Een nieuwe blik op complexe situaties:
Systems thinking in de praktijk

Jenneken Naaldenberg
Radboudumc geneeskunde voor mensen met een verstandelijke beperking
Academische werkplaats ‘Sterker op eigen benen’

Radboudumc

$$A \rightarrow B$$

Complex

the relationship between cause and effect can only be perceived in retrospect

probe – sense - respond

emergent practice

Complicated

the relationship between cause and effect requires analysis or some other form of investigation and/or the application of expert knowledge

sense – analyze - respond

good practice

novel practice

no relationship between cause and effect at systems level

act – sense -respond

Chaotic

best practice

the relationship between cause and effect is obvious to all

sense – categorize - respond

Simple

Kenmerken

complicated	complex
gesloten	open
statisch	dynamisch
Weinig onderdelen/actoren	Veel onderdelen/actoren
Weinig interactie	Veel interactie
Lineair gedrag	Non-lineair gedrag: Divergence: zelfde input andere output Convergence: andere input, zelfde output
voorspelbaar	(deels) onvoorspelbaar
Geen emergence	Emergent behavior: leerprocessen, aanpassingen, self-adaptation

Wat is er nu belangrijk?

- Veel verschillende betrokkenen
- Complexe interacties
- Context heeft een grote invloed
- Tijd heeft een grote invloed

In plaats van:

- Oorzaak- gevolg
- Eenduidige oplossing
- Controleren en manipuleren

Naar:

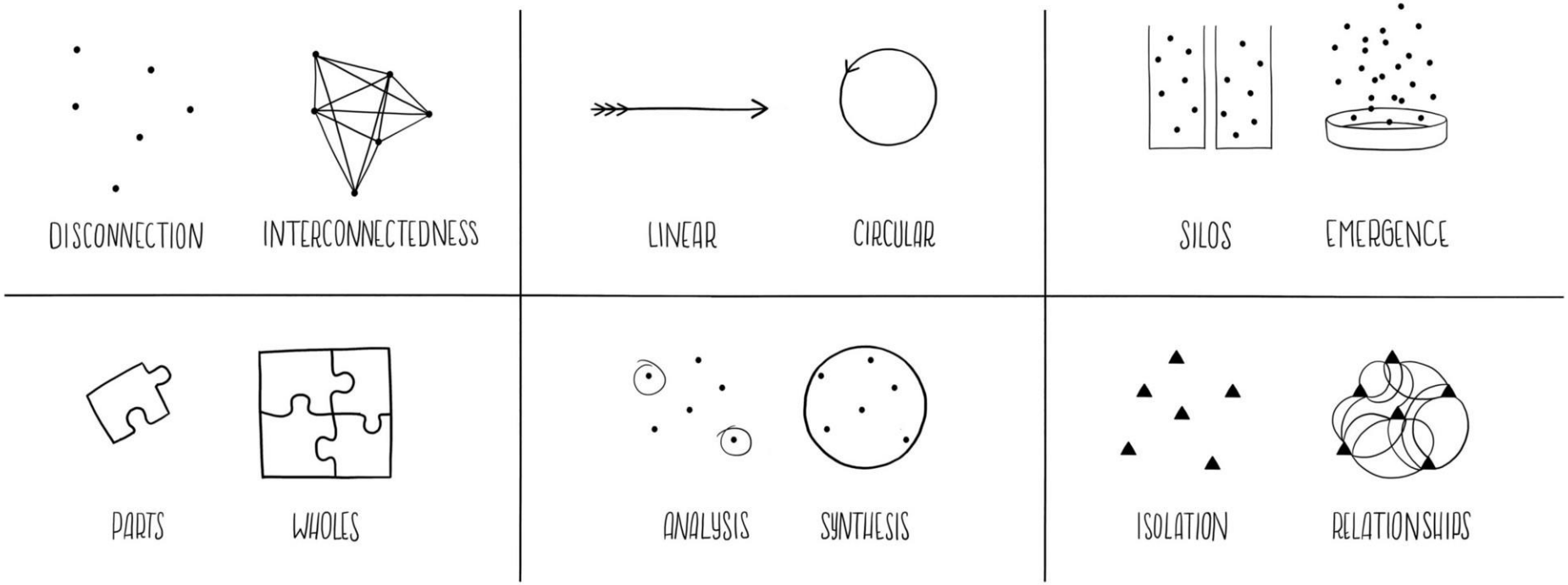
- Co-creatie van gewenste situatie
- Het systeem in beweging brengen, innovatie
- stimuleren

Radboudumc

Handvatten

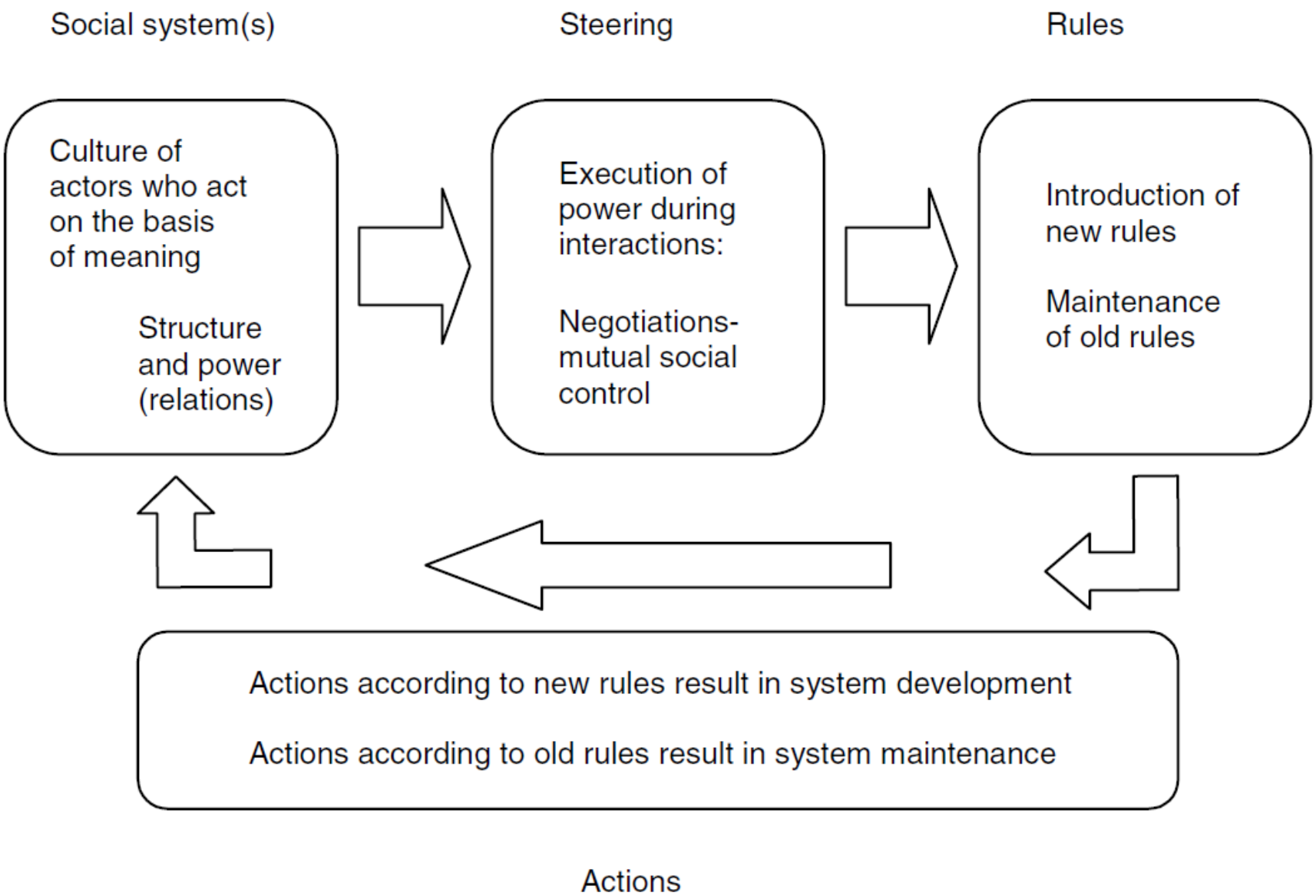
- Sociale systemen
- Systems thinking
- Causal loop models
- Agent based models
- Innovatie systemen

TOOLS OF A SYSTEM THINKER



DISRUPT DESIGN

Radboudumc



Van Raak & Paulus Sys Res 18 2001
Based on: Parsons social system theory

Radboudumc

Pathirana et al, BMJ 2017;358:j3879

▸ **Possible drivers**

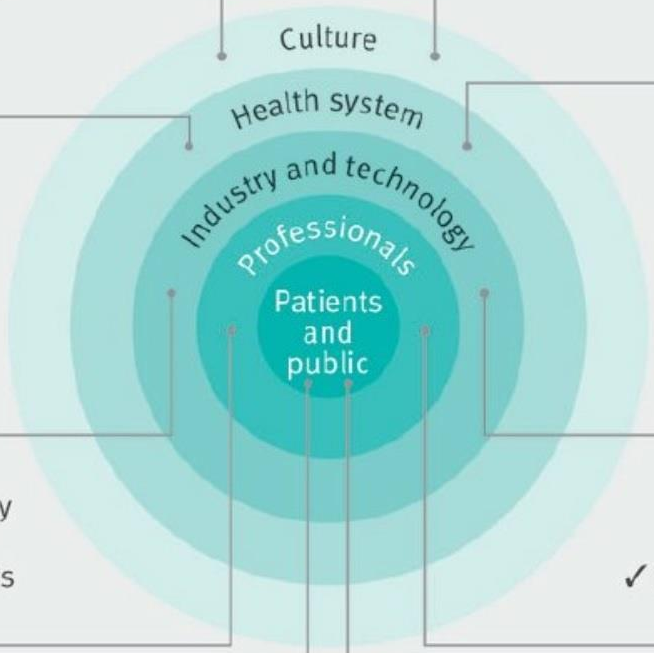
Culture
- Beliefs; for example, more = better
- Faith in early diagnosis
- Intolerance of uncertainty
- Biased media reporting
- Medicalisation

Health system
- Financial incentives
- Expanding disease definitions
- Quality measures
- Complexity of care
- Guidelines
- Screening

Industry and technology
- Industry promotion
- Diagnostic test sensitivity
- Medicine as a business
- Industry expands markets

Professionals
- Fear of litigation
- Fear of missing disease
- Flaws in training
- Lack of confidence or knowledge
- Over-reliance on tests

Patients and public
- Over-reliance on tests
- Lack of confidence or knowledge
- Expectation clinicians will "do something"



✓ **Possible solutions**

Culture
- ✓ Awareness/information campaigns
- ✓ Healthy scepticism about early diagnosis
- ✓ Address uncertainty
- ✓ Improve media reporting

Health system
- ✓ Reform incentives from quantity to quality
- ✓ Reform disease definition
- ✓ Reform quality measures
- ✓ Reform guidelines
- ✓ Reform screening
- ✓ More research on OD and OU
- ✓ Multicomponent interventions

Industry and technology
- ✓ Better regulate promotion
- ✓ Better evaluation of tests
- ✓ Declare, reduce, exclude COIs
- ✓ Better evaluate disease definitions

Professionals
- ✓ Reform litigation driver
- ✓ Comfort with uncertainty
- ✓ Educate and inform
- ✓ Interventions for providers
- ✓ Reduce test over reliance

Patients and public
- ✓ Shared decision making
- ✓ Education and information campaigns
- ✓ Promote "doing nothing"

Fig 2 Overdiagnosis and related overuse. Mapping possible drivers to potential solutions. COI=conflict of interest; OD=overdiagnosis; OU=overuse.

Maternal Literacy
Hygiene & household Environment
Feeding and nutrition
Untreated Diseases (malaria and others)
Safe deliveries
Family Planning Services
Long labour hours and excessive bleeding
Frequency of Child Deliveries
Teenage pregnancies
Health of Mothers
Sensitization by Community Leaders/Peer
Belief in perceptions and myths
R3
Myths Loop
Breastfeeding practices
Low birth weight
Death Risk of Neonate
Recommended Nutrition
Level of Awareness on MHC &NHC
Media with relevant and localised content
Neonatal Survival
Care of Neonate
Free sustainable supplies of basic requirements to low class mothers
Safe Deliveries & PNC
Hypothermia
Socio-economic status
Family Support (transport)
R1
Awareness Loop
Respect to Cultural factors e.g promotion of vertical delivery
R2
Trust Loop
Health Education by Health Workers
Trust in the Healthcare Service
Mothers' Birth Preparedness
Male partner sensitization
R4
Health Loop
Mothers attending ANC, hospital deliveries and PNC
Male partner involvement
Resource inadequacy (staffing, drugs, logistics and supplies)
B1
Frustration Loop
Mothers' busy schedule
Attitude of Health Workers
Mothers' Frustration (long waiting times, stock outs)
Permission from work to attend ANC
Population

Legend

Denotes a **positive link** where a change in the influencing element is in the same direction as the influenced element

Denotes a **negative link** where a change in the influencing element is in the opposite direction as the influenced element

Denotes a **delay** where a change in the influencing element produces a change in the influenced element only after a delay

Denotes a **reinforcing loop** (R1) in counter clockwise direction. Similarly R2,R3 and R4 are Reinforcing loops

Denotes a **balancing loop** (B1) in a counter clockwise direction

Radboudumc

Roles in the innovation system / System condition categories	Producers	Intermediaries	Users	Preconditional
Infrastructural conditions				
Institutional conditions • Hard: laws, regulations… • Soft: norms, values…				
Interaction conditions • Strong network conditions • Weak network conditions				
Capabilities conditions				

Van den Driessen Mareeuw et al BMC Public Health2015**15**:922

Klein Woolthuis et al, Technovation, 2005

Radboudumc

Mogelijke tekortkomingen	
infrastructuur	Fysieke infrastructuur, geografische afstand, kennisinfrastructuur
Instituties ‘hard’	Formele mechanismes zoals subsidies, wet en regelgeving
Instituties ‘zacht’	Normen, waarden. Percepties met betrekking tot hoe dingen gedaan horen te worden, wat goede kwaliteit is. bereidheid om bij te dragen, impliciete spelregels.
Interacties ‘sterk’	Kan heel productief zijn, risico op geslotenheid, lock in, group think, inner circle
Interacties ‘zwak’	Vanuit zwakkere verbanden kan veel niuew inspiratie ontstaan. Risico is dat interacties niet doorgroeien
bekwaamheid	Benodigde bronnen, vaardigheden en kennis, flexibiliteit. Mogelijkheid om nieuwe kennis te waarderen, op te nemen en toe te passen

Meer weten?

https://www.coursera.org/learn/systems-thinking

J. Naaldenberg et al. Global health promotion. Elaborating on systems thinking in health promotion practice. http://journals.sagepub.com/doi/pdf/10.1177/1757975908100749

J Naaldenberg. Healthy aging in complex environments http://edepot.wur.nl/169511

Rutter et al 2017 The need for a complex systems model of evidence for public health http://researchonline.lshtm.ac.uk/3962417/1/cp_The%20need%20for%20a%20complex_GREEN%20AAM.pdf

Jenneken.Naaldenberg@Radboudumc.nl

Radboudumc