specific support and to allow selecting and arranging this support for future reuse.

Voigt, M., Niehaves, B., & Becker, J. (2012). Towards a Unified Design Theory for Creativity Support Systems. *Proceedings of the Design Science Research in Information Systems* (pp. 152–173).

Unified Design Theory for (I)CSS



Voigt, M., Niehaves, B., & Becker, J. (2012). Towards a Unified Design Theory for Creativity Support Systems. *Proceedings of the Design Science Research in Information Systems* (pp. 152–173).

Think of it...

What are tool features for...

Simulation

Modification

Integration

Iteration

Comparison

Customization

Rich representation

Holistic view

Special purpose tools

Natural interaction

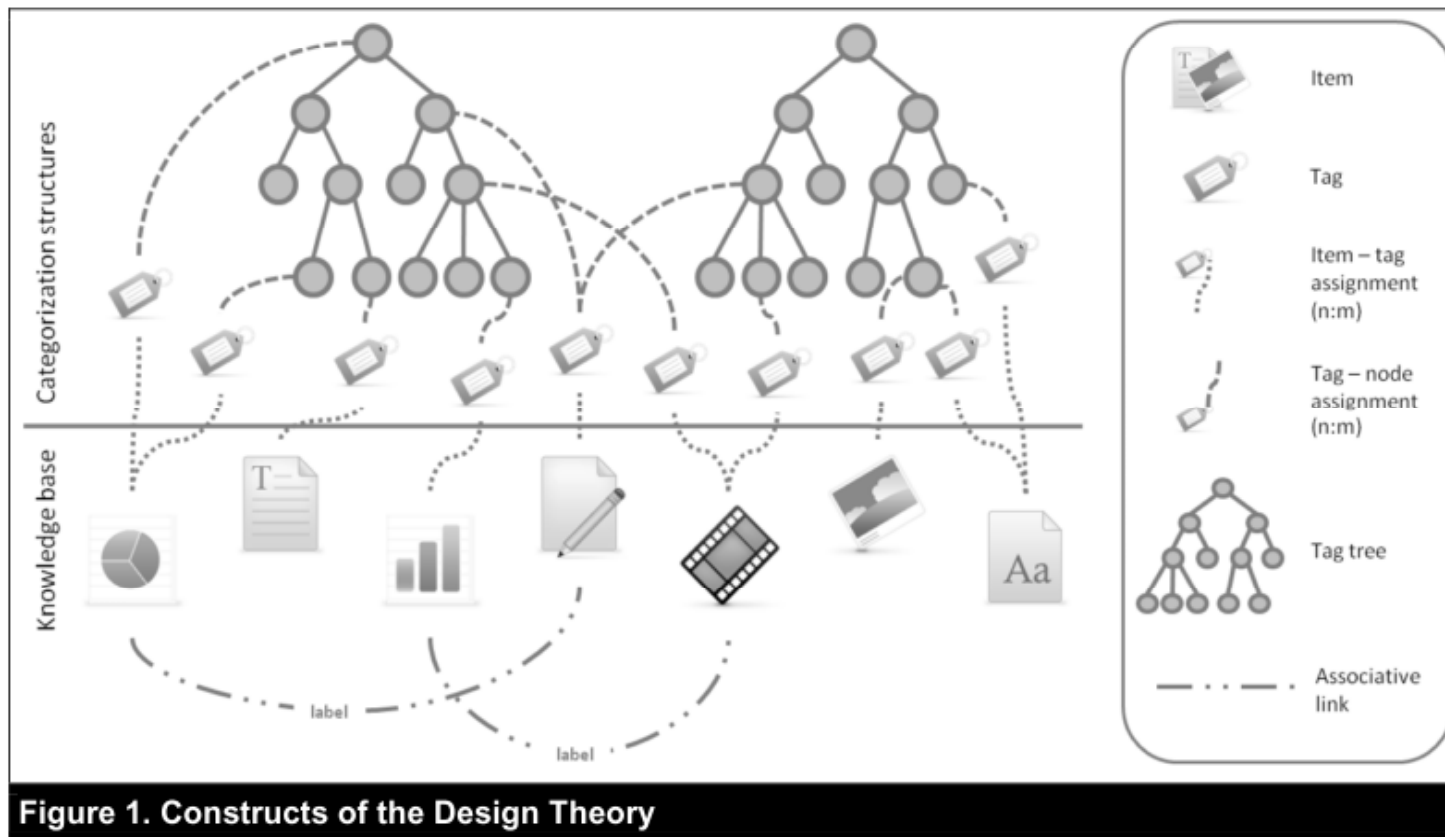
Constant grounding

A Design Theory for Systems that Support Convergent and Divergent Thinking

Table 1. Mapping of Design Requirements to Constructs and Principles of Form and Function		
	Design requirement	Constructs and principles of form and function
Convergence	C.1: Organize available knowledge hierarchically	Knowledge items can be categorized by multiple tags , which are organized in hierarchical tag trees .
	C.2: Provide diverse perspectives on existing knowledge	Different tag trees provide different perspectives of the knowledge items .
	C.3: Enable dynamic filtering of the knowledge base	Different types of graphical filters can be combined to interactively restrict the set of displayed knowledge items.
Divergence	D.1: Provide external stimuli	Stimuli originate from the knowledge items, tags, tag trees, content-based item recommendations, algorithms mining associations between tag trees , associative links between items, and tapped external data sources
	D.2: Provide different levels of stimuli	The stepwise categorization of items within a tag tree and the possibility to retrieve items with similar content provide intra-domain stimuli . The plurality of tag trees, the algorithms mining associations between tag trees, and the associative links between knowledge items produce inter-domain stimuli .
	D.3: Stimulate both symbolic systems of human cognition	The internal knowledge base contains both verbal and non-verbal knowledge items. In addition, multimedia content from tapped social networks can be requested.

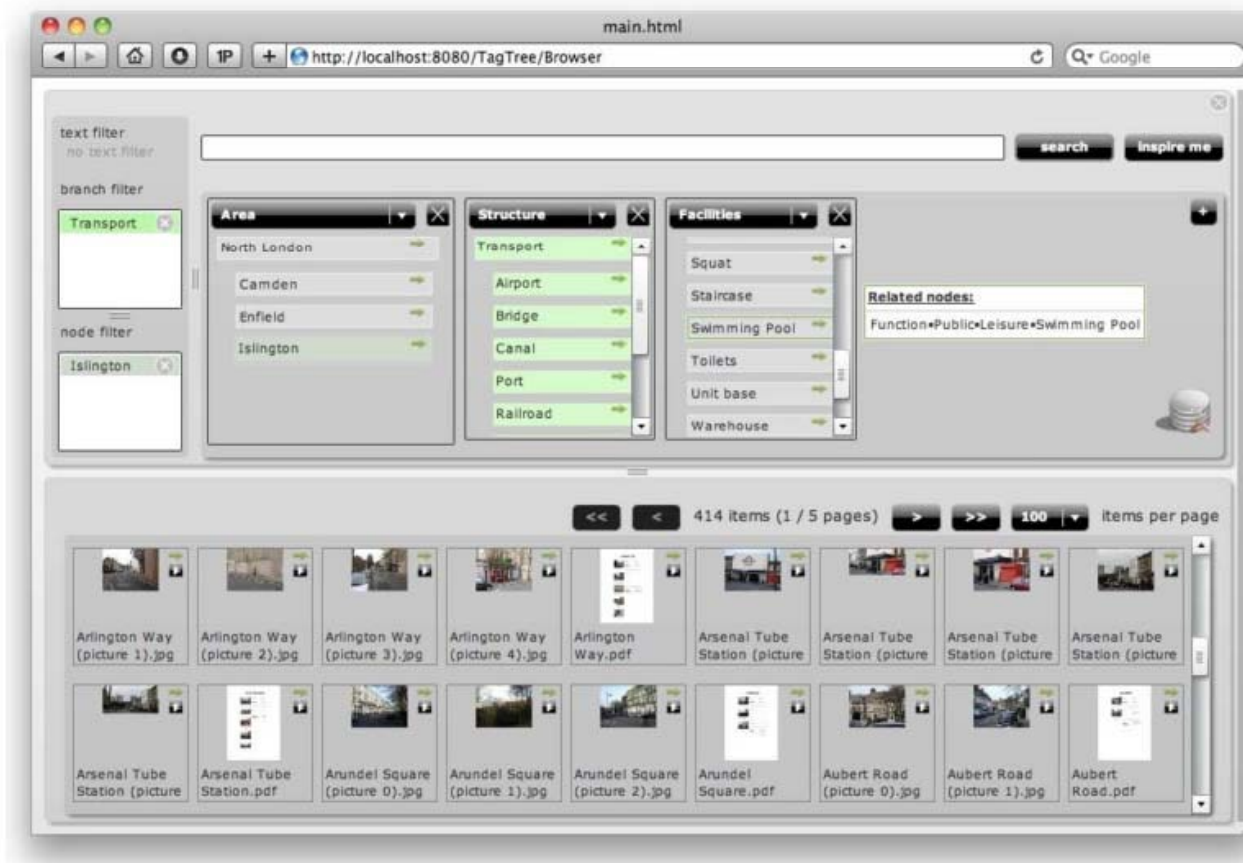
Müller-Wienbergen, F., Müller, O., Seidel, S., & Becker, J. (2011). Leaving the Beaten Tracks in Creative Work – A Design Theory for Systems that Support Convergent and Divergent Thinking. *Journal of the Association for Information Systems*, 12(11), 714–740.

A Design Theory for Systems that Support Convergent and Divergent Thinking



Müller-Wienbergen, F., Müller, O., Seidel, S., & Becker, J. (2011). Leaving the Beaten Tracks in Creative Work – A Design Theory for Systems that Support Convergent and Divergent Thinking. *Journal of the Association for Information Systems*, 12(11), 714–740.

Expository Instantiation (Tool)



Müller-Wienbergen, F., Müller, O., Seidel, S., & Becker, J. (2011). Leaving the Beaten Tracks in Creative Work – A Design Theory for Systems that Support Convergent and Divergent Thinking. *Journal of the Association for Information Systems*, 12(11), 714–740.

External Stimuli



Müller-Wienbergen, F., Müller, O., Seidel, S., & Becker, J. (2011). Leaving the Beaten Tracks in Creative Work – A Design Theory for Systems that Support Convergent and Divergent Thinking. *Journal of the Association for Information Systems*, 12(11), 714–740.

[Theory Catch-Up]

from yesterday

Creativity in Groups

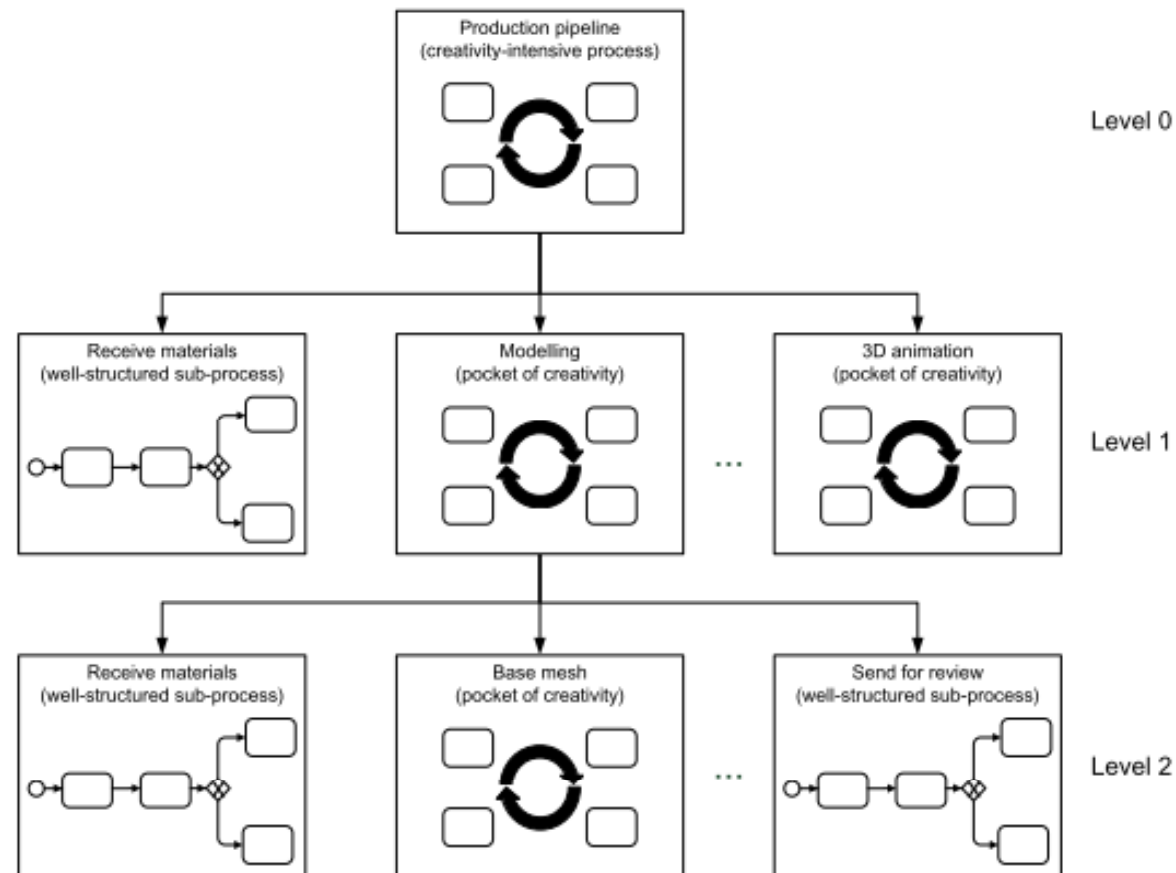
Collaboration Pattern

- **Diverge:** To move from a state of having fewer concepts to a state of having more concepts.
- **Converge:** To move from a state of having many concepts to a state of having a focus on, and understanding of, the few worthy of further attention.
- **Organize:** To move from less to more understanding of the relationships among concepts.
- **Evaluate:** To move from less to more understanding of the possible consequences of concepts.
- **Build consensus:** To move from having less to having more agreement on courses of action.

Briggs, R. O., De Vreede, G.-J., & Nunamaker, J. F. (2003). Collaboration Engineering with ThinkLets to Pursue Sustained Success with Group Support Systems. *Journal of Management Information Systems*, 19(4), 31–64.

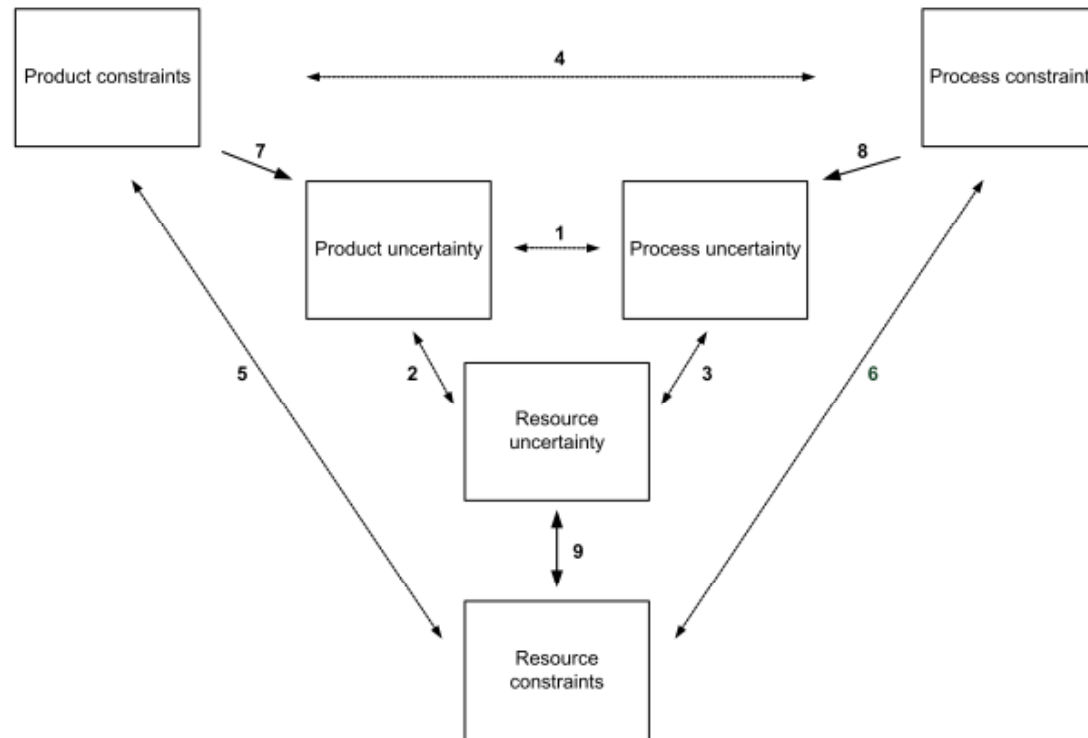
Creativity in Business Processes

The Creativity-intensive Process



Seidel, S., Müller-Wienbergen, F., & Rosemann, M. (2010). Pockets of creativity in business processes. *Communications of the AIS*, 27(1), 415–436.

Pocket of Creativity



Legend for arrows

- 1, 2, 3: Mutual relationships between three types of uncertainties
- 4, 5, 6: Mutual relationships between three types of constraints
- 7, 8: Impact of constraints on uncertainties
- 9: Mutual impact of resource uncertainty and resource constraints

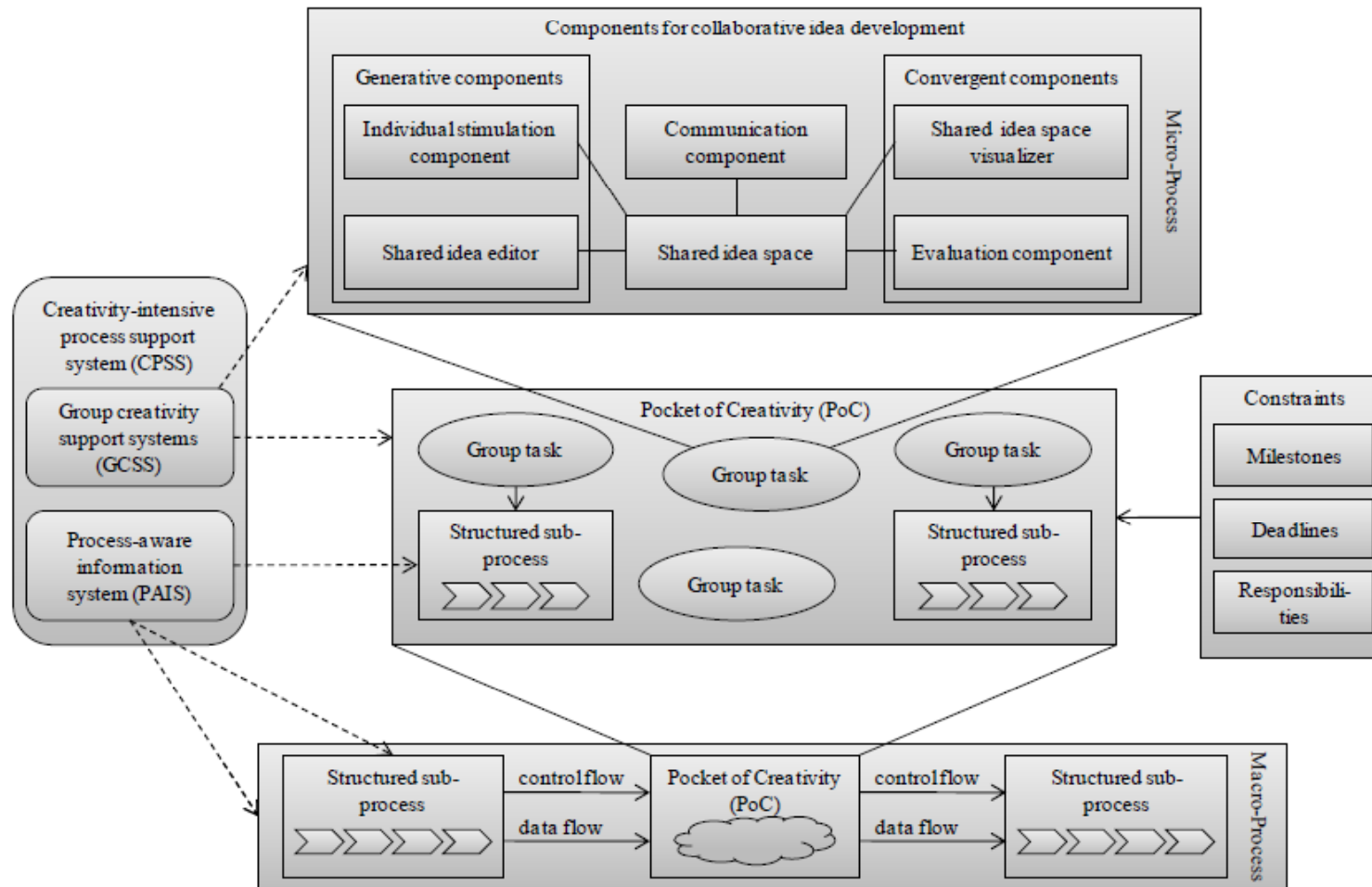
Seidel, S., Müller-Wienbergen, F., & Rosemann, M. (2010). Pockets of creativity in business processes. *Communications of the AIS*, 27(1), 415–436.

[Theory Catch-Up]

END

Design of Organizational CSS

Architecture for Creativity-intensive Process Support Systems (CPSS)



Expository Instantiation (CreativeFlow)

Willkommen **Produzent01** | WFMS | Hilfe | Abmelden

Meine Aufgaben | **Meine Arbeitsmappen** | Übersicht | Dokumente | Arbeitszeit | Projektverwaltung

In Bearbeitung | Abgeschlossen | 1 2 3 4 >> | Neue Arbeitsmappe


Angemeldet als: St Li (Storyliner01) | Logout | **Creative Flow**

Betreff

- Erstellung eines Drehbuchs
- Mir san mir in NRW
- Betreff
 - Drehbuchname festlegen
 - Storyline erstellen
 - Erste Aufgabe
 - Startdatum: 2/15/2011 7:21:05 PM
 - Enddatum:
 - Bearbeiter: Katrin Bergener, u s; St Li
 - Ersteller: Matthias Voigt
 - Redigierung der Storyline
- Dokumentname
 - Drehbuch_mir_san_mir_NRW.
- Auf gehts'
- Name1
- Erstellung eines Drehbuchs
- Verliebt in Münster
- Verliebt in Köln
- Holdrio
- Verliebt in Münster 123
- Münsteraner Kochduell, Folge 124

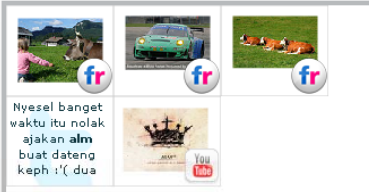
Projekt | Workflows | Repository | Inspiration

Alm Inspirieren



Name	Beschreibung	Tweet	Autor
ALM:uk Name Above All Names E	ALM:uk discuss their new pr	@bisma ALM RT @sellanoviara:	andre_ontet (andre oktariano)
Alm Racing Audi S2 Gatebil Rudsk	Seiers-runden etter Breislad	Nyessel banget waktu itu nolak aj	iludJDB (Luthfia Hidy Bieber)
"ALM" - A TRIBUTE TO A GREAT AI	A tribute to our past "ALM" f	2005, bs ketemu Alm .Aldy lagi:	gitaica (Gita 'Gisa' Annisa)
Alm Racing Promo 2010	A short promovideo of the t	MFS source "issues" today (again	DaveJohnson8080 (Dave Johnson)
Alm Racing @ GATEBIL Våler 2009	Noen runder fra gatebil eXtr	sabar bro, doain trus alm bokap	Imamamiruddin (imam amiruddin)
Alm Racing Inboard Audi S2 Gateb	Inboard i fra S2'n de første	RT @sharepointdev: A MUST RE	frodewagen (Frode Wågen)
Flemming Alm Slow motion test	Just messing around with sc	Yg punya lagu udah alm ,hayok	khemoche (mokhe asrie)
[FullHD] Lofer - Loferer Alm. SKIRI	Lofer - Saalachtal - SKIRES	Gra² browsing tokso, rubella, sm	uLiLanggita (Ayu Anggita Octavia)
		#Open #Cloud The single vendor	OpenStackClouds (Open Stack Clc

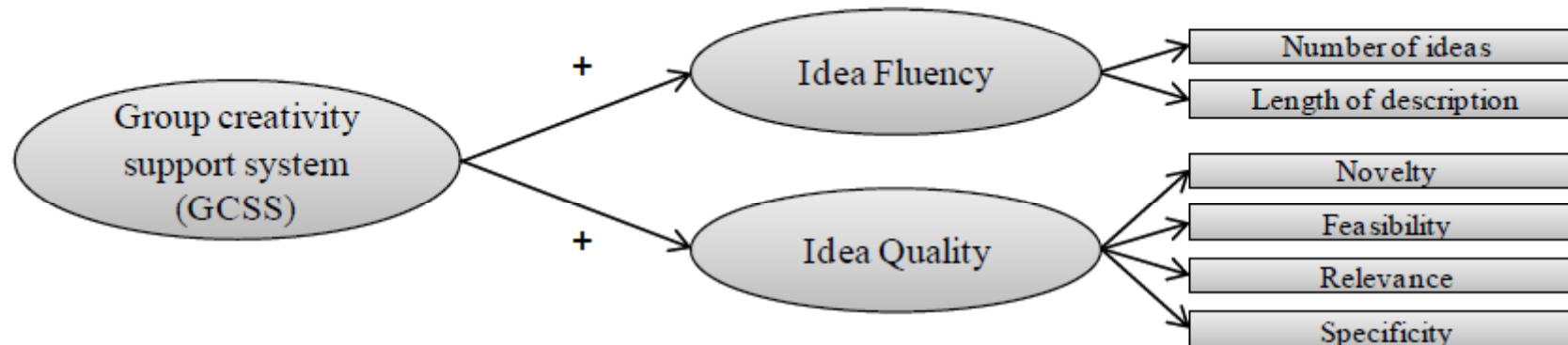
Das Motiv Alm



Nyessel banget waktu itu nolak ajakan **alm** buat datang kepah !:(dua

Persönliche Aufgabenliste

Some Evaluative Results



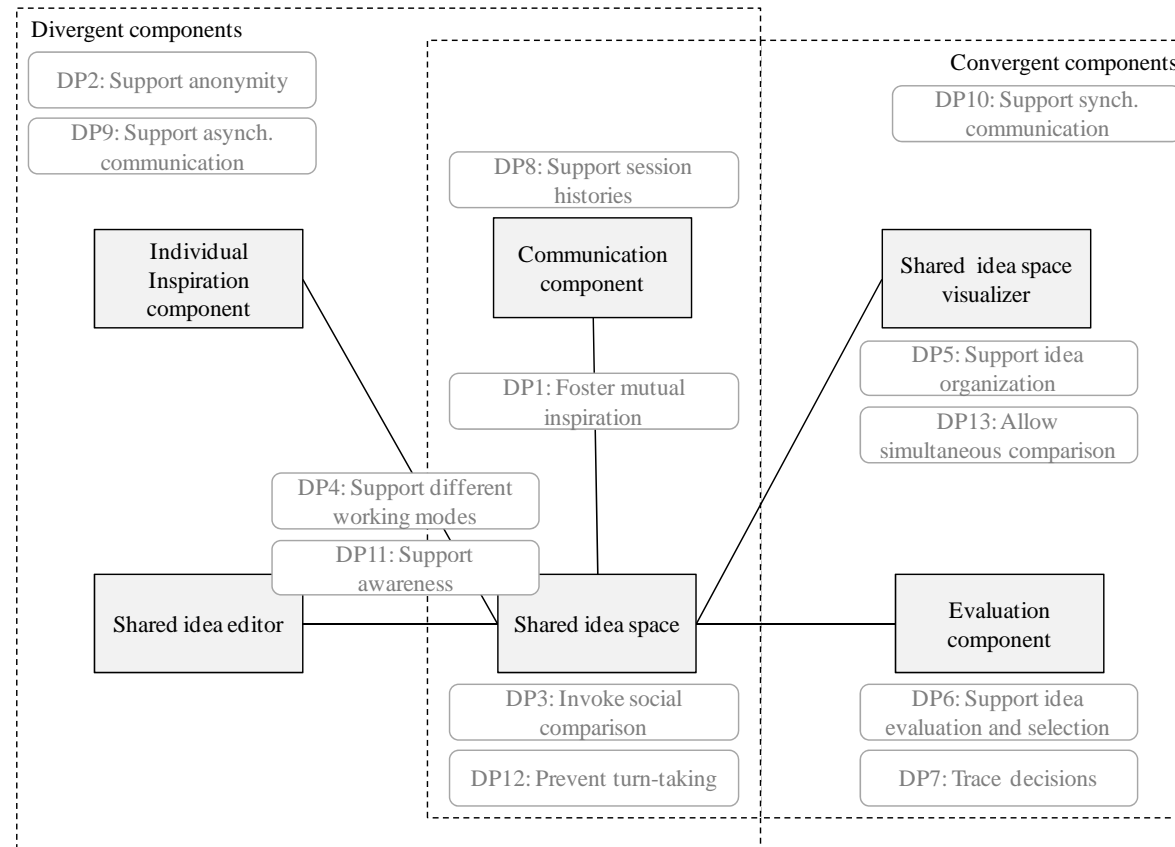
1=very high; 5= very low

	Novelty	Feasibility	Relevance	Specificity	Overall
Tool group	3.79 (0.96)	2.71 (1.05)	3.82 (0.77)	3.93 (0.98)	3.56 (0.42)
No tool group	3.66 (1.29)	2.40 (1.01)	3.99 (0.97)	4.18 (0.89)	3.56 (0.35)
Student t-test	t= 0.46, p= 0.64	t= 1.42, p= 0.16	t=-0.84, p= 0.40	t= -1.30, p= 0.19	

Ideas of the no tool group were rated significantly more feasible than those of the tool group, while ideas of the tool group were rated significantly more specific.

Design of Group CSS

Designing Support for Collaborative Idea Generation



Voigt, M., & Bergener, K. (2013). Enhancing Creativity in Groups – Proposition of an Integrated Framework for Designing Group Creativity Support Systems. *Proceedings of the 46th Hawaii International Conference on System Sciences*.

That's it for now.

BUT: there's much more on that.

Contact me 😊