20251107_Business_Intelligence_WIN6

Villalba-Diez, J., Ordieres-Meré, J., Chudzick, H., Lopez-Rojo, P. (2015). NEMAWASHI: Attaining Value Stream alignment within Complex Organizational Networks. Procedia CIRP, 37, 134--139. https://doi.org/10.1016/j.procir.2015.08.021

Nemawashi: prepare the ground.

Hypothesis: there is a list of KPIs given, with values at different time points.

$$KPI_i = KPI_i(t) \quad i = 1, \dots, n$$

This method visualizes the dynamics of the organization through its KPIs.

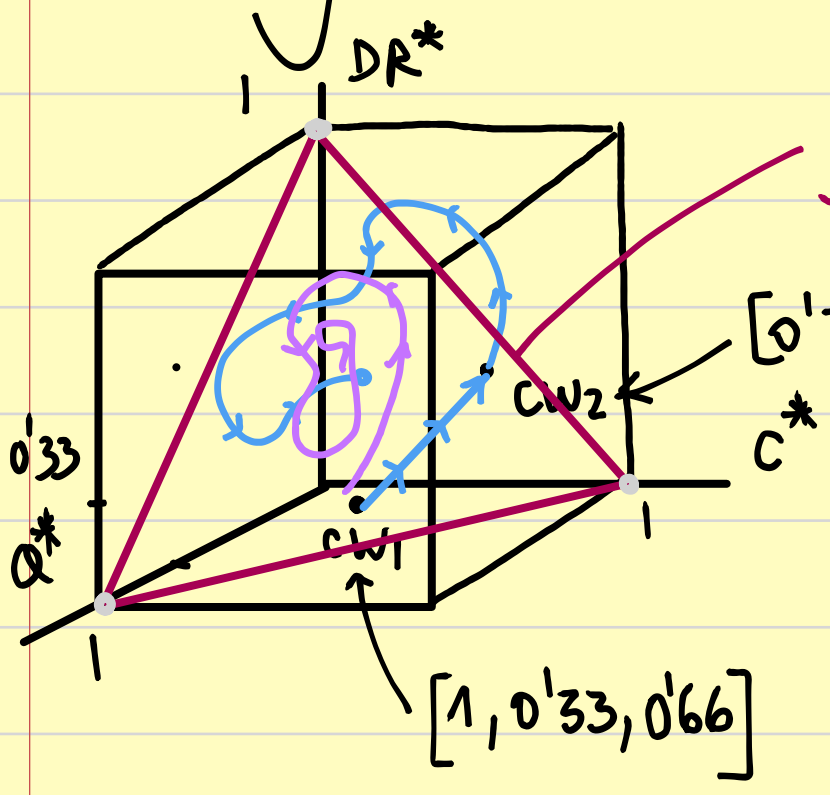
Example: A KPI-System is 3 dimensional and has following data.

	Quality [ppm]	Delivery Rate [%]	Cost [€/part]
CW1	3300	91	17
CW2	2700	93	18
CW3	1800	89	16
CW4	1500	92	15
CW5	1300	95	16

Step 1. NORMALIZE ——— ① $x_i^* = \frac{x_i - \bar{x}}{\sigma_x}$; ② $x_i^* = \frac{x_i - x_{min}}{x_{max} - x_{min}}$

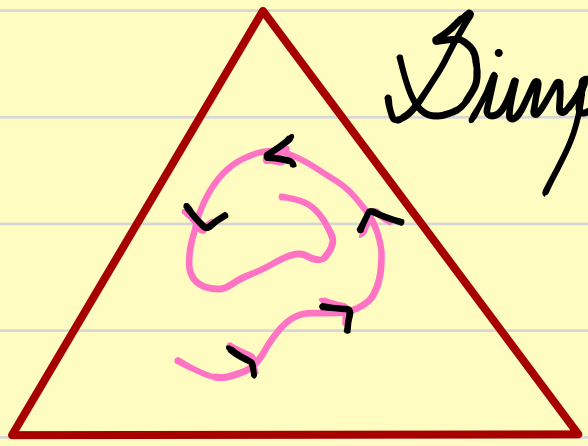
	Q*	DR*	C*
CW1	$\frac{3300-1300}{3300-1300}=1$	$\frac{91-89}{95-89}=0'33$	$\frac{17-15}{18-15}=0'66$
CW2	$\frac{2700-1300}{3300-1300}=0'7$	$\frac{93-89}{95-89}=0'66$	$\frac{18-15}{18-15}=1$
CW3	$\frac{1800-1300}{3300-1300}=0'25$	$\frac{89-89}{95-89}=0$	$\frac{16-15}{18-15}=0'33$
CW4	$\frac{1500-1300}{3300-1300}=0'1$	$\frac{92-89}{95-89}=0'5$	$\frac{15-15}{18-15}=0$
CW5	$\frac{1300-1300}{3300-1300}=0$	$\frac{95-89}{95-89}=1$	$\frac{16-15}{18-15}=0'33$

Step 2. Represent graphically the organizational dynamics.



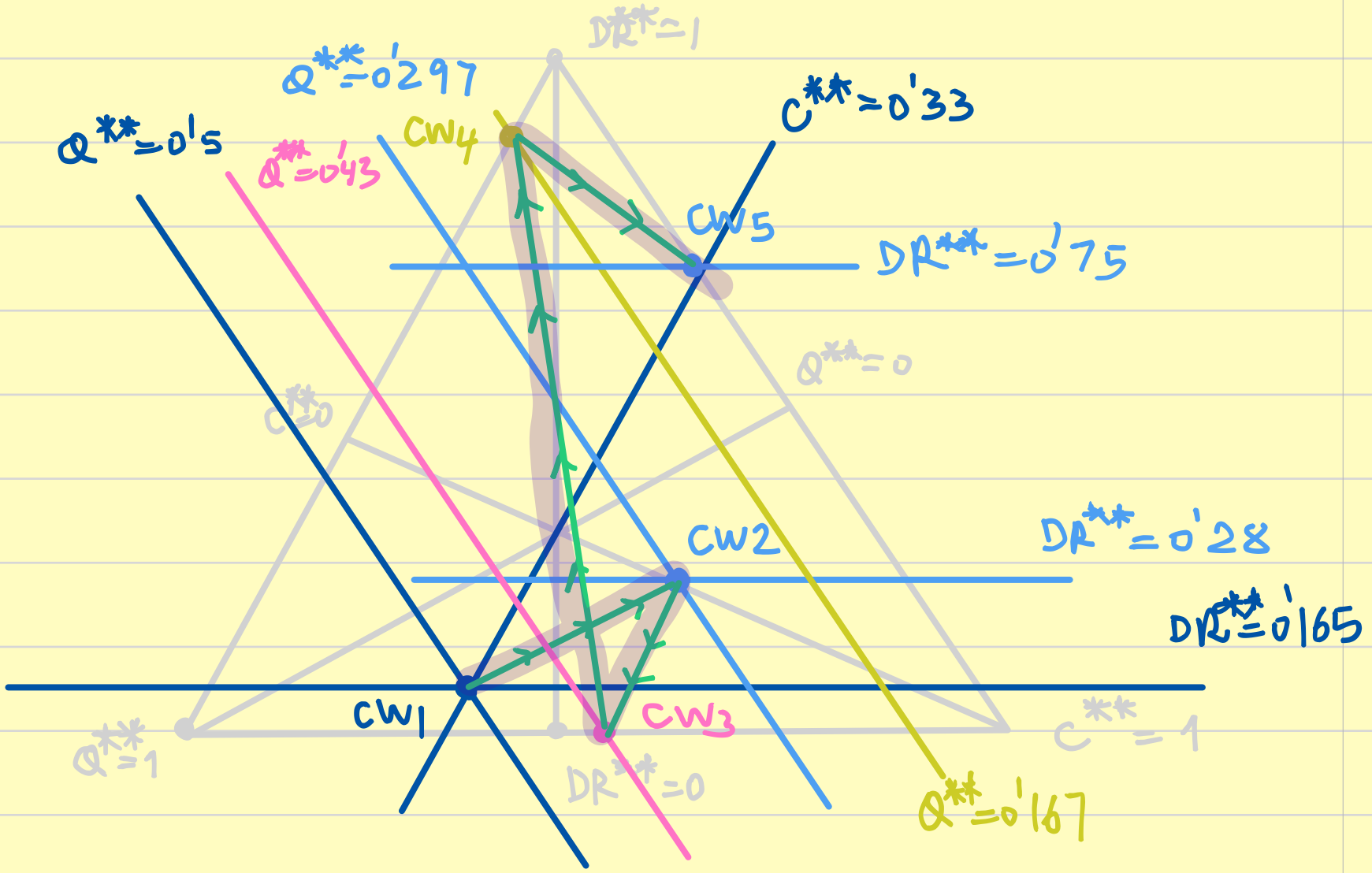
Simplex: the coordinates of all the points add one:

$\forall [x,y,z] \quad x+y+z=1$



Step 3. Temporal normalization.

	Q^{**}	DR^{**}	C^{**}
CW1	$\frac{1}{1+0'33+0'66} = 0'5$	$\frac{0'33}{1+0'33+0'66} = 0'165$	$\frac{0'66}{1+0'33+0'66} = 0'33$
CW2	$\frac{0'7}{0'7+0'66+1} = 0'297$	$\frac{0'66}{0'7+0'66+1} = 0'28$	$\frac{1}{0'7+0'66+1} = 0'42$
CW3	$\frac{0'25}{0'25+0+0'33} = 0'43$	0	$\frac{0'33}{0'25+0+0'33} = 0'57$
CW4	$\frac{0'1}{0'1+0'5+0} = 0'167$	$\frac{0'5}{0'1+0'5+0} = 0'833$	0
CW5	0	$\frac{1}{0+1+0'33} = 0'75$	$\frac{0'33}{0+1+0'33} = 0'25$



Step 4. Interpretation of the dynamics.

The system is in Alignment on a timepoint t_j if the distance between $|t_{j-2}, t_{j-1}|$ is bigger than the distance between $|t_{j-1}, t_j|$.

Distance:

- $|CW1 - CW2| > |CW2 - CW3|$ → The distance decreases so we have Alignment in CW3.
- $|CW2 - CW3| < |CW3 - CW4|$ → No Alignment in CW4
- $|CW3 - CW4| > |CW4 - CW5|$ → Alignment in CW5.