Een research-based implementatie strategie voor AI

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Introductie

Innovatie implementatie

Results:
From the 163 identified innovation projects, only 54% were successfully implemented.

50% van innovaties met succes geïmplementeerd

Implementatie is een langdurig proces (15-17 jaar)

$1,8 triljoen uitgave aan gezondheidszorg projecten met minimaal tot geen impact

Radiotherapy and Oncology
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Original Article
External validation of a prediction model for timely implementation of innovations in radiotherapy

Rachelle R. Swart [a], Rianne Fijten [a], Liesbeth J. Boersma [a], Petros Kalendralis [a], Myra D. Behrendt [c], Martijn Ketelaars [b], Cheryl Roumen [a], Maria J.G. Jacobs [c]

Highlights
• 45% out of 80 innovation are not timely implemented, or fail completely.

- Khan et al., (2021), Cancer Causes & Control http://doi.org/10,1007/s10552-020-01376-z
- Morris et al., (2011), J R Soc Med https://pubmed.ncbi.nlm.nih.gov/22179294/
- World Economic Forum. 2024 [cited 2024 March 19]. https://www.weforum.org/impact/accelerating-value-based-healthcare-globally/
- Swart et al., (2021), BJR https://www-birpublications-org.mu.idm.oclc.org/doi/10.1259/bjr.20200613
- Swart et al., (2023), Radiotherapy & Oncology https://www-sciencedirect-com.mu.idm.oclc.org/science/article/pii/S0167814022046114?via%3Dihub

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Implementatie AI…

Focus klinische implementatie
- Inhoud
- Workflow
- Proces van ontwikkeling

…andere factore van belang!

- Implementatie is vaak moeilijk:

weerstand, angst, organisatorische beperkingen

- Integrale aanpak nodig

klinisch en proces

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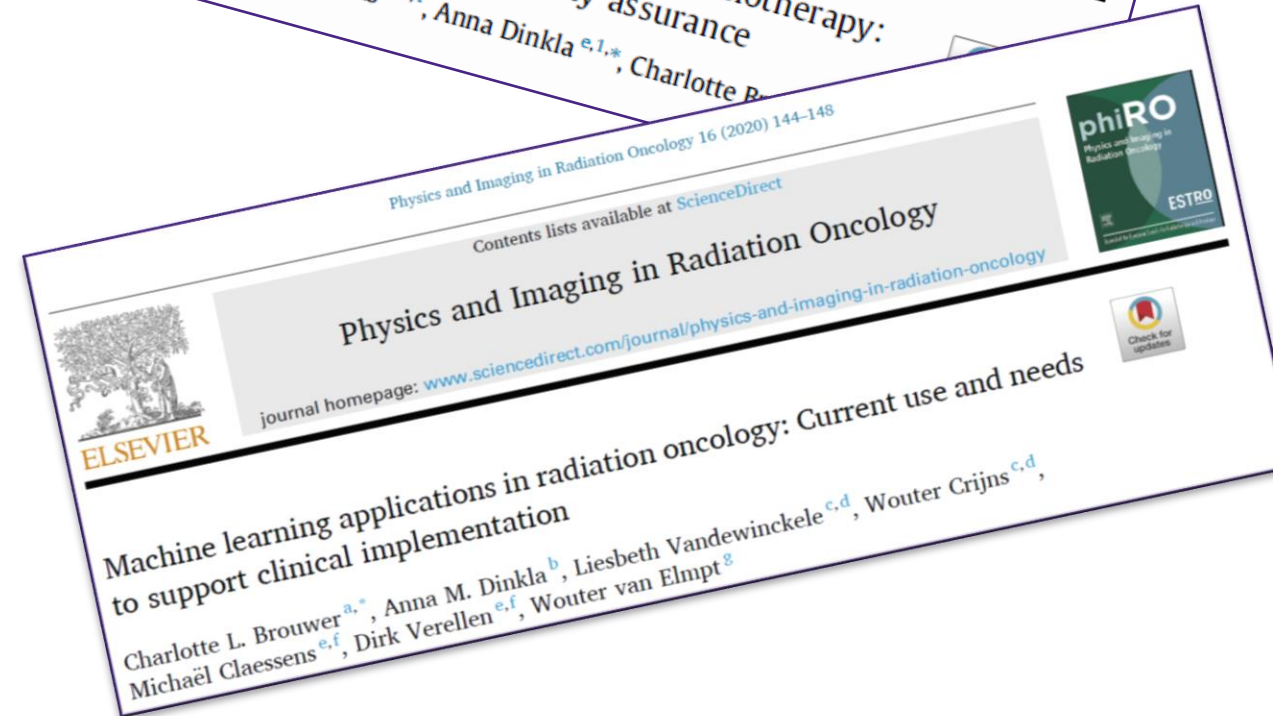
Wat is implementatie wetenschap?

...zowel wetenschap als praktijk!

Implementatie wetenschap:

*...is de **wetenschappelijke studie van methoden** om onderzoeksresultaten en op bewijs gebaseerde praktijken systematisch te integreren in de gezondheidszorg en de de-implementatie van zorg met een lage waarde te bevorderen.*
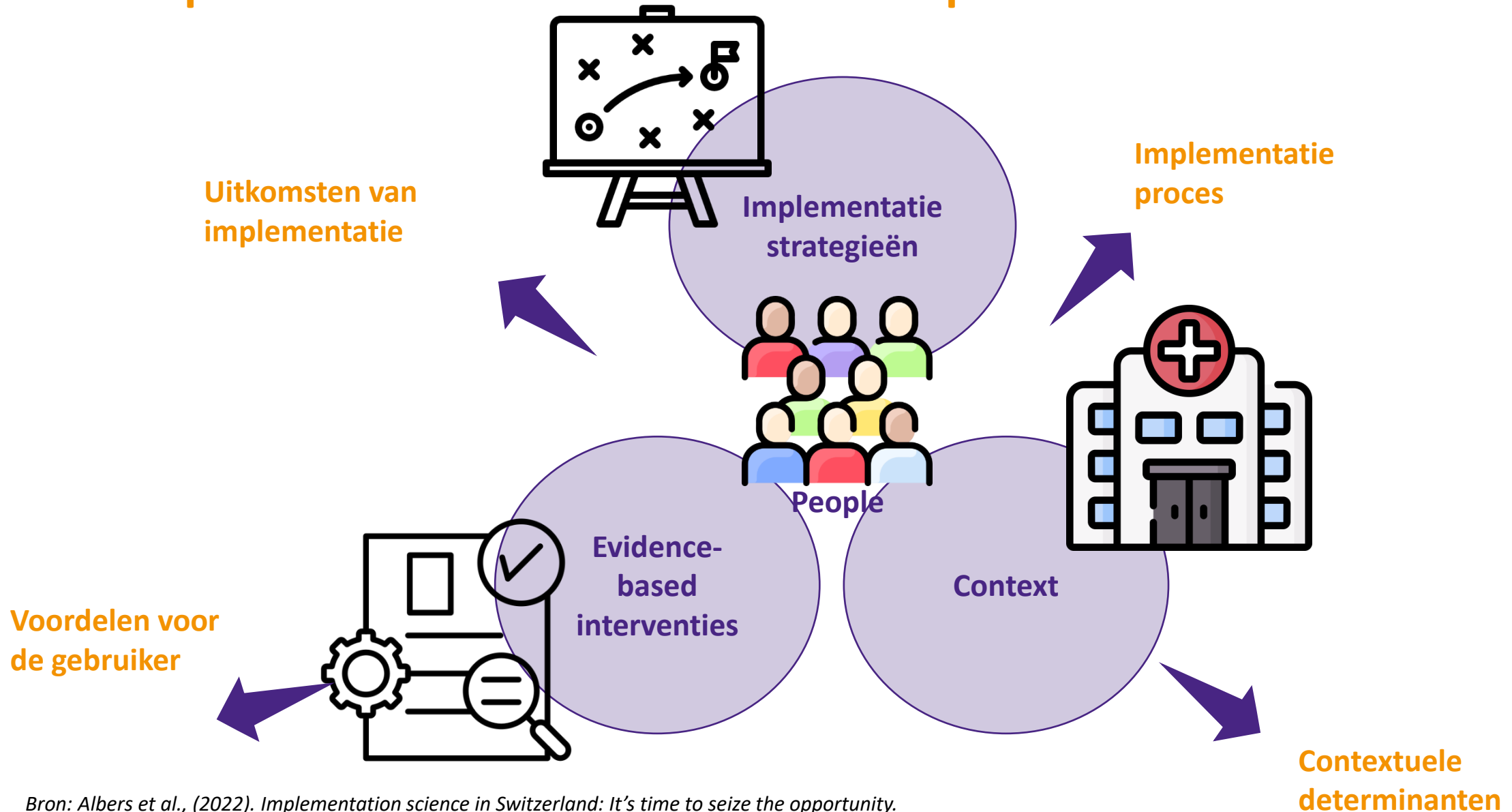
Vandaag

Implementatie praktijk:

*...is de **toepassing van de resultaten afgeleid van implementatiewetenschap** door individuen (...) om te voldoen aan de unieke behoeften van gemeenschappen en individuen en om resultaten te verbeteren.*
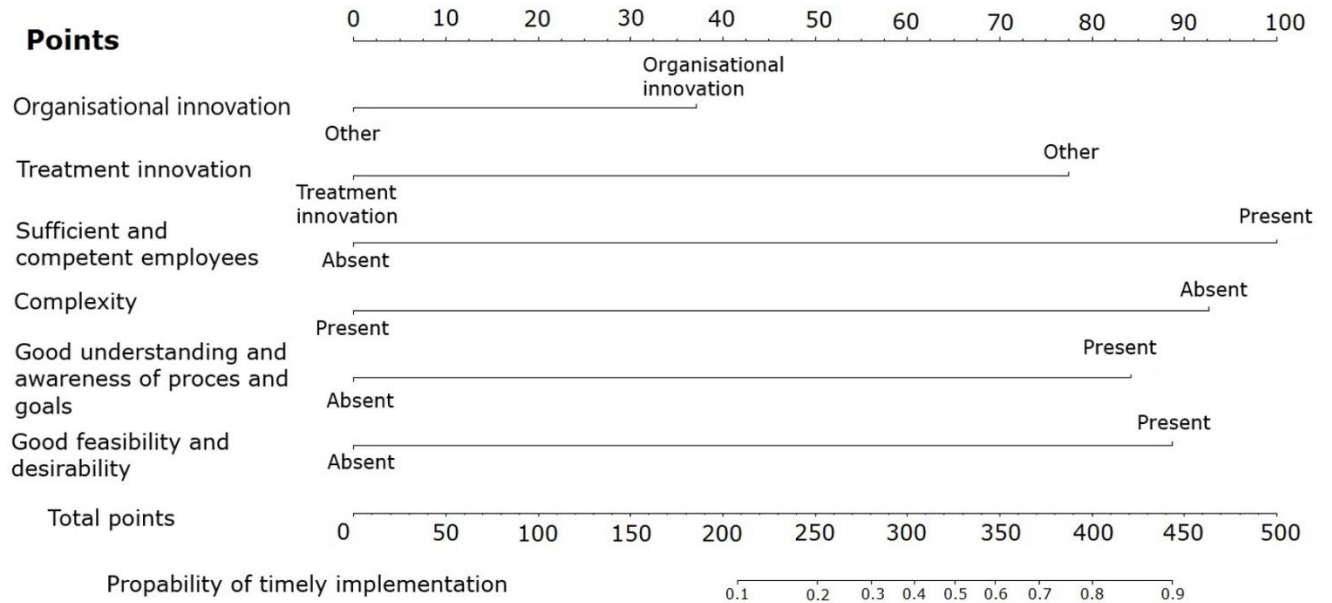
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Implementatie wetenschap – de focus?

Uitkomsten van implementatie

Implementatie proces

Implementatie strategieën

People

Evidence-based interventies

Context

Voordelen voor de gebruiker

Contextuele determinanten

Bron: Albers et al., (2022). Implementation science in Switzerland: It's time to seize the opportunity. Swiss Medical Weekly, 152:4950. https://doi.org/10.57187/smw.2022.40021.

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Implementatie praktijk – quick scan projecten met voorspellings-model voor tijdige implementatie

- *Swart et al., (2021), BJR https://www-birpublications-org.mu.idm.oclc.org/doi/10.1259/bjr.20200613*
- *Swart et al., (2023), Radiotherapy & Oncology https://www-sciencedirect-com.mu.idm.oclc.org/science/article/pii/S0167814022046114?via%3Dihub*

$$p(y = 1) = \frac{1}{(1 + e^{-(-2,90+0,69x_1-1,44x_2+1,86x_3-1,72x_4+1,57x_5+1,65x_6)})}$$

May 2021								
Is het project een organisatorische innovatie?	Is het project een behandel innovatie?	Zijn er voldoende en competente medewerkers om het project uit te voeren?	Is het een complex project (integratie van functionaliteiten en apparaten/ veel professionals)?	Zijn de doelen van het project en het proces zodanig goed gecommuniceerd met teamleden dat deze dit helemaal helder hebben?	Wordt het project/de innovatie haalbaar en wenselijk geacht?	Kans op succes		Gemiddelde kans op succes
0	0	1	0	1	1	0,90	90%	0,66
0	0	1	1	1	1	0,61	61%	66%
0	0	1	1	1	1	0,61	61%	
0	0	1	1	1	1	0,61	61%	
0	0	1	1	1	1	0,61	61%	
0	0	1	1	1	1	0,61	61%	

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Implementatie strategie

Hoe kun je een research-based implementatie strategie opstellen?

- Identificeren stakeholders

- Stakeholder analyse

- Barrières & facilitators in kaart brengen

- Ontwerp implementatie strategie i.s.m. stakeholders

- Ontwerp evaluatie protocol i.s.m. stakeholders

Stakeholders: wie, wanneer en hoe te betrekken?

- ## Wie is stakeholder?

  ... elke groep of individu die beïnvloed wordt door of invloed kan uitoefenen op het behalen van de doelstellingen van een organisatie/project...

- ## Stakeholder analyse – waarom?

  - Het identificeren en betrekken van medewerkers maakt een succesvolle en duurzame implementatie waarschijnlijker:
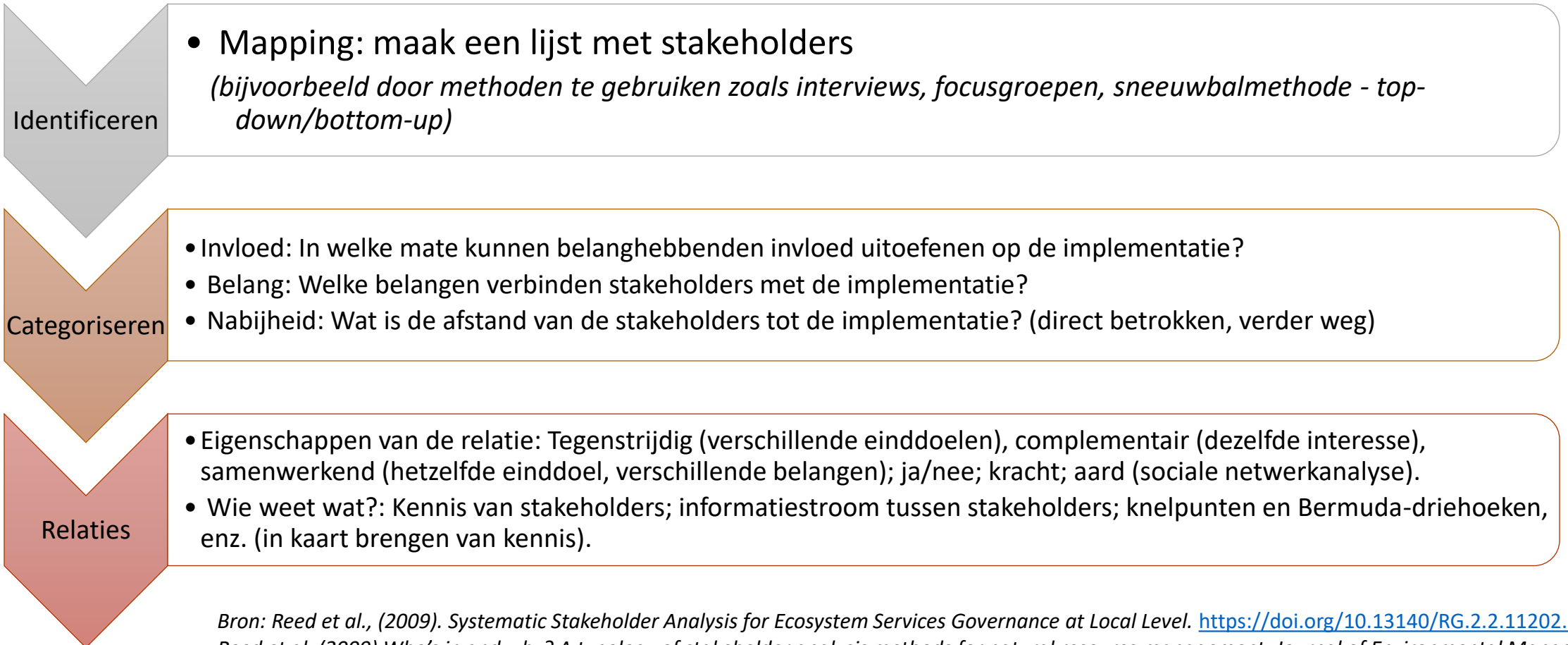   a) belangrijkste beïnvloedende factoren worden in overweging genomen - gerelateerd aan werknemers
    b) beslissingen worden op een transparante manier genomen
    c) medewerkers ontwikkelen onderling vertrouwen tijdens de implementatie
    d) de legitimiteit van de implementatie wordt versterkt

Source: Reed et al., (2009). Systematic Stakeholder Analysis for Ecosystem Services Governance at Local Level. https://doi.org/10.13140/RG.2.2.11202.20161.
Reed et al. (2009) Who's in and why? A typology of stakeholder analysis methods for natural resource management. Journal of Environmental Management, 90. https://doi:10.1016/j.jenvman.2009.01.001

Stakeholder analyse - hoe

Identificeren

- Mapping: maak een lijst met stakeholders

  (bijvoorbeeld door methoden te gebruiken zoals interviews, focusgroepen, sneeuwbalmethode - top-down/bottom-up)

Categoriseren

- Invloed: In welke mate kunnen belanghebbenden invloed uitoefenen op de implementatie?
- Belang: Welke belangen verbinden stakeholders met de implementatie?
- Nabijheid: Wat is de afstand van de stakeholders tot de implementatie? (direct betrokken, verder weg)

Relaties

- Eigenschappen van de relatie: Tegenstrijdig (verschillende einddoelen), complementair (dezelfde interesse), samenwerkend (hetzelfde einddoel, verschillende belangen); ja/nee; kracht; aard (sociale netwerkanalyse).
- Wie weet wat?: Kennis van stakeholders; informatiestroom tussen stakeholders; knelpunten en Bermuda-driehoeken, enz. (in kaart brengen van kennis).

Bron: Reed et al., (2009). Systematic Stakeholder Analysis for Ecosystem Services Governance at Local Level. https://doi.org/10.13140/RG.2.2.11202.20161.
Reed et al. (2009) Who's in and why? A typology of stakeholder analysis methods for natural resource management. Journal of Environmental Management, 90. doi:10.1016/j.jenvman.2009.01.001

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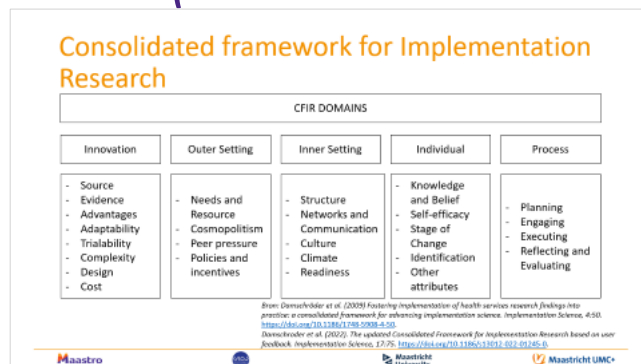# Stakeholders Implementatie AI

Intern
- RTTs
- RTOs
- Fysici
- IT
- CMIO
- Managers
- Onderzoekers
- Klinisch fysisch medewerkers
- Physician Assistants
- Patienten planners

Extern
- Patienten
- Verwijzers
- Andere RT instellingen
- Zorgverzekeraars (vergoeding)
- Overheid (wet- en regelgeving)

Mapping Barrieres & facilitators

- Mapping
  - Literatuur:
    - Welke barrieres en facilitators zijn er al bekend?
  - Stakeholders:
    - Welke barrieres zien medewerkers?

- Beoordelen/categoriseren volgens CFIR
  (Consolidated Framework for Implementation Research)

Consolidated framework for Implementation Research

CFIR DOMAINS				
Innovation	**Outer Setting**	**Inner Setting**	**Individual**	**Process**
- Source - Evidence - Advantages - Adaptability - Trialability - Complexity - Design - Cost	- Needs and Resource - Cosmopolitism - Peer pressure - Policies and incentives	- Structure - Networks and Communication - Culture - Climate - Readiness	- Knowledge and Belief - Self-efficacy - Stage of Change - Identification - Other attributes	- Planning - Engaging - Executing - Reflecting and Evaluating

Bron: Damschröder et al. (2009) Fostering implementation of health services research findings into practice: a consolidated framework for advancing implementation science. Implementation Science, 4:50. https://doi.org/10.1186/1748-5908-4-50.
Damschroder et al. (2022). The updated Consolidated Framework for Implementation Research based on user feedback. Implementation Science, 17:75. https://doi.org/10.1186/s13012-022-01245-0.

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Top 10 beinvloedende factoren implementatie AI

	Literature		Interviews	
	CFIR domain	Factor	CFIR Domain	Factor
1	Innovation	Data availability and quality	Innovation	Black box, explainability
2	Innovation	Privacy & Security	Implementation process	In- and external multidisciplinary collaboration[1]
3	Innovation	Black box, explainability	Implementation process	Lack of stakeholder involvement / engagement /consensus
4	Outer setting	Laws & legislation, policy (MDR, GDPR, CE marking)	Outer setting	Laws & legislation, policy (MDR, GDPR, CE marking)
5	Individuals	Knowledge and understanding of AI[1]	Inner setting	Communication
6	Individuals	Trust in AI	Innovation	QA, updating models[1]
7	Implementation process	Education[1]	Individuals	Knowledge and understanding of AI[1]
8	Implementation process	Lack of stakeholder involvement / engagement /consensus	Innovation	Interoperability, standardisation
9	Implementation process	In- and external multidisciplinary collaboration[1]	Innovation	Validation models, validity[1]
10	Innovation	Interoperability, standardisation	Inner setting	Finance & resources
	[1]Factors included in current recommendations which can be interpreted as a consensus of radiotherapy centres represented at the 3rd ESTRO Physics Workshop (2).			
	Matching factors in the top 10 for literature and interviews			

Implementatie strategie selecteren

- Doelbewust kiezen van implementatiestrategieën

- Op maat gemaakte implementatie om barrieres aan te pakken

- Betrokkenheid van belanghebbenden

- Theoretische en gevalideerde benaderingen voor het selecteren van implementatiestrategieën

- Combinatie **CFIR** (Damschroder et al., 2009) determinanten & **Expert Recommendations for Implementation Change** (ERIC, Powell et al., 2015) implementatie strategieen – Mapping tool online beschikbaar (https://cfirguide.org/)

Source: Schultes, M.-T., Albers, B., Caci, L., Nyantakyi, E. & Clack, L. (2022). A Modified Implementation Mapping Methodology for Evaluating and Learning From Existing Implementation. Frontiers in Public Health, 10:836552. https://doi.org/10.3389/fpubh.2022.836552
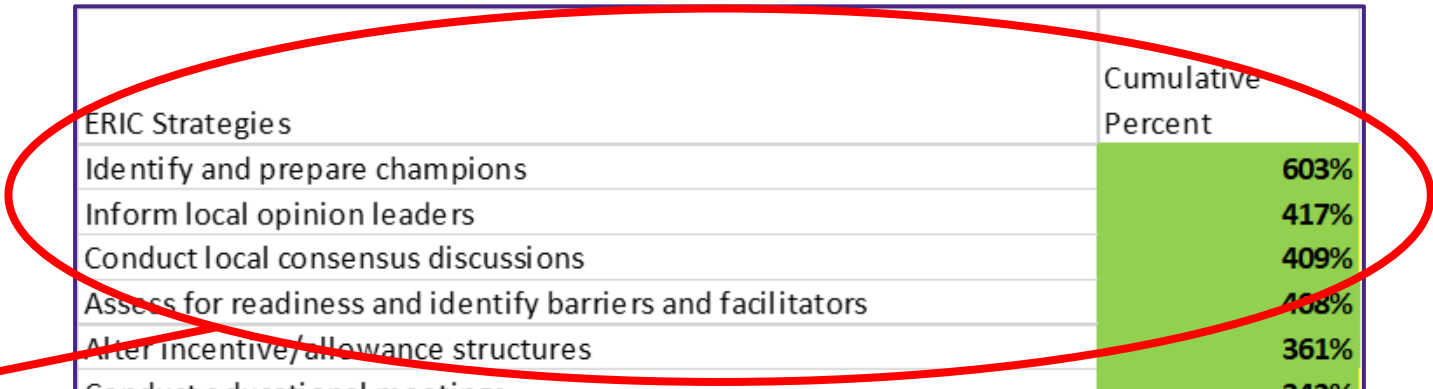
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ERIC strategy mapping tool

Clear All	Topic/Descripti	Related Barrier
Select All	**INTERVENTION CHARACTERISTICS**	
0	Intervention Source	Stakeholders have a negative perception of the innovation because of the entity that developed it and/or where it was developed.
0	Evidence Strength & Quality	Stakeholders have a negative perception of the quality and validity of evidence supporting the intervention.
0	Relative advantage	Stakeholders do not see the advantage of implementing the innovation compared to an alternative solution or keeping things the same.
0	Adaptability	Stakeholders do not believe that the innovation can be sufficiently adapted, tailored, or re-invented to meet local needs.
0	Trialability	Stakeholders believe they cannot test the innovation on a smaller scale within the organization or undo implementation if needed.
0	Complexity	Stakeholders believe that the innovation is complex based on their perception of duration, scope, radicalness, disruptiveness, centrality, and/or intricacy and number of steps needed to implement.
0	Design Quality and Packaging	Stakeholders believe the innovation is poor quality based on the way it is bundled, presented, and/or assembled.
0	Cost	Stakeholders believe the innovation costs and/or the costs to implement (including investment, supply, and opportunity costs) are too high.

Clear All	Topic/Description	Related Barrier
Select All	**INTERVENTION CHARACTERISTICS**	
	OUTER SETTING	
0	Patient Needs & Resources	Patient needs, including barriers and facilitators to meet those needs, are not accurately known and/or this information is not a high priority for the organization.
0	Cosmopolitanism	The organization is not well networked with external organizations.
0	Peer Pressure	There is little pressure to implement the innovation because other key peer or competing organizations have not already implemented the innovation nor is the organization doing this in a bid for a competitive edge.
0	External Policy & Incentives	External policies, regulations (governmental or other central entity), mandates, recommendations or guidelines, pay-for-performance, collaborative, or public or benchmark reporting do not exist or they undermine efforts to implement the innovation.
	INNER SETTING	
0	Structural Characteristics	The social architecture, age, maturity, and size of an organization hinders implementation.
0	Networks & Communications	The organization has poor quality or non-productive social networks and/or ineffective formal and informal communications.
0	Culture	Cultural norms, values, and basic assumptions of the organization hinder implementation.

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ERIC general strategies

ERIC Strategies	Cumulative Percent
Assess for readiness and identify barriers	408%
Conduct local consensus discussions	409%
Inform local opinion leaders	417%
Identify and prepare champions	603%

ERIC Strategies	Cumulative Percent
Identify and prepare champions	603%
Inform local opinion leaders	417%
Conduct local consensus discussions	409%
Assess for readiness and identify barriers and facilitators	408%
Alter incentive/allowance structures	361%
Conduct educational meetings	342%
Capture and share local knowledge	323%
Promote adaptability	314%
Build a coalition	311%
Identify early adopters	309%
Create a learning collaborative	289%
Conduct local needs assessment	262%
Audit and provide feedback	247%
Facilitation	238%
Involve executive boards	231%
Develop a formal implementation blueprint	227%
Tailor strategies	226%
Develop and implement tools for quality monitoring	211%
Conduct educational outreach visits	202%
Recruit, designate and train for leadership	201%
Develop educational materials	189%
Organize clinician implementation team meetings	189%
Conduct cyclical small tests of change	185%
Use advisory boards and workgroups	180%
Involve patients/consumers and family members	177%
Facilitate relay of clinical data to providers	170%

Voorbeeld: Barrieres implementatie AI @ Maastro en Implementatie strategieën

Gap research – clinic **Timing clinical need vs data availability** **Communication & Support**	AI-research agenda	Appoint contact person per clinical team: possibilities and needs to create a shared AI research/development agenda. Contact person = link between research and clinic. Quarterly meeting clinicians – researchers
Support, **Ownership, Communication**	AI-champions/ opinion leaders in clinical teams	Champions promote innovation on the work floor, gain support from other people, define, and overcome obstacles
Lack of knowledge and understanding	Education program	Define basic knowledge level and specific requirements for employees Training program and teaching materials will be made available.
Management/ Leadership	Management development program AI	Development of a module leading digital transformation for management.
Lack of stakeholder engagement, **Clear goals and process** **Support, Ownership &** **Communication**	Interactive, Multi-disciplinary Kick-off Workshop	Participants of the workshop: All relevant stakeholders (from researcher to ICT). Goal workshop: Creating collective problem awareness/collective ownership Workshop content: Goal and planning, barriers from various stakeholders, Brainstorming solutions for bottlenecks Evaluation: Acceptability, feasibility, appropriateness, costs
Risk analyses **Evaluation and testing** **Lack of effect measurement** **Education** **Clear goals and process**	Project plan & Evaluation	*Project plan including*: Phasing, Milestones/deliverables, Risk analysis, Effect measurement, training, Communication plan, *Complete project planning, including*: Time commitment, Staff deployment, Planning in time. *Evaluation before, during and at the end of project*: acceptability, appropriateness, feasibility, and the cost of the project *Evaluation after the project*: both content and process

Evaluatie gebruikte methode/format

- Taskforce Innovatie Implementatie – NVRO
  - Oktober 2023 workshop "Een research-based Implementatie strategie opstellen voor AI"

- Subgroepen opstellen eigen strategieen voor de Implementatie van auto-segmentatie op basis van AI

- Feedback op methode:
  - praktisch toepasbaarheid
  - systematische benadering
  - efficiëntie

Succesvol implementeren