



Advanced Memory Buoyancy for Forgetful Information Systems

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- 2. Memory Buoyancy
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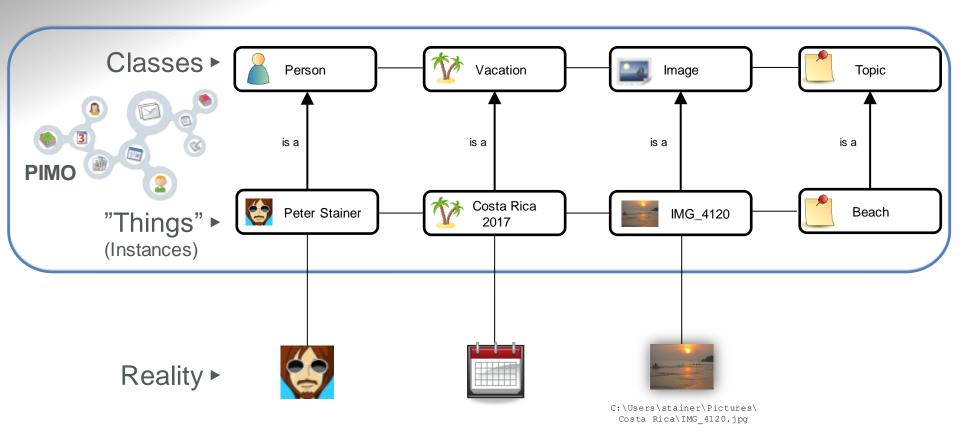
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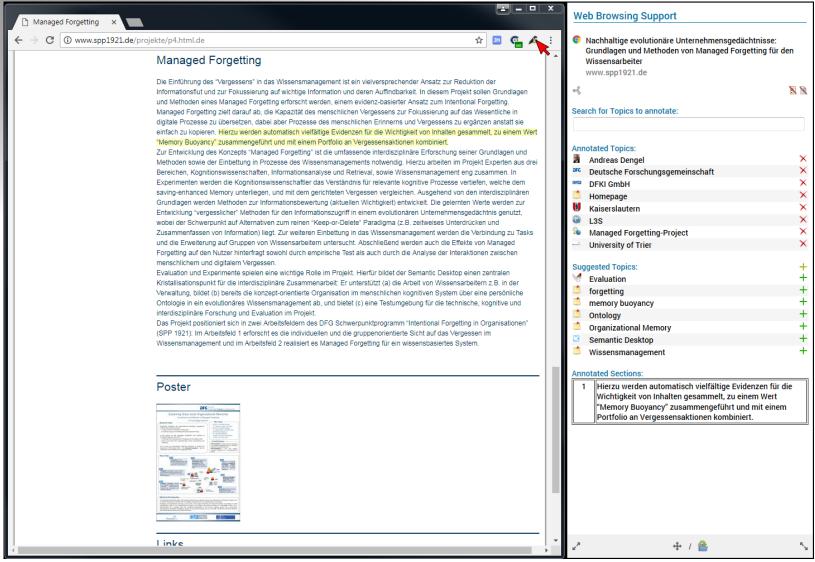
1. Semantic Desktop & Managed Forgetting Personal Information Model (PIMO)

PIMO represents the user's mental model as vocabulary for applications without confronting users with formal knowledge representation



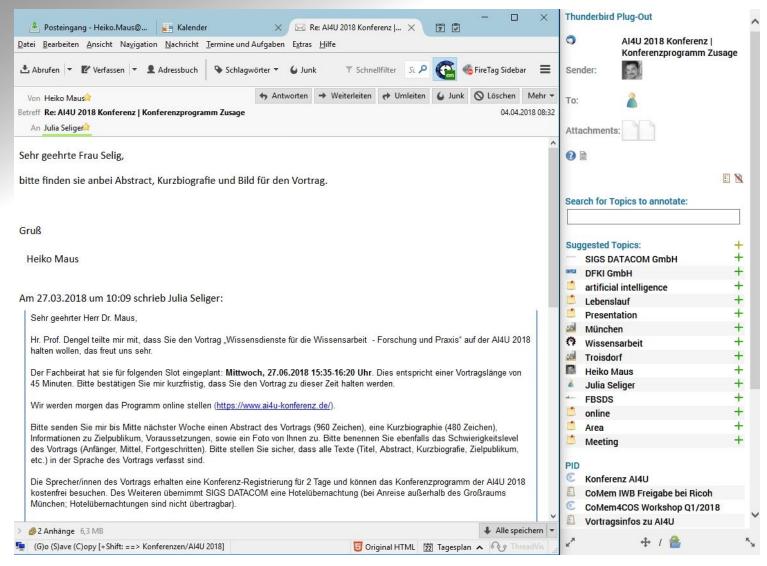


1. Semantic Desktop & Managed Forgetting Impressions: Browser & Context-Sensitive Sidebar





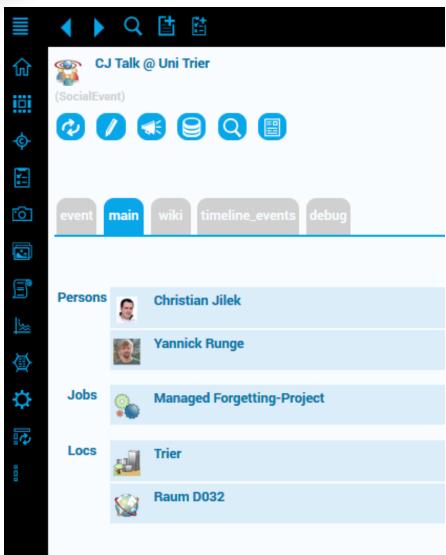
1. Semantic Desktop & Managed Forgetting Impressions: E-Mail Client & Context-Sensitive Sidebar





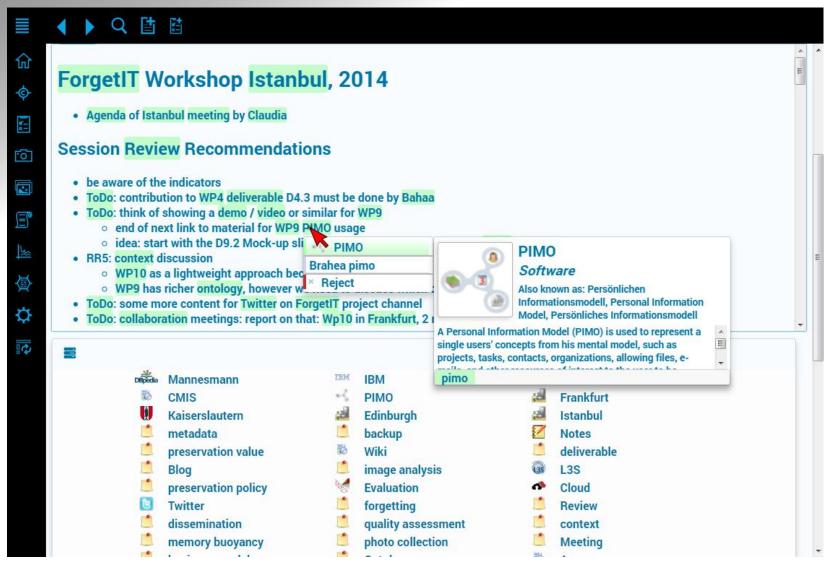
Impressions: Calendar Integration

	Montag 11. Dez	Dienstag 12. Dez	Mittwoch 13. Dez	
09:00		GruSi Hiwi-Meeti Jessica		
10:00				
11:00				
12:00	Blocker: get-to-gether			
13:00			Jour fixe CI-Projekt	
14:00				
15:00				7
16:00			CJ Talk @ Uni Trier 4	
17:00				



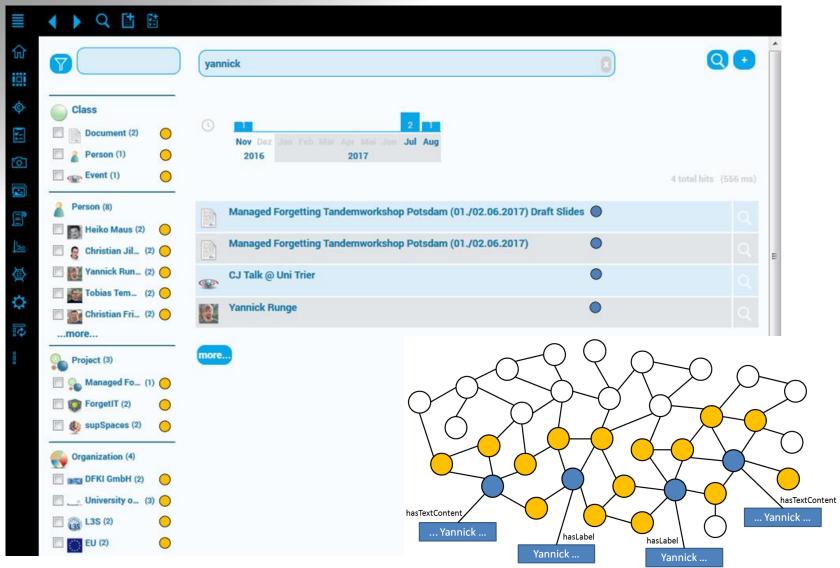


Impressions: Semantic Editor "Seed"





Impressions: Faceted Search





1. Semantic Desktop & Managed Forgetting EU-Project ForgetIT (2013–2016)

























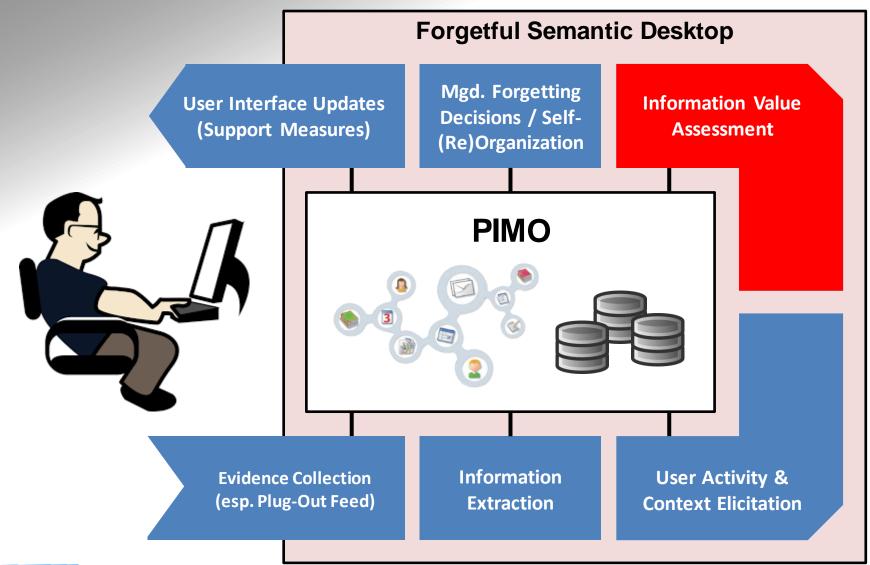
Concise Preservation by Combining Managed Forgetting and Contextualized Remembering

- Information Value Assessment:
 - *Memory Buoyancy (MB)* → information item's short-term value
 - Preservation Value (PV) → information item's long-term value
- Data Contextualization (e.g. as shown in the Semantic Editor Seed)
- Managed Forgetting:
 - · temporal hiding
 - condensation
 - adaptive synchronization, archiving and deletion





Recently: Forgetful Semantic Desktop





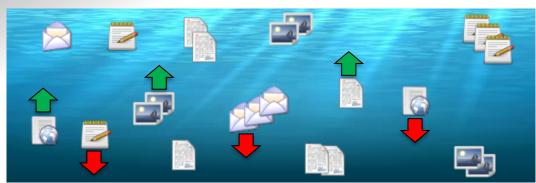
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2. Memory Buoyancy Idea





metaphor:

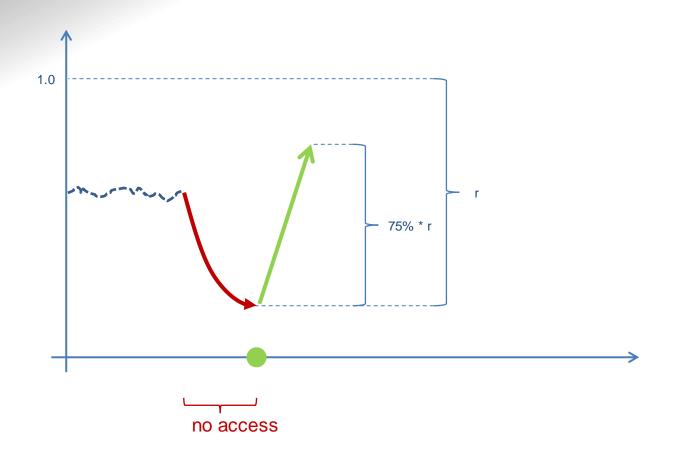
- items losing relevance sink away
- items (re)gaining relevance are pushed closer to the surface (user) by their higher buoyancy
- C. Niederée, N. Kanhabua, F. Gallo, R. H. Logie: **Forgetful Digital Memory: Towards brain-inspired long-term data and information management**. *SIGMOD Record*, 44(2), 41–46 (2015)
- C. Niederée, N. Kanhabua, T. Tran, K. D. Naini: **Preservation value and managed forgetting**. In: *Personal Multimedia Preservation: Remembering or Forgetting Images and Video*, pp. 101–129. Springer (2018)



- MB is updated every time a thing is stimulated
- MB depends on
 - user interaction (e.g., viewing, modifying, annotating, etc.),
 - the thing itself (e.g. email vs. presentation), and
 - its connections in the semantic network of the PIMO
- MB values are normalized

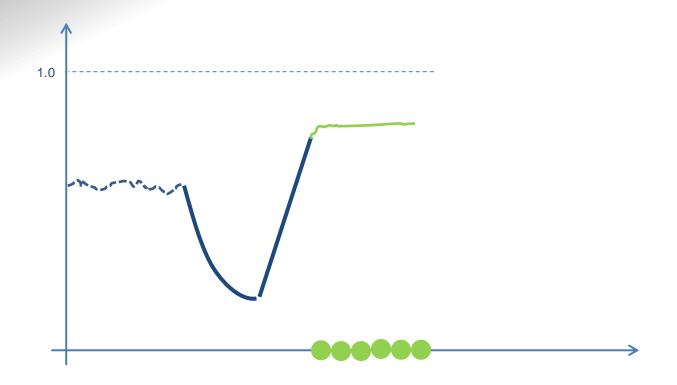


Single access of an item should not directly lead to an MB of 1.0



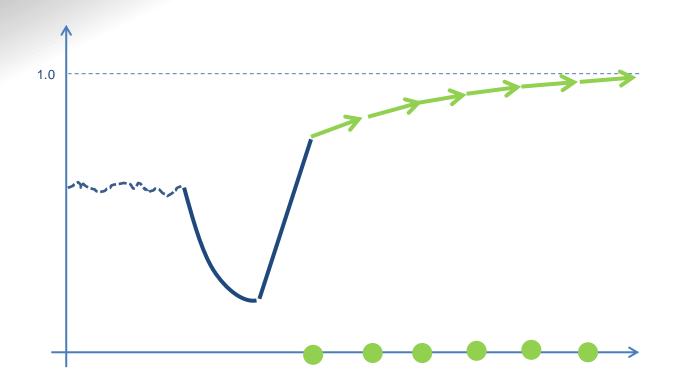


Multiple accesses in quick succession (every minute) are treated reluctantly





Multiple accesses every day will saturate against 1.0





- MB drops for things that are not stimulated
 - first steep decline then
 - a long-tail of slow decline
- rules and heuristics to deal with requirements of various domains:
 - upcoming events should stimulate connected things
 - finished items shall decrease faster (tasks, events) unless other indicators speak against this
 - times with low user interaction should not lead to massive decay in MB



- MB utilizes the semantic network (PIMO):
 - spreading activation is performed:



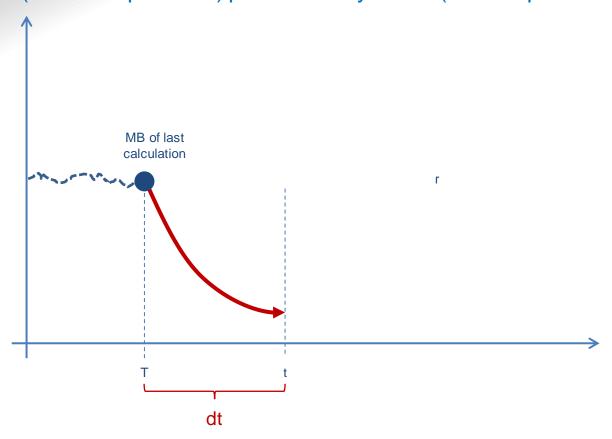
- heuristics for
 - types (e.g. email vs. person) and
 - number of relations connecting things



- technical requirements:
 - MB is time-dependent which poses a challenge for calculation as MB values change permanently just as time passes
 - MB values must always be up-to-date
 - keep high overall performance of the system despite additional MB calculation



splitting MB value into two parts:
 a static (time-independent) part and a dynamic (time-dependent) part.





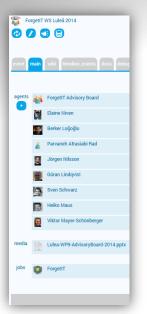
2. Memory Buoyancy

"MB in Action" - Example of a Project Workshop in 2014

during workshop



... after 8 months



... after 2 years





































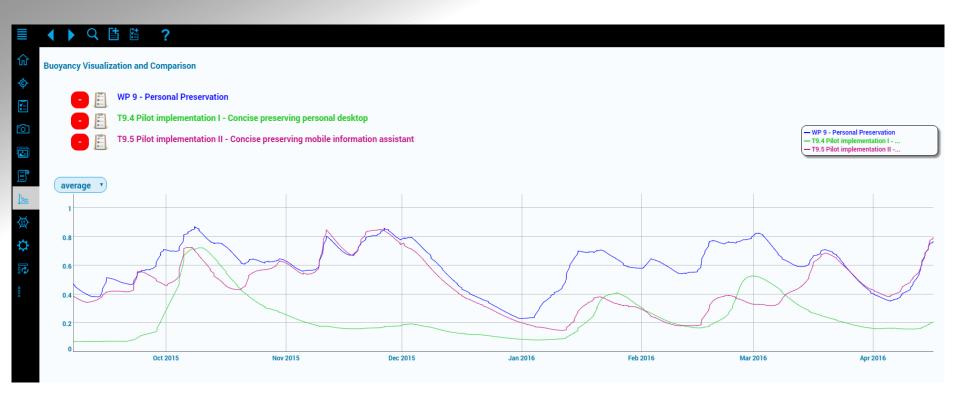






2. Memory Buoyancy

Ex. Success Story: Rising & Fading Out Works Well ©



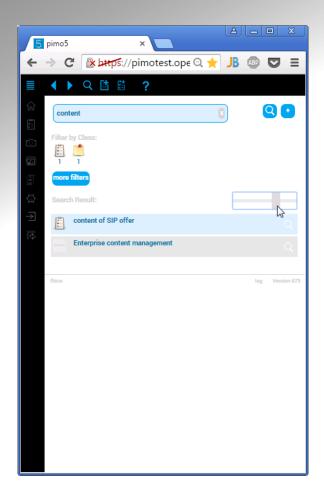
Example of wiriting a project deliverable:

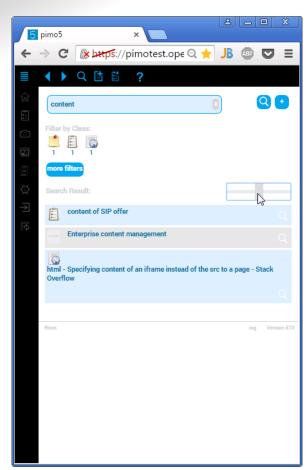
- revisiting old deliverable task (9.4) when working on recent deliverable task (D9.5)
- MB of parent work package task (WP9) is also plotted

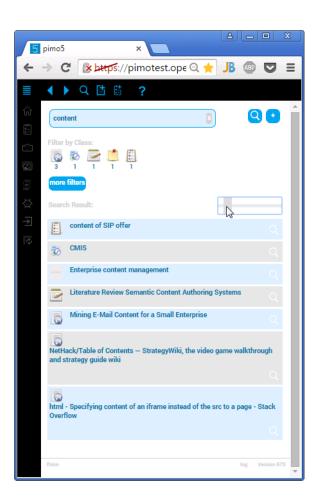


2. Memory Buoyancy

Ex. Failure Story: Pathological Behavior in Search UI (8)









2. Memory Buoyancy Problems

- high dependence on graph connectivity
- abrupt context switches are problematic

 \downarrow

Advanced Memory Buoyancy

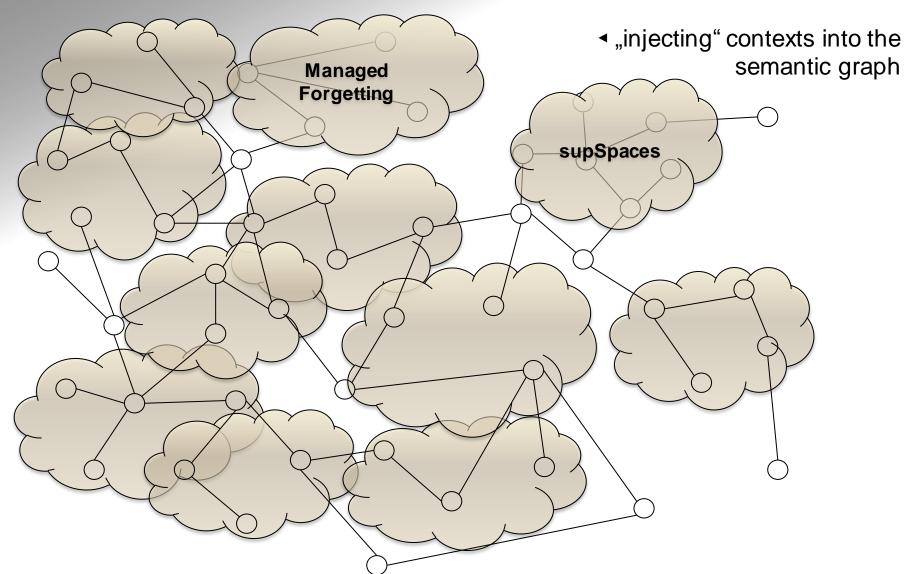
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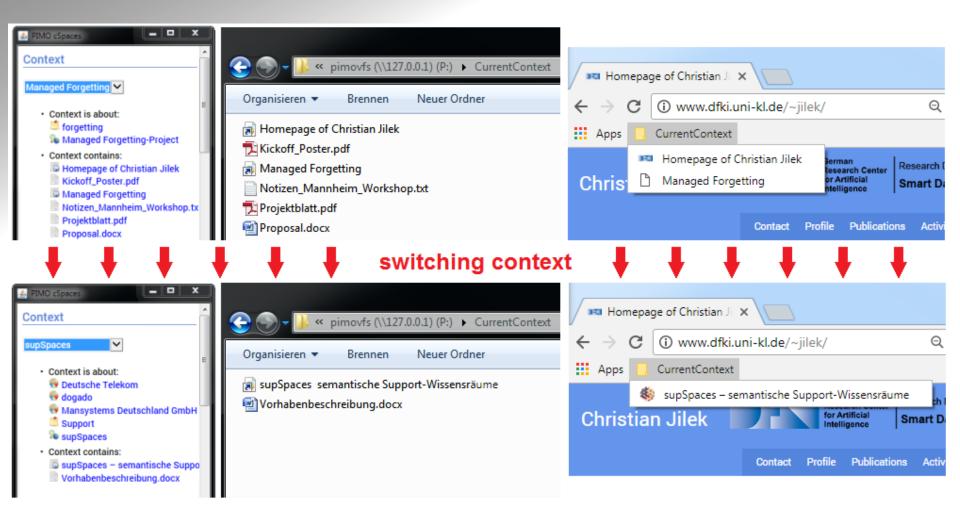
3. Advanced Memory Buoyancy

Motivation: Context Spaces extending Semantic Desktop





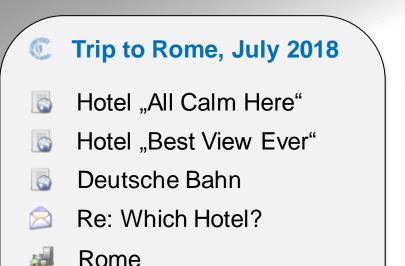
3. Advanced Memory Buoyancy Motivation: Context Spaces extending Semantic Desktop





3. Advanced Memory Buoyancy

Motivation: Memory Buoyancy & Context Switches

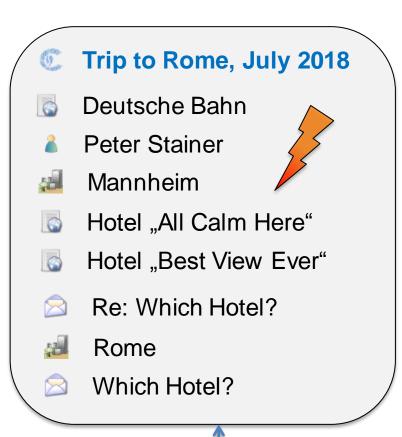


Mannheim

Peter Stainer

Which Hotel?





-> context switch: preparing a meeting

(location: Mannheim, attendees: Peter Stainer, ..., travelling with Deutsche Bahn) then switching back



3. Advanced Memory Buoyancy Local Memory Buoyancy

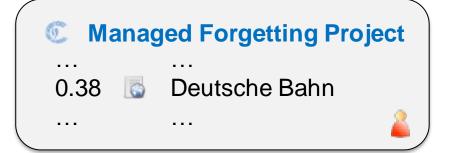


Local MB (Resource, User, Context)









3. Advanced Memory Buoyancy Global Memory Buoyancy

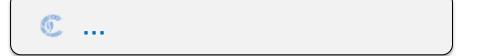
Global MB (Resource, User)





Mannheim Meeting 12.06.2018





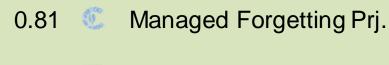
... ...

0.72 Trip to Rome, July 2018

0.65 Mannheim Meeting...

0.58 Deutsche Bahn

... ...



0.49 Deutsche Bahn

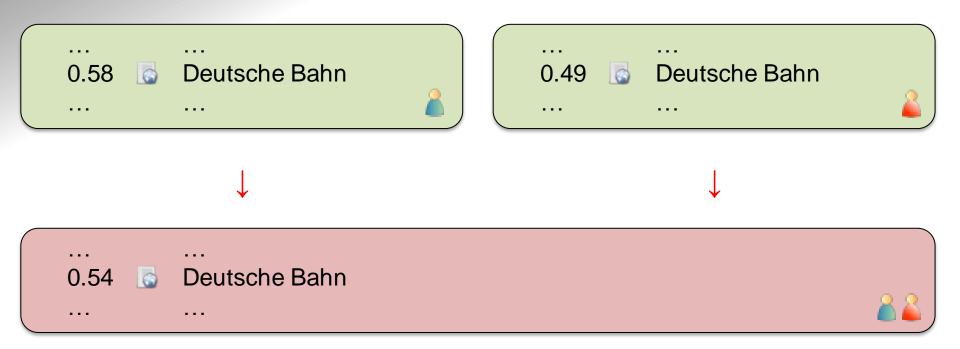
... ...



3. Advanced Memory Buoyancy Group Memory Buoyancy

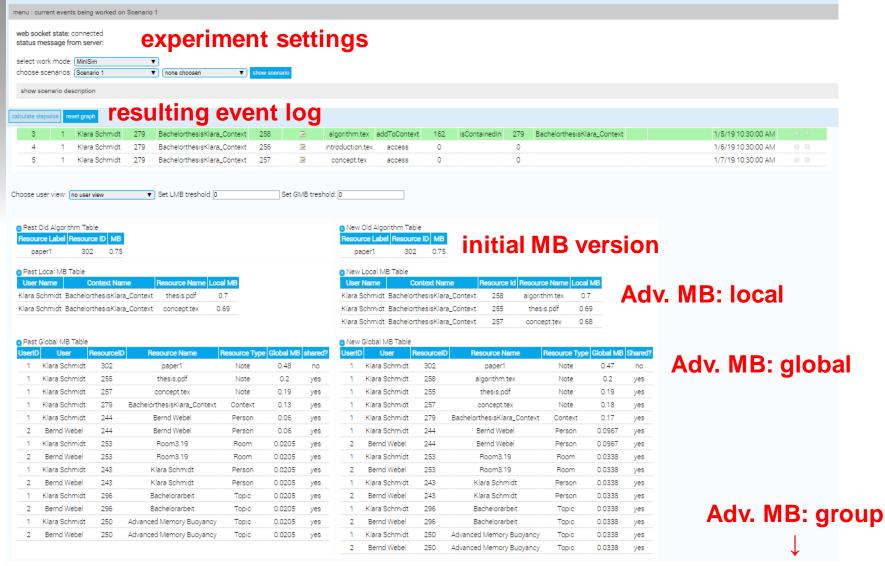


Group MB (Resource)



3. Advanced Memory Buoyancy

Impressions of current Advanced MB Research Prototype





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4. Conclusion & Outlook

Conclusion

- incorporated MB into our productively used Semantic Desktop prototype
- thus 3 years of practical experience with MB in daily work
- experienced success and failure stories → lessons learned
- designed Advanced MB especially taking User Context into account
- presented first impressions of Advanced MB prototype

Outlook

- (more) user experiments → detailed evaluation
- scaling experiments with "big personal data"



Thanks for your attention! © Any Questions?

References:

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