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NATIONAL CENTRE FOR ENGINEERING IN AGRICULTURE

Defining Precision Irrigation

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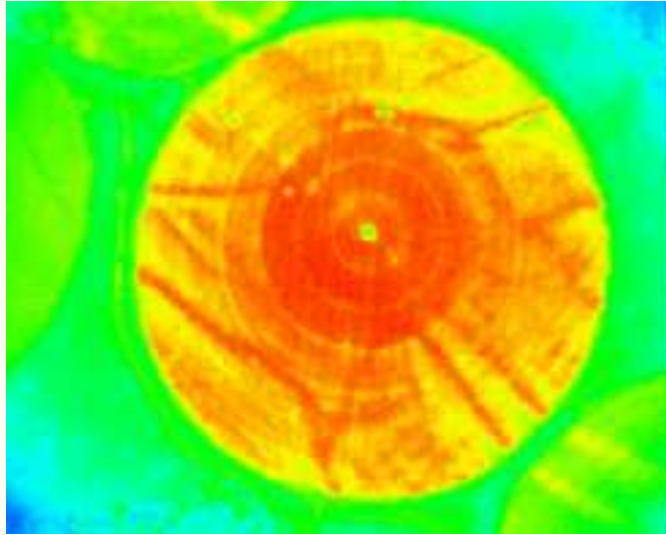


**Queensland
Government**

Natural Resources,
and Water

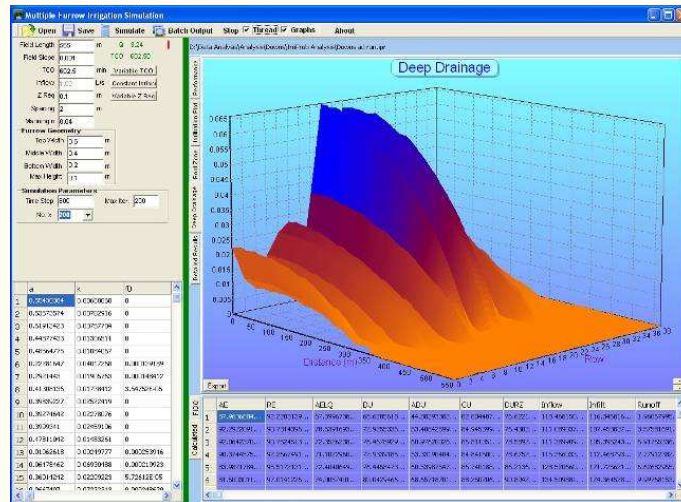


AUSTRALIA



Goal
to provide guidance to the irrigation industry on the application of Precision Irrigation (PI) and associated technologies.

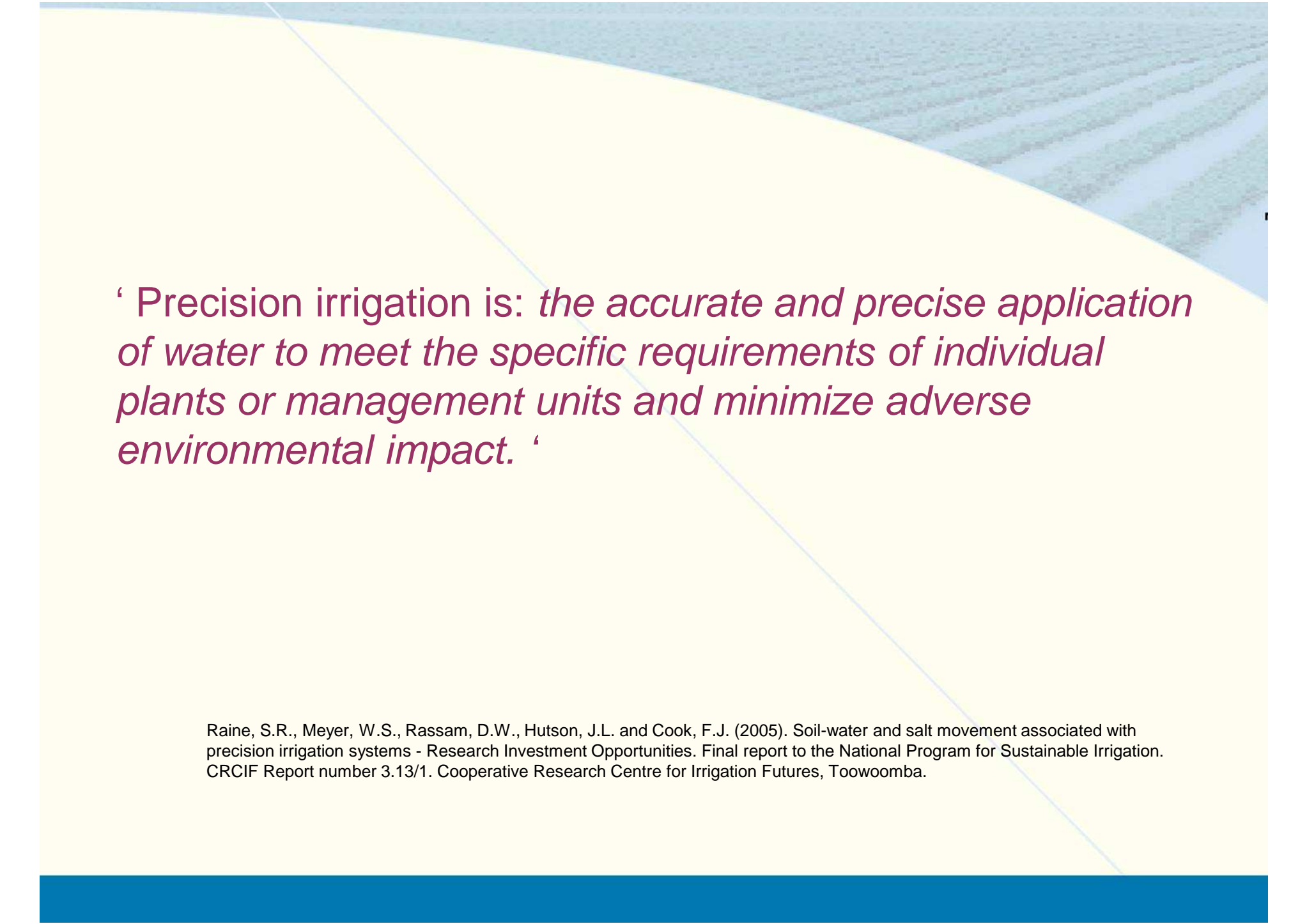
Funded by National program for Sustainable Irrigation (NPSI)



Project outcomes

- an agreed conceptualisation and definition of precision irrigation,
- an indication of the opportunities and likely success of adapting current application systems to precision irrigation,
 - case studies where PI is being implemented in whole or part, and
 - an evaluation of the likely or potential benefits from precision irrigation, and
 - a clear direction for future research in precision irrigation.



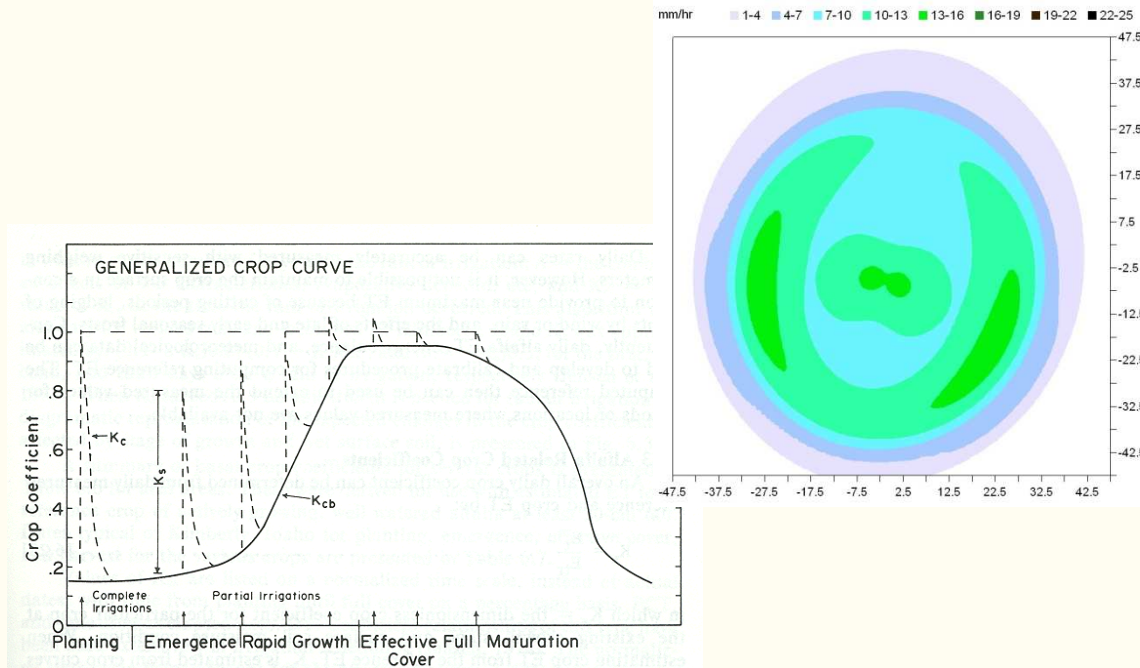


‘ Precision irrigation is: the accurate and precise application of water to meet the specific requirements of individual plants or management units and minimize adverse environmental impact. ‘

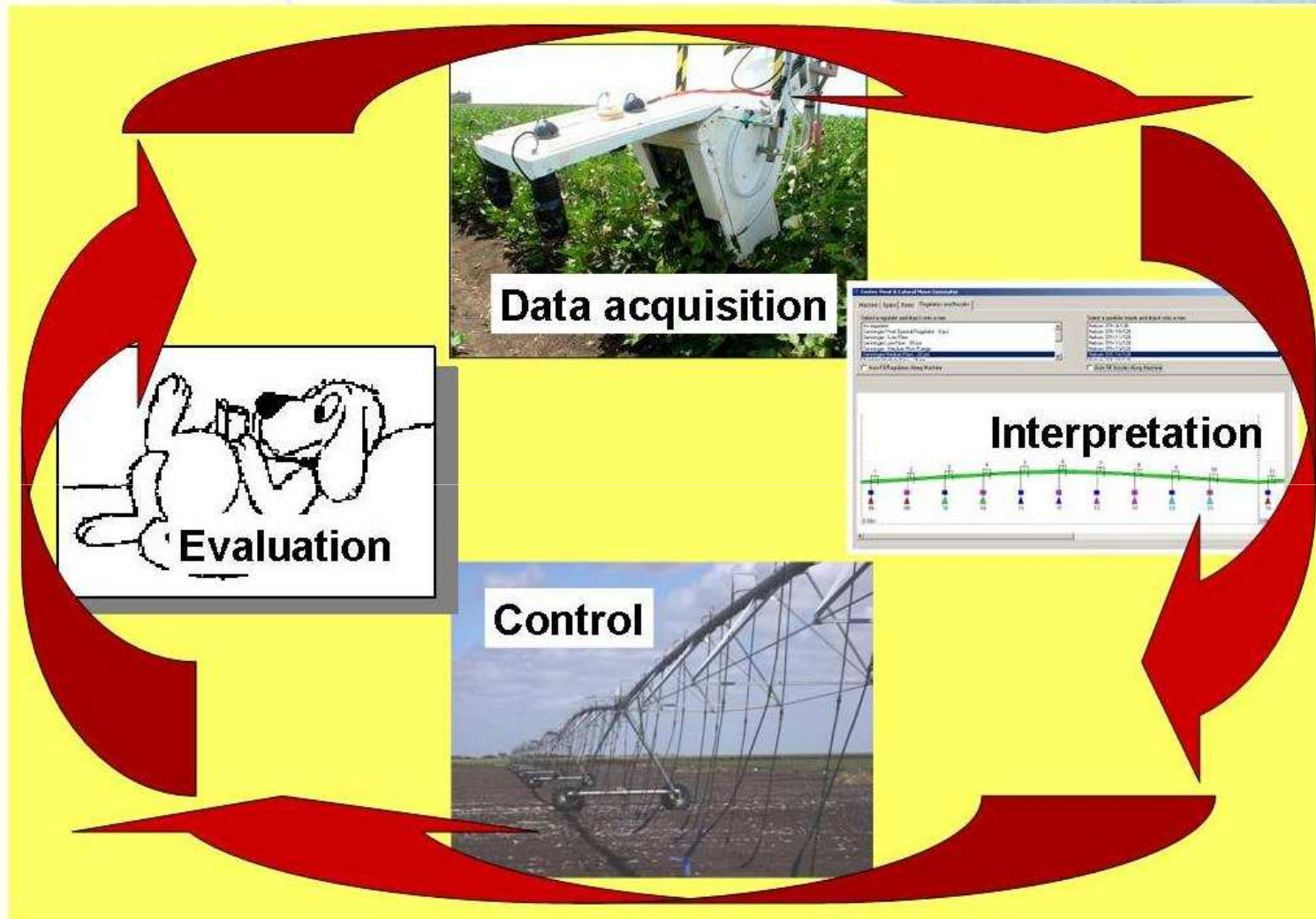
Raine, S.R., Meyer, W.S., Rassam, D.W., Hutson, J.L. and Cook, F.J. (2005). Soil-water and salt movement associated with precision irrigation systems - Research Investment Opportunities. Final report to the National Program for Sustainable Irrigation. CRCIF Report number 3.13/1. Cooperative Research Centre for Irrigation Futures, Toowoomba.

Precision irrigation is:

- is the optimal management of irrigation spatially and temporally;
- is holistic, combining seamlessly the optimal performance of the application system with the crop, water and solute management;
- is not a specific technology, it's a way of thinking;
- is adaptive, it's a learning system; and
- is applicable to all irrigation application methods.



Precision irrigation cycle



Precision irrigation is adaptive control

Components of PI

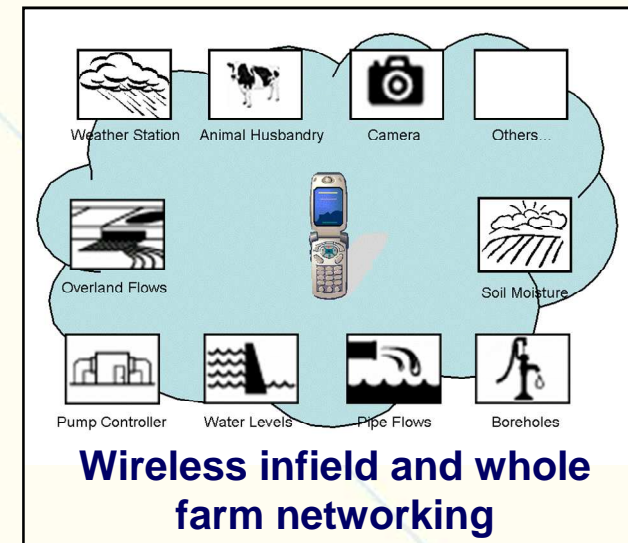


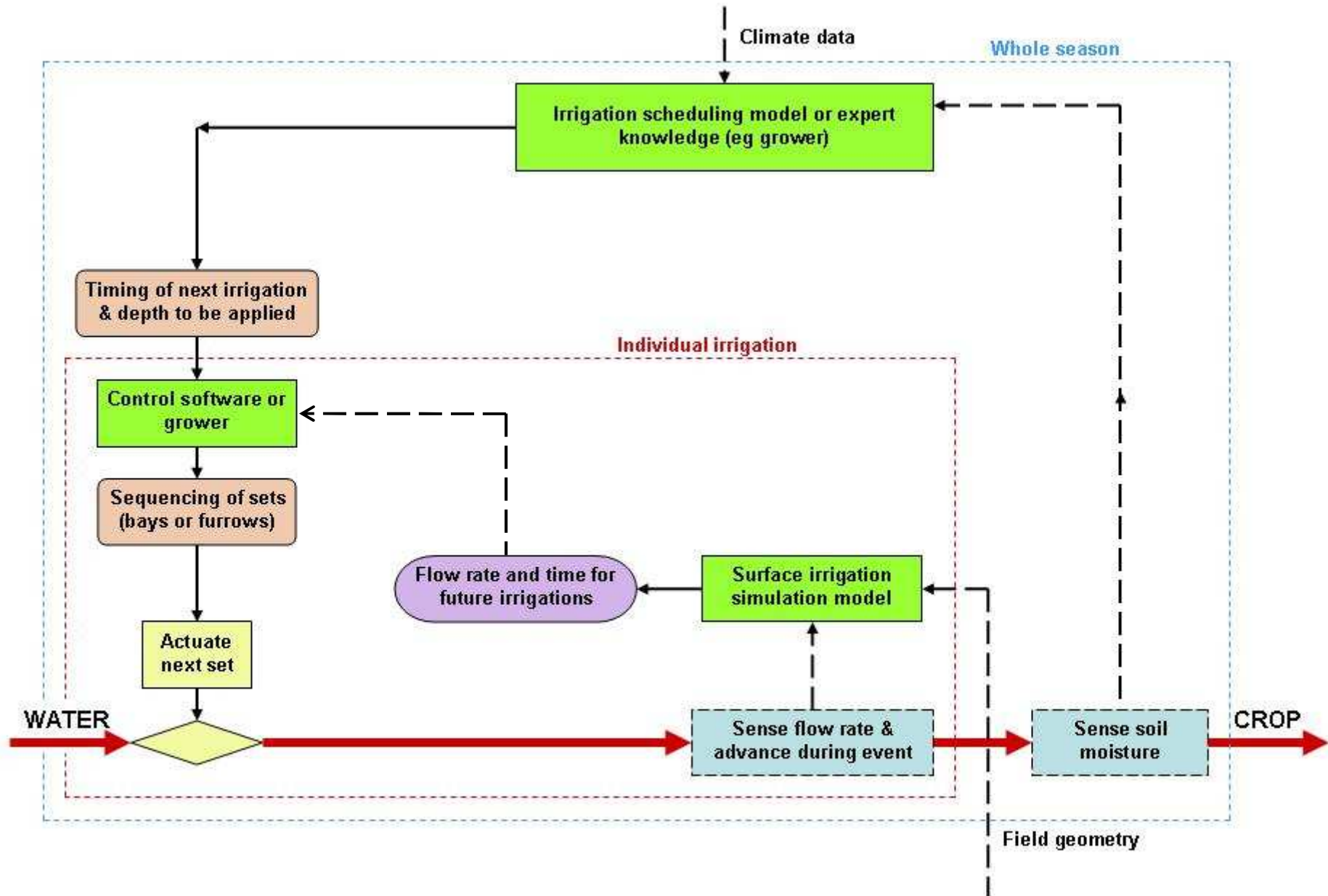
Essential

- measurement & simulation tools for evaluation & optimisation of the application system;
- sensing & decision support tools for irrigation management (ie, irrigation scheduling); and
- an effective control & response mechanism.

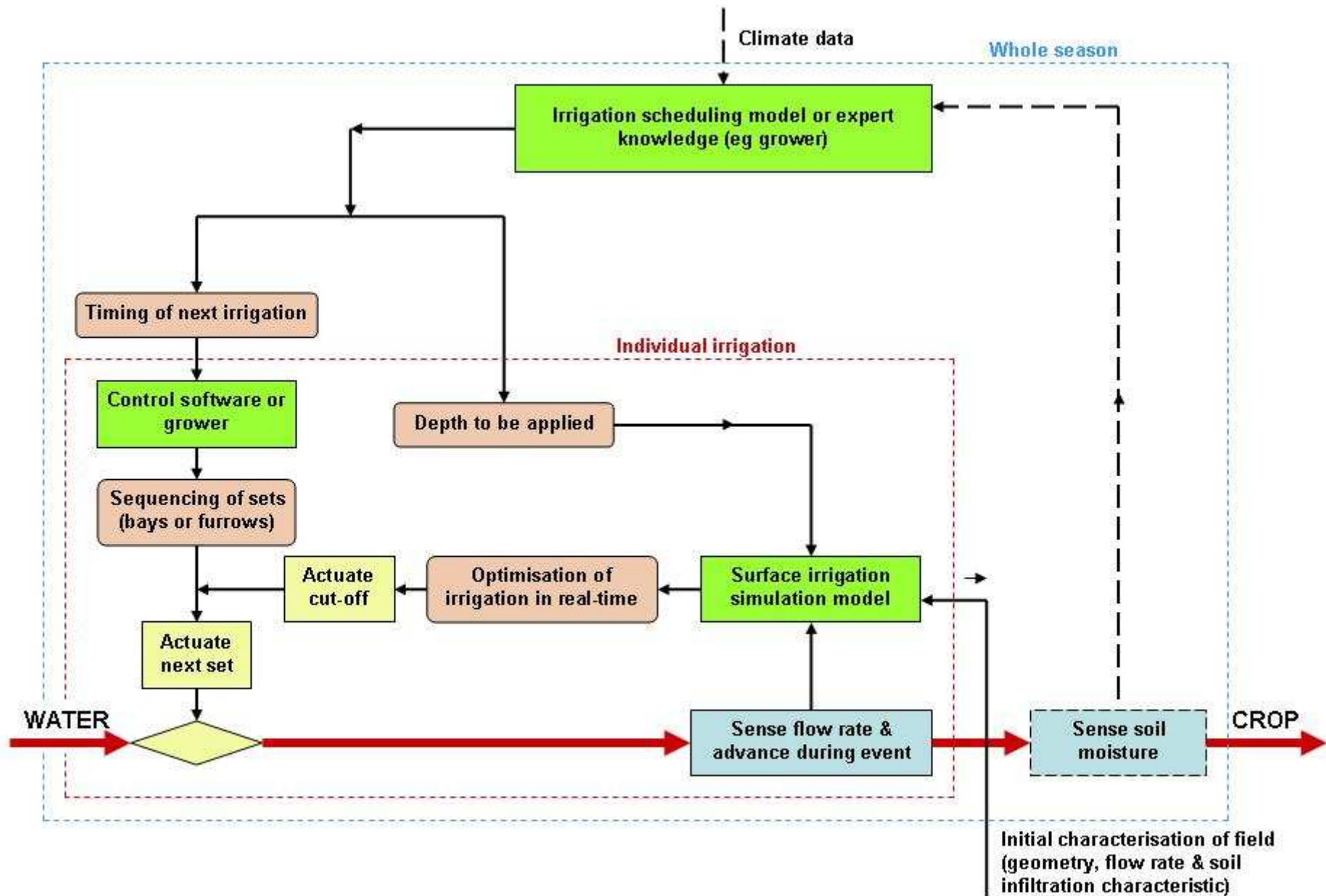
Optional

- Spatially & temporally varied applications (flexible) or management zones (fixed)
- Automation
- Informatics (information & communication technologies)
- Machine based &/or real-time control

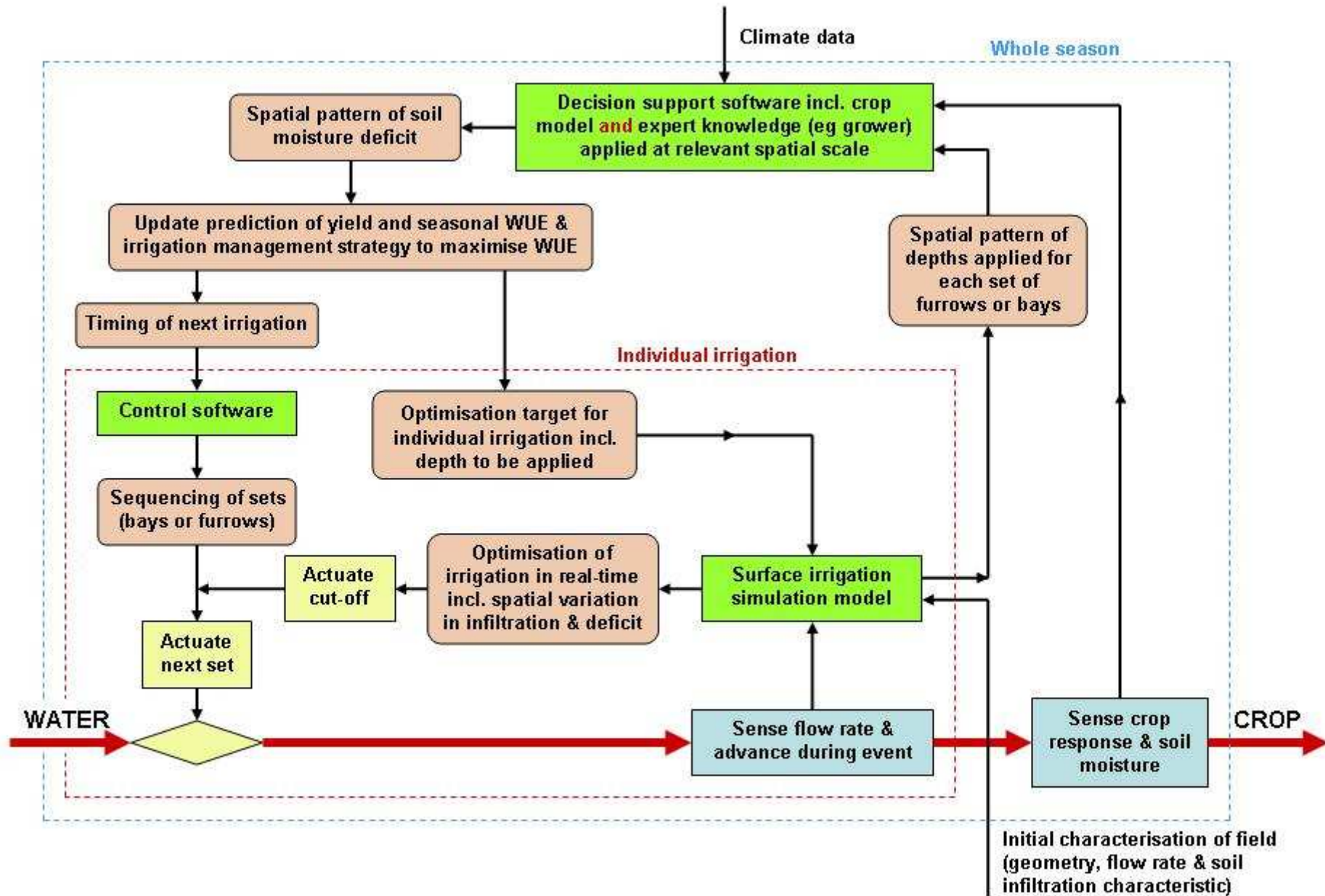




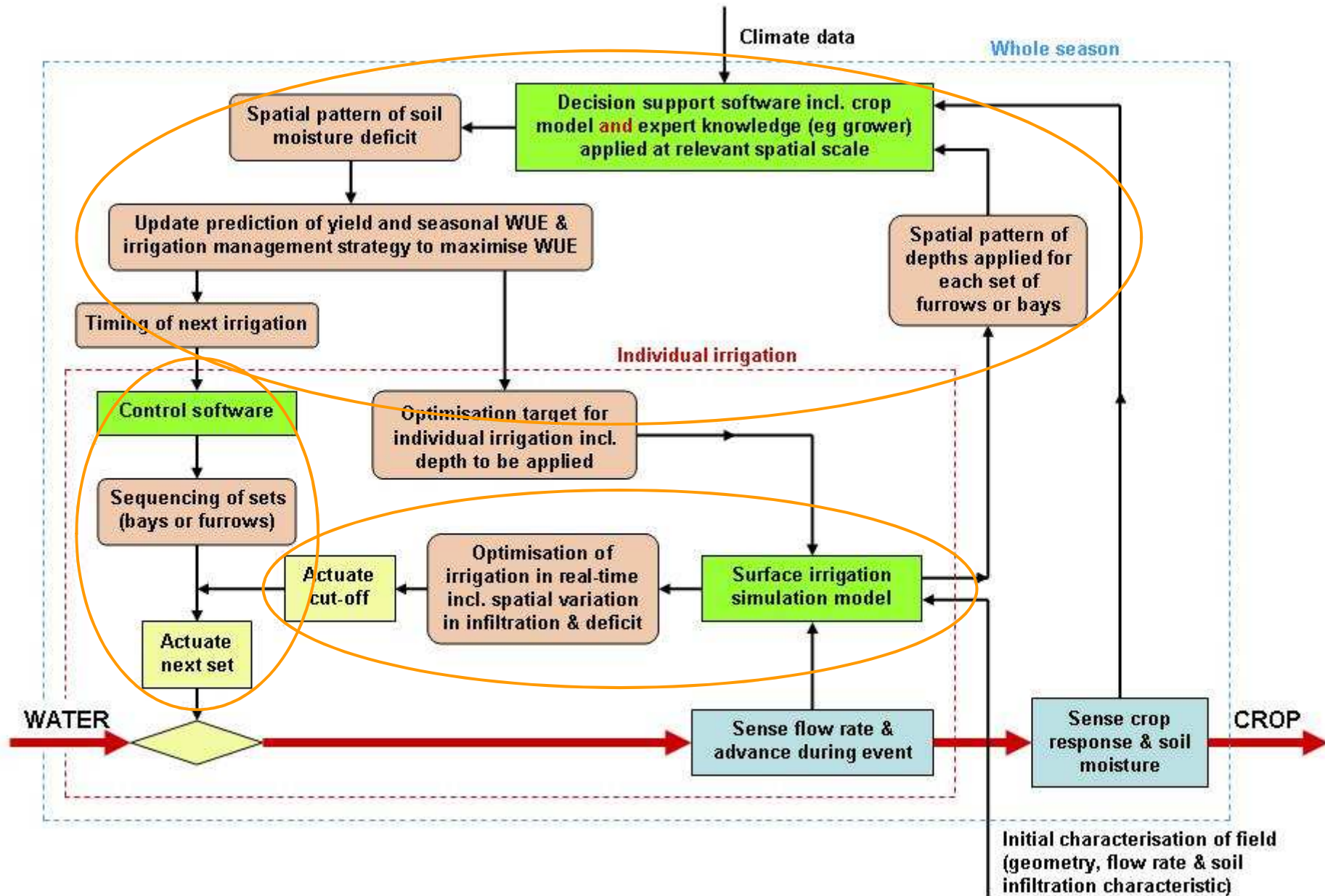
Traditional surface irrigation (automated or manual)



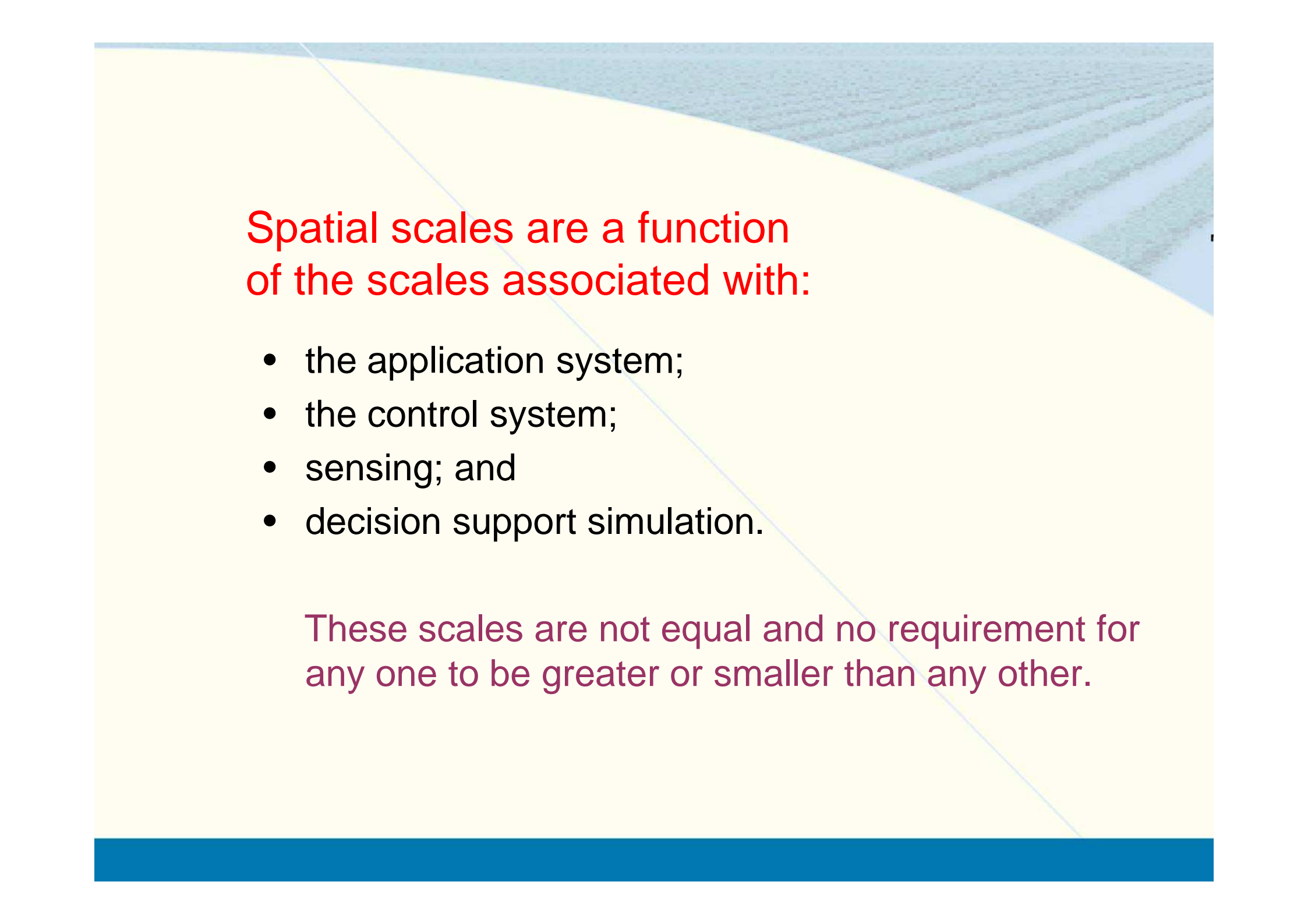
Smart automated surface irrigation



Surface irrigation as PI



Surface irrigation as PI

The background of the slide features a photograph of a green agricultural field with distinct rows of crops. A thin, light blue diagonal line runs from the top left towards the bottom right, crossing the field. The top portion of the slide is a light blue gradient, and the bottom portion is a solid dark blue bar.

Spatial scales are a function of the scales associated with:

- the application system;
- the control system;
- sensing; and
- decision support simulation.

These scales are not equal and no requirement for any one to be greater or smaller than any other.

Minimum spatial scales of common irrigation systems

System	Spatial Unit	Order of magnitude of spatial scale (m ²)
Surface - furrow	single furrow	1000
Surface - furrow	set of furrows	50000
Surface - bay	bay	10000 to 50000
Sprinkler - solid set	wetted area of single sprinkler	100
Centre pivot, lateral move	wetted area of single sprinkler	100
LEPA - bubbler	furrow dyke	1
Travelling irrigator	wetted area of sprinkler	5000
Drip	wetted area of an emitter	1 to 10
Micro-spray	wetted area of single spray	20

Key Conclusion

- No PI systems operational
- Many of the component systems, practices, tools and technologies available
- Integration is the research imperative



