Evaluation of environmental decision and information support tools: from adoption to outcome

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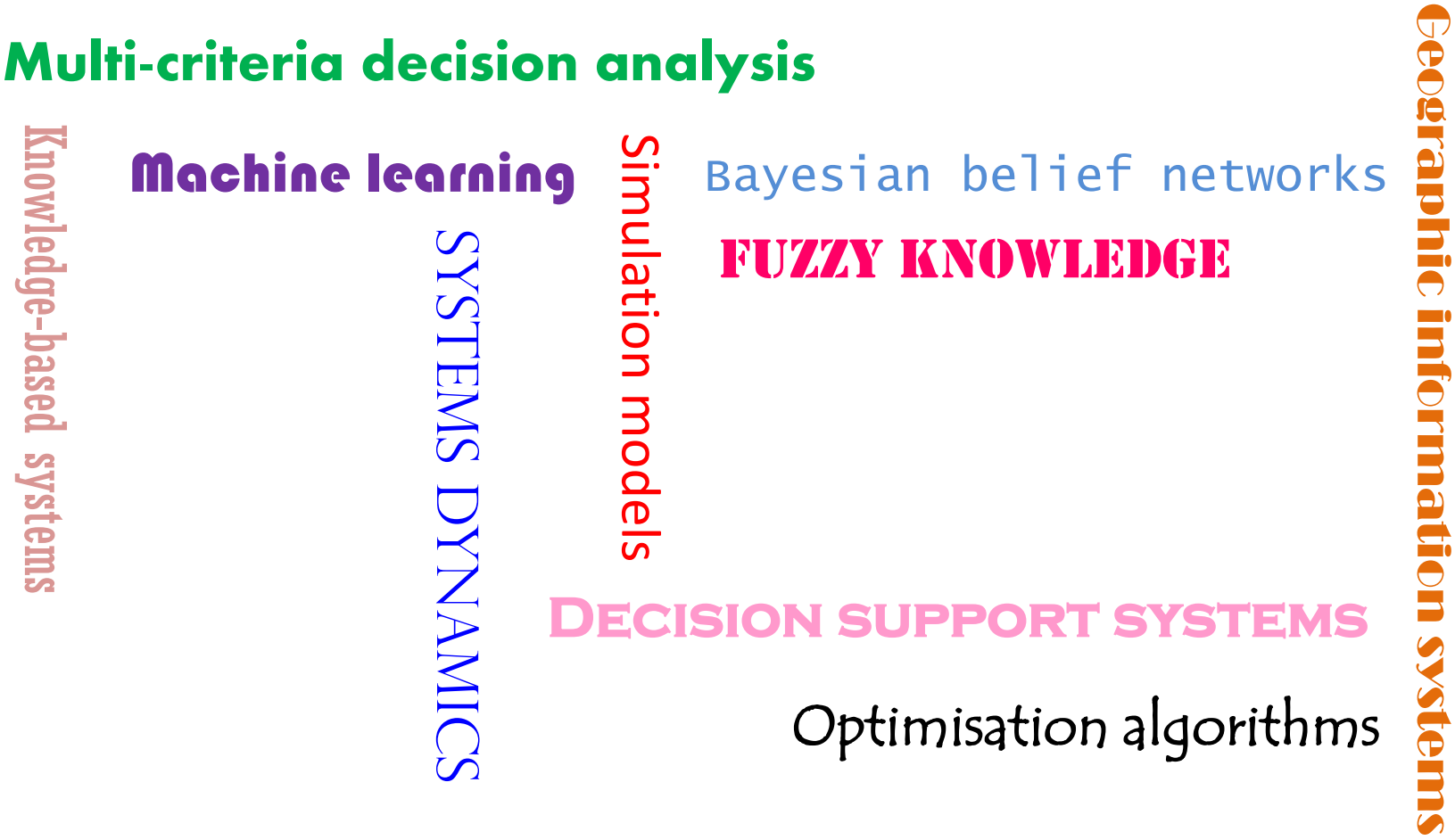
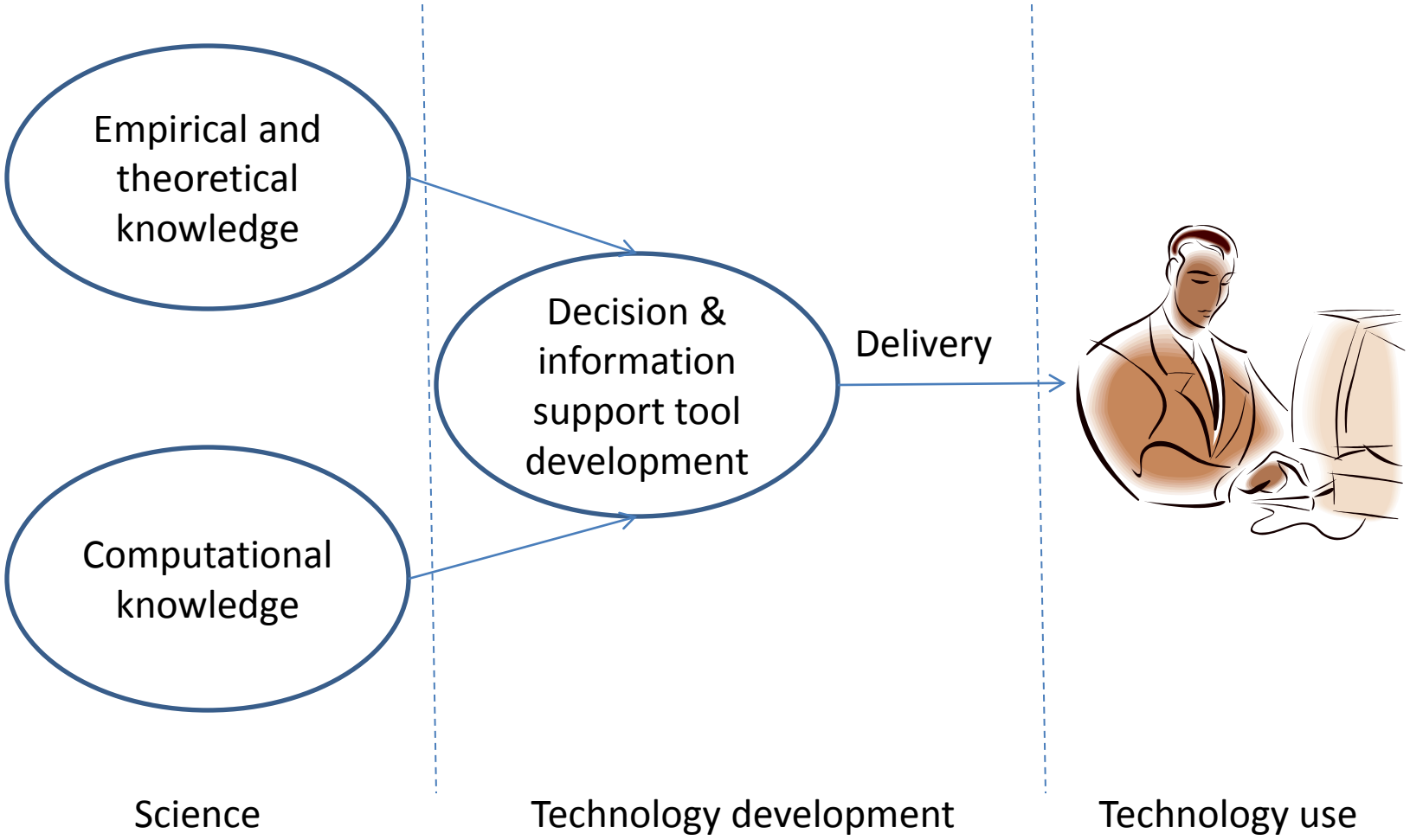
The richness of environmental decision & information support tools!

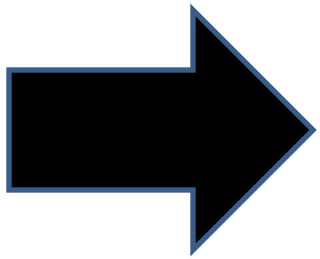


Are we neutral agents of scientific knowledge transfer?



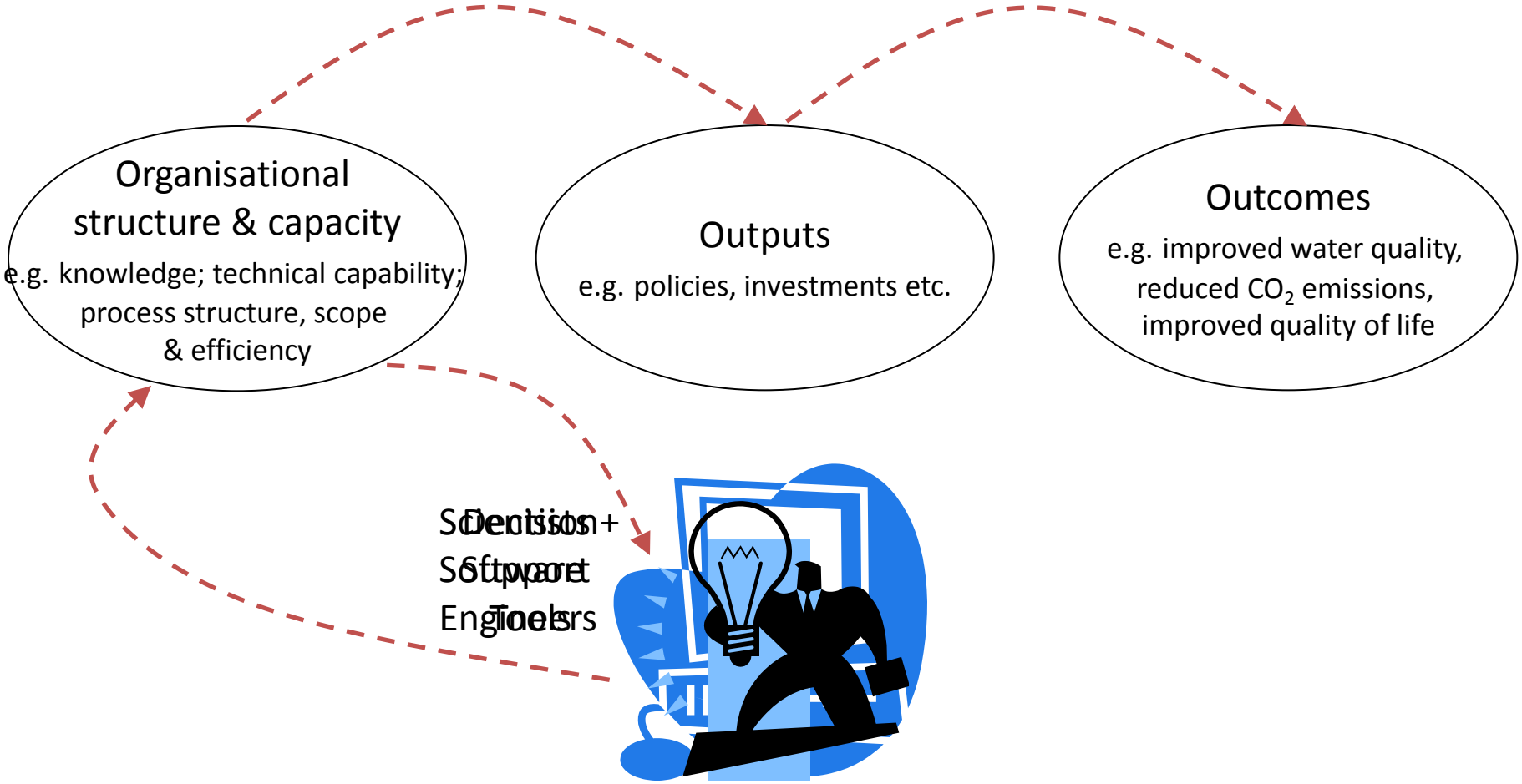
Evolving frameworks for product development

Technology push
1900s

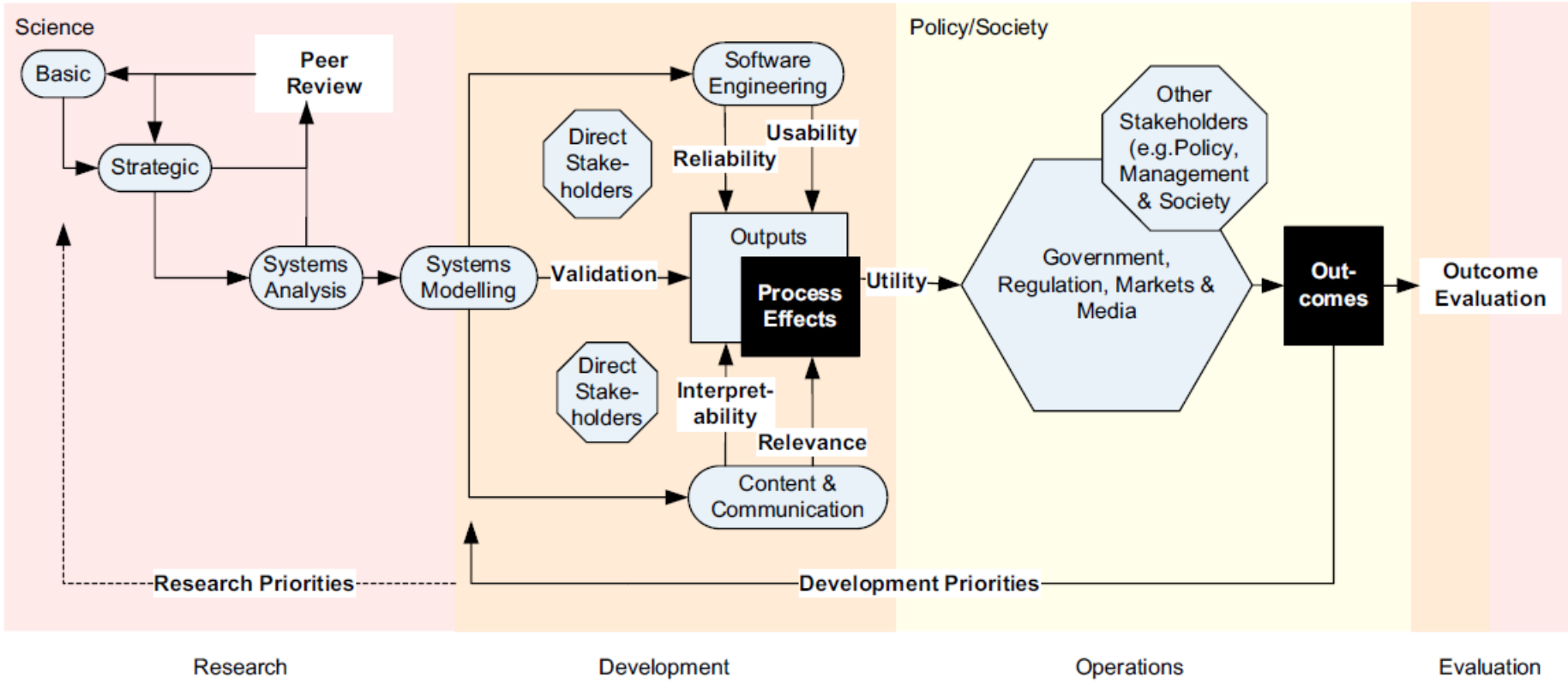


Interaction design
2000s

A simple model of DIST impact, output & outcome

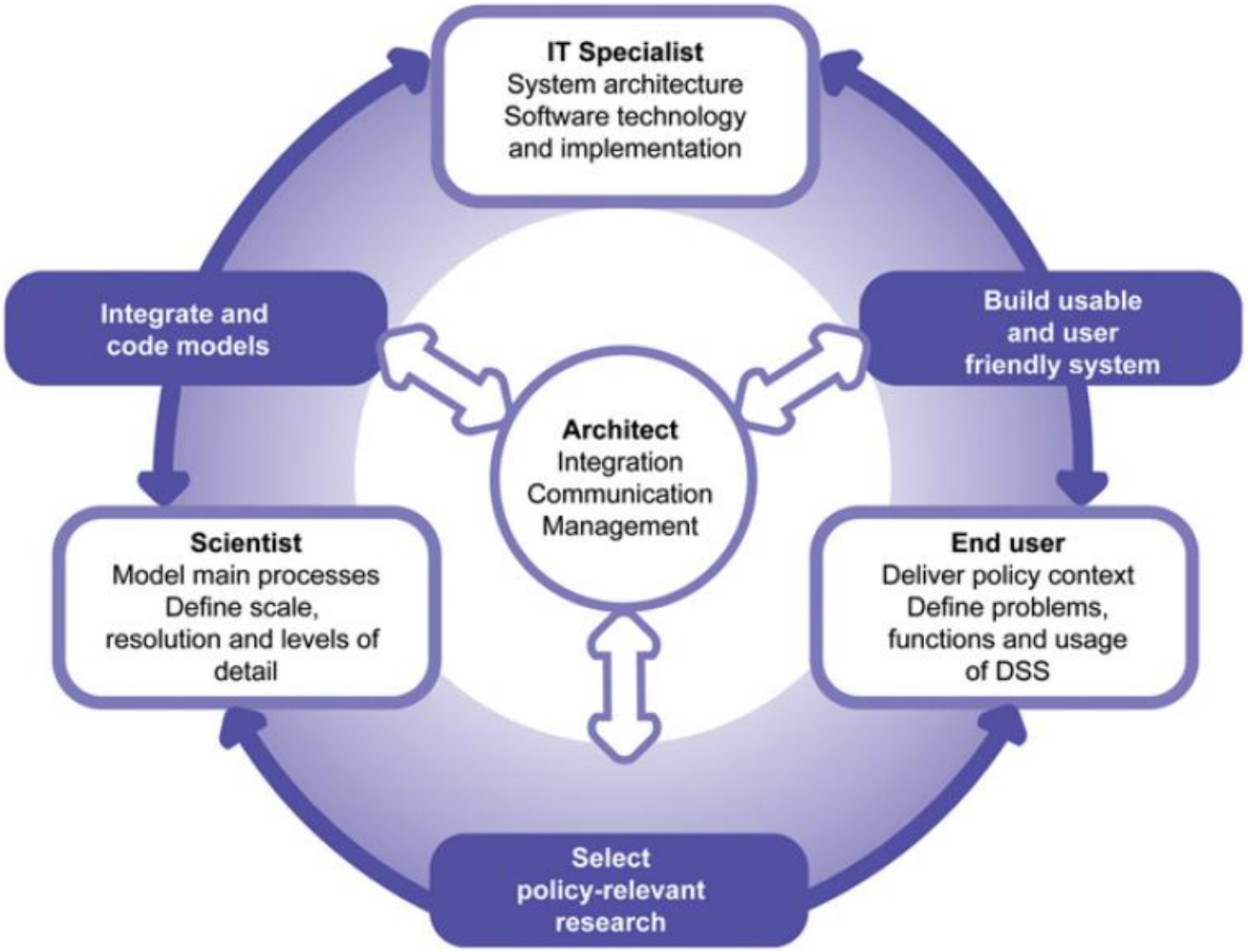


Matthews *et al.* (2011) model of EMS impact, output and outcome



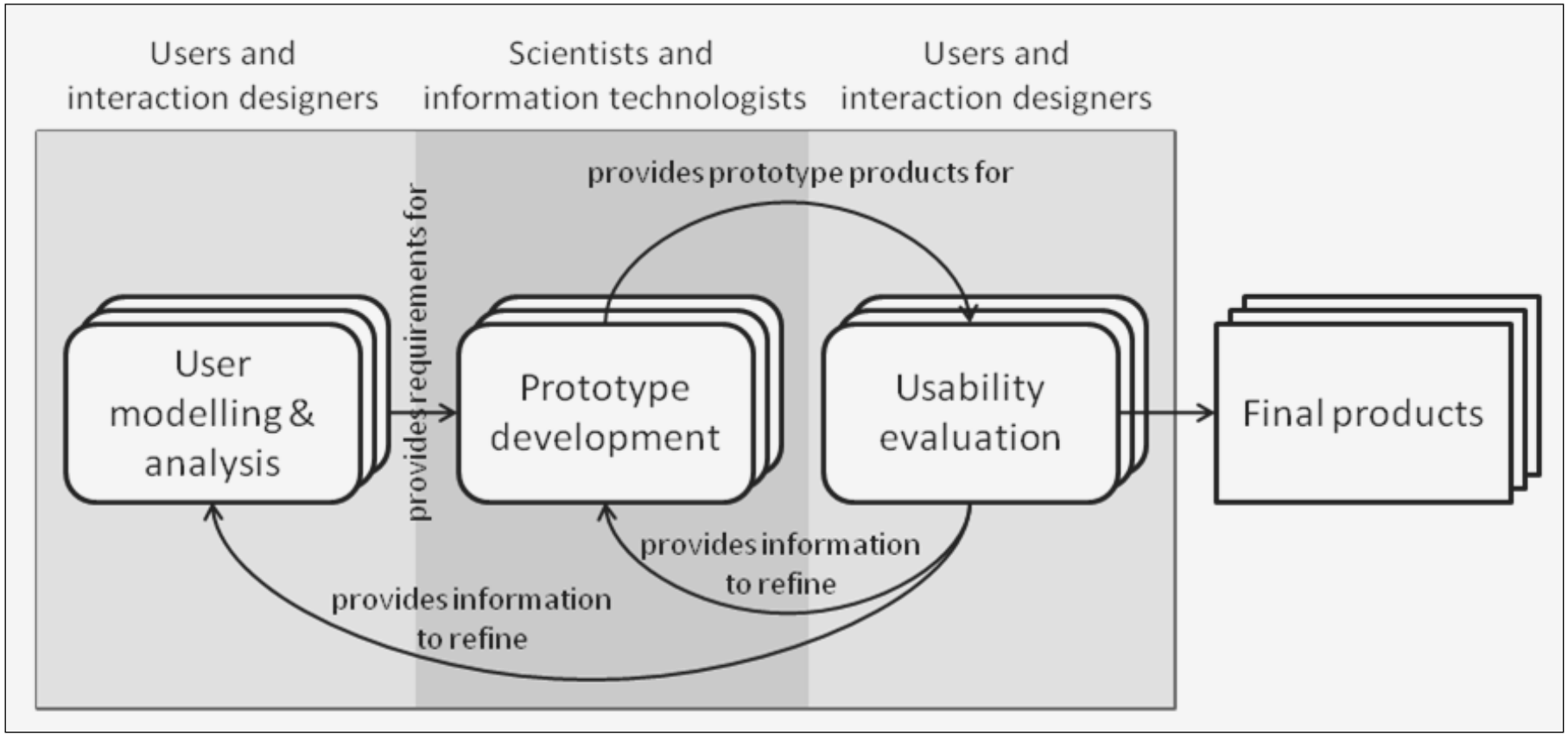
Matthews, K.B., Rivington, M., Blackstock, K., McGrum, G., Buchan, K. and Miller, D.G. (2011). Raising the bar? – The challenges of evaluating the outcomes of environmental modelling and software. *Environmental Modelling and Software* 26:247-257.

User centred design practices



van Delden, H., Seppelt, R., White, R. and Jakeman, T. (2011). A methodology for the design and development of integrated models for policy support. *Environmental Modelling and Software* 26: 266-279.

User centred design ideas



McIntosh, B.S. (2011). Evaluation of environmental decision and information support tools: from adoption to outcomes, Keynote paper given at MODSIM 2011, 12th-16th December 2011, Perth, WA.

Decision & information support innovation is organisation specific

- Requires significant engagement to ensure correspondence between decision support design, & individual & collectively perceived deficiencies & opportunities
- Windows of opportunity and timing are crucial
- Small advances may be part of an experimental approach to learning by users
- Decision support therefore less about adoption and more about co-operative, gradual change

Empirical understanding of impact

Impacts	Changes to execution and performance of work	Better effectiveness
		Better efficiency
		Capability to perform new activities
		Facilitation of information dissemination
		Freeing up time for other work
		Improved participation & decentralisation of decision making
		Improved communication internally and externally
	Changes to organisational structure	Allocation of new responsibilities
		Establishment of new units or departments
		Independence from other organisations
		New mandate of organisation
		New work protocols
	Financial investment	Computer acquisition
		Employment (additional)
		Training provision

Diez, E. and McIntosh, B.S. (2011). Organisational drivers for, constraints on and impacts of decision and information support tool use in desertification policy and management. *Environmental Modelling and Software* 26:317-327.

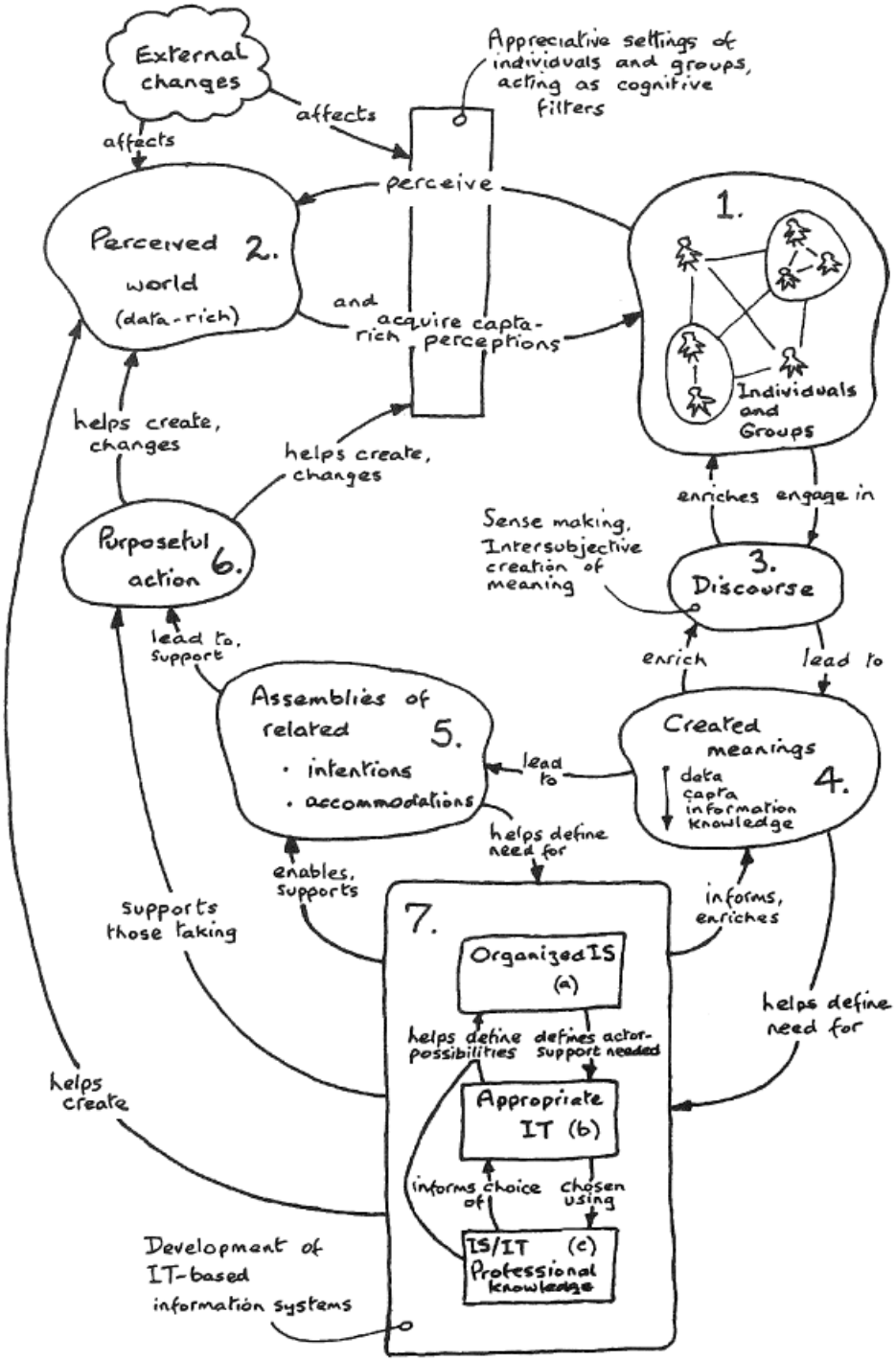
Empirical understanding of impact

DIST type	Drivers	Constraints	Impacts of use
Remote sensing	Data collection Desertification assessment Desertification monitoring	Financial investment Need for validation of DIST Need for updating of information in DIST Uncertainty	Better effectiveness Better efficiency Establishment of new units or departments Improved participation & decentralisation of decision making Investment in computers Need to hire people Training provision
GIS	Data management Desertification assessment Desertification monitoring Ease of use Facilitation of communication Facilitation of participation Forecasting Information integration Information updating Helping decision making Low cost Mapping capabilities Improving process understanding Provision of more detailed information	Tool complexity Financial investment Irrelevance Mistrust of developer Need for support to use DIST Need for validation of DIST Need for updating of information in DIST New work protocols Scarcity of documentation Uncertainty Unreliability	Better effectiveness Better efficiency Capability to perform new activities Establishment of new units or departments Facilitation of information dissemination Freeing up time for other work Improved communication internally and externally Improved participation & decentralisation of decision making Investment in computers Making more people aware of the effects of decisions Need to hire people Possibility to take more informed decisions Training provision
Statistical models	Desertification monitoring Ease of use Low cost	Need for updating of information in DIST Uncertainty	Investment in computers Need to hire people Training provision
Simulation models	Desertification monitoring Low cost	Mistrust of developer New work protocols Uncertainty	Better efficiency Investment in computers Need to hire people Training provision
DSS	Facilitation of communication	Incompleteness Uncertainty	Better efficiency Improved communication internally and externally Improved participation & decentralisation of decision making

Our evolving understanding of organisations

"In the 1960s the adoption of the standard assumption from management science that organisations could be treated as if they were instrumentalities, goal-seeking machines, seemed not unreasonable. But in the 1980s such an assumption seemed increasingly dubious. Why not treat organisations as if they were not goal-seeking machines but discourses, cultures, political battle-grounds, quasi-families, or communications and task networks?"

Checkland, P. and Scholes, J. (1990), *Soft Systems Methodology in Action*. John Wiley and Sons, Chichester



Process for organisation meanings (POM)

Checkland, P. and Holwell, S. (1998). *Information, Systems, and Information Systems: making sense of the field*. John Wiley and Sons, Chichester.

ETHICS

A response:
Effective Technical & Human Implementation of Computer-Based Systems (ETHICS)

- Objective 1: to ensure the future users or those impacted by organisational change play a major role in the design of those systems
- Objective 2: to enable those groups affected to apply specific job satisfaction objectives in addition to the usual operational and technical objectives
- Objective 3: to ensure that any technical system is supported by a functioning and compatible organizational system

Mumford, E. (1983). *Designing Human Systems - The ETHICS model*, Manchester Business School.

What is clear …

- We should not pretend to be engaged in a neutral transfer of scientific knowledge
- We are seeking to change environmental decision making positively and have a responsibility to ensure that this is what we end up doing
- We do not know enough about the ‘process effects’ our products have, nor whether they are good or bad in ethical terms
- We need to improve our understanding of the impacts of our products, and establish our ethics
- Are we sufficiently accountable?

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