

Exercise Sheet 3 System Dynamics and DSM

Exercise 3.1 /dynamic/ system modeling

Consider the following problem:

"We observe again and again that we have to push a lot of short-timed hotfixes after each release. This causes a lot of stress in the teams and our users are obviously not really satisfied either. Let's try to model these problems in a dynamic system model."

1. What variables are there that are related with the problem? (3 max.)
Hint: they are typically things/specific aspects of the system that can be small/big/high/much/low/little/ or zero.
Attention: phrase clearly, descriptive and uniquely.

2. The identified variables undergo changes. What variables are there that affect the problem variables?
Identify these and relate them to the problem variables of step 1.
Hint: The following questions might be helpful...
 - What influences could play a role in user satisfaction?
 - How are they related to the hotfixes?

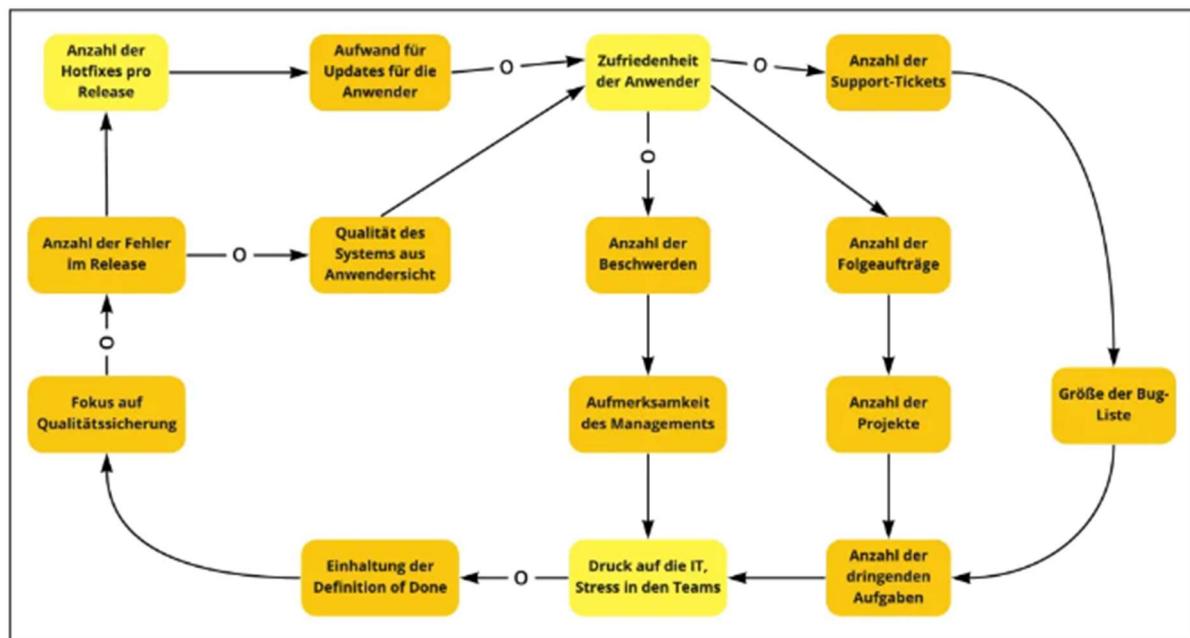
3. Select one scenario from the previous step. How can this be related to another problem variable found in step 1?

4. How do the related variables strengthen or weaken each other? Are there any effects on other variables as well?
Hint: The following question might be helpful...:
 - If variable A changes upwards, i.e. becomes stronger, higher or more in its expression, how does variable B change?"

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REALLY, DON'T'!

5. Your model could look like this or something similar in parts. What does the term "cycle" mean in this scenario?



This example has been taken from the following website: <https://agilecoach.de/wissen/systems-thinking-mit-causal-loop-diagrammen/>

Exercise 3.2 Component-Based Design Structure Matrix

Given is the following paper by [Browning et al., Applying the Design Structure Matrix to System Decomposition and Integration Problems: A Review and New Directions; IEEE TRANSACTIONS ON ENGINEERING MANAGEMENT, VOL. 48, NO. 3, AUGUST 2001.](#)

He lists an overview of the following DSM applications:

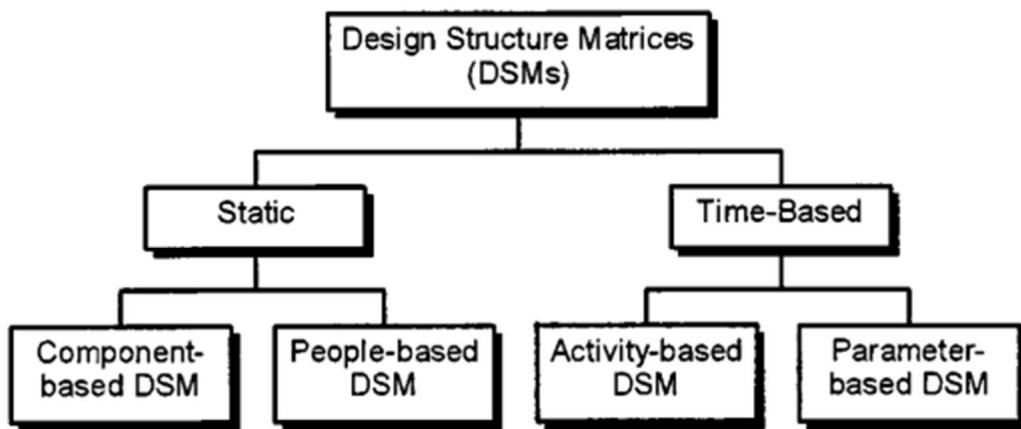


Fig. 2. DSM taxonomy (adapted from [20]).

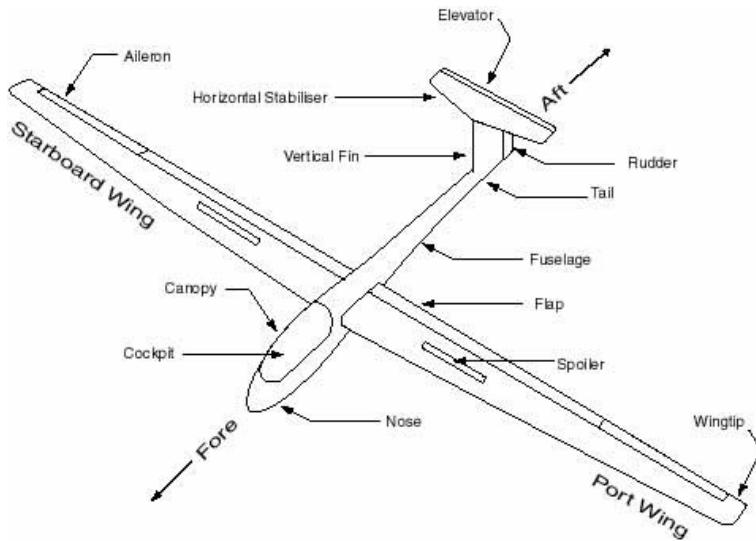
Let's focus on static/Component based DSM.

Summarize from the paper the answers to the following questions:

1. What could be an influencing factor for innovative product architectures?
2. What are the three steps to form a DSM?
3. What are the four types of system interactions?
4. What does weighting of off-diagonal marks mean?
5. What are the steps of integration analysis?
6. What does clustering algorithms mean in that sense?

Exercise 3.3 Design Structure Matrix

Given is the following glider system and a DSM. Analyze the DSM and restructure as discussed within the lecture.



Picture taken from here: https://yorksoaring.com/wp-content/uploads/coursework/GPGSDEC11/parts_of_a_glider.html

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
Fuselage Frame	A	X		X X		X			X X					
Tow Hook	X	B												
Landing Gear			C	X										
Wheel				D										
Landing Gear Wheel Reracting Assembly	X		X	D										
Vertical Tail	X				E	X	X							
Rudder					X	F			X					
Horizontal Tail	X				X		G	X						
Elevator						X	H	X						
Controls						X			I			X X		
Canopy	X								J					
Wings	X									K	X	X X		
Ailerons								X		X	L			
Drive Brakes								X		X		M		
Winglets									X				N	

Use

- Excel or
- an open source training tool (<https://dsmweb.org/dsmmatrix/>)

- or <https://github.com/ajcarney/DSMEditor>

to analyze and restructure the given DSM. No weightings needed.