

Commercialisation of models and modelling software developed under WRC funding.

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1. INTRODUCTION

The South African water research community has attained international recognition through the quality of the outputs that it has produced over the years. In the sanctions era when South Africa did not have access to overseas software, institutions embarked on the development of their own simulation software models. In addition, software models that were developed for the water sector were often tailored to the specific conditions of South Africa. These models were mainly intended for in-house or in-country use and were not developed for commercial purposes. Over the past years, the Water Research Commission of South Africa has continued to fund projects which have produced a number of models. A number of current projects in the Key Strategic Area 1 (KSA1) have “development or refinement of a model” as one of the main research deliverables.

The opportunity of commercialisation of research outputs, including such models has increasingly received attention worldwide. Greater sustainability could be achieved if this commercialisation can yield a good return, which could in turn be reinvested in further development and support of the models. This has been to some extent the case for institutions in developed countries such as the Danish Hydraulics Institute in Denmark, Delft Hydraulics in Holland, and HR Wallingford in the United Kingdom. In the Water Research Commission funded projects, commercialisation is therefore one aspect that is increasingly getting more attention in the project proposals as the organisation seeks to gain better returns on the research funds. In the case of projects that result in the development of models, the need to commercialise the models is even greater.

This paper summarises the results of a preliminary survey of the broad base of model users within the country. The questionnaire was designed to provide information on the current use of models (Section B), the status of models that have been developed within South Africa (Section C) and general attitudes on model design and use (Section D). The questionnaire is provided as an appendix for more information, while the following three parts of this paper summarise the replies that were received for the three sections.

2. Section B – Existing use of modelling software

The questionnaire replies referred to 49 different models and with some multiple model references a total of 85 model/organisation combinations were referred to.

2.1 The models

Table 1 lists the models referred to by the organisations that replied, their application category and brief descriptions of their purpose (when available).

Table 1 The models referred to in Section B of the replies.

Name of Model	Model Type	Short Description
SPATSIM	1,5,11	Integrated spatial and numerical database system with links to a wide variety of models
WRYM	2	Water resources yield model

WRSM 2000	1	Surface water and reservoir simulation model
ACRU	1,7,13	Surface water, reservoir, sediment and water quality simulation model
WRPM	2	Water resources planning model
WSAM	1,2	National water resources availability and yield model
UPFlood	5	Flood modelling and design (deterministic and probabilistic)
SAPWAT	12	
Modflow	3	Ground Water model
HEC-RAS	10	Hydraulic routing and hydrodynamic model
ETO Calculator	12	
SWAT	2	
HSPF	1,7,13	Database management system with links to surface water, water quality and sediment models
SCS-SA	5	Design flood simulation model based on SCS method adapted for SA
WAS	12	
US National Weather Service River Forecast System	1	
SWB	7	
Saltman	7	
Rain	14	
EPA Net	?	
Civil Designer	1	
3pg	14	
WRSM 90	1	Surface water and reservoir simulation model (see WRSM 2000)
WISH	3	
Watercad	9	Water supply reticulation design using CAD type approach
WADISO SA 4.3	9	
VTI (Hymas - Dos)	1	Daily surface water simulation model (now in SPATSIM)
TSOFT	1	Generalised time series display and analysis program (see SPATSIM)
SWAP	12	
Stasoft	7	
Salt Balance	7	
RETC	13	
Reserve Desktop Model	11	Low confidence model to estimate the ecological reserve requirements (see SPATSIM)
Rapid GW Reserve	3	
Patching Model	1	Streamflow data patching, extension model based on flow duration curves (see SPATSIM)
Mike Basins	1,2	Surface runoff and yield model
Mike 11	10	Hydraulic routing and hydrodynamic model
ISIS	10	
IMPAQ 1.1	7	
IHACRES	1	Daily surface water simulation model
Groundwater		
VISTAS	3	
Geo Seepw	3	
Geo Ctrain	7	
GAMS		
FC Method	4	

Drift And Drift-Solver	11	Model for the determination of the ecological reserve based on workshop outcomes
Cropwat	12	Crop water requirement modelling
CFP	10	
Aquawin	3	

2.2 Purchase costs

The majority of the models that were referred to were obtained for no cost (see Table 2) and therefore it can be concluded that there is very little financial investment by existing model users. As many of the models referred to are of South African origin, it may be assumed that the costs have been largely carried by the organisations that sponsored the development of the models.

Table 2 Percentage of all model/organisation combinations referred to (85) subdivided by purchase price categories.

Cost	Free	<500	500-1000	1000-5000	5000-20000	>20000
Percentage	67	5	7	11	5	5

2.3 Maintenance costs

The majority of the replies either failed to fill in the maintenance cost question or specified no maintenance cost. While this could be because maintenance is not provided (or where provided, not used), it is also clear that very few financial resources are expended on software maintenance. The total annual maintenance costs for all 85 model/organisation combinations is R56 000.

2.4 Number of users

The estimated total number of individual users is 163 and Table 3 illustrates the extent to which individual models are in use. It is clear that many models out of the total of 49 referred to in the replies are used by a small number of individuals, while very few models are in more widespread use. The models falling into the top three categories (i.e. more than 10 users) are WRSM, WRYM, WRPM, ACRU, SPATSIM and MODFLOW. This may be a reflection of the type of organisations that replied and their interest in this survey. However, this is considered by the review team to be a reasonable reflection of the relative extent of model use within South Africa, even if the actual number of users is greater. WSAM, UPFLOOD and SAPWAT all reflected a total of 7 users, which also confirms some of the perceptions of the review team.

Table 3 Percentage of models (total = 49) falling into 5 categories based on the number of users.

No of users	1-4	5-9	10-14	15-19	20-30
Percentage	82	6	8	2	2

2.5 Frequency of use

66% of the 85 model/organisation combinations reported infrequent use, 20% moderately frequent use and 14% frequent use.

2.6 Satisfaction with software and support

Many replies failed to identify their satisfaction with the level of support and in most cases the assumption was made that they did not receive support or had not called upon any support services and the reply was assumed to be 'No Support'. This has biased the results for this component of the survey and the figures given in the third row of Table 4 may not be an adequate reflection of the support offered by the model developers or custodians. It is apparent that there is a high level of satisfaction with the software available to South African organizations, but that there is a need to address levels of support.

Table 4 Percentage of the 85 model/organisation combinations reporting different levels of satisfaction with the software and support.

Satisfaction	Excellent	Good	Fair	Poor	No Support
Software	31	48	19	2	N/A
Support	22	22	25	6	25

2.7 General observations

There were some notable gaps in the replies, with some relatively large organisations that are known to make extensive use of models (and develop their own) not submitting returns. However, an understanding of their level and type of model use suggests that the general conclusions from this section would not have been affected. The main impact would have been to increase the degree of model use and add a few more models to the list. It is difficult to estimate what the effect would have been on the level of satisfaction though.

In general terms it is apparent that the existing level of model use is relatively small and mainly lies with a limited number of organisations and individuals. This may have a significant impact on the potential to commercialise models and software.

3. SECTION C – Summary of information on Model development

Section C of the questionnaire deals with model development. The responses are first described per grouping before the main conclusions are drawn in relation with the objective of the study.

3.1 Profile of respondents

13 respondents are involved in model development,
Their profile is as follows:

- 7 research institutions (54%)
- 5 consultancy firms (38%)
- 1 directorate within a government department.

3.2 Type of models

20 models were reported on, covering by priority ranking the fields shown in table 5.

Table 5 Models under different fields

Field	Number of models	Comment
Agriculture water management	7	5 models are from 2 departments within one university and 2 models from one consultant.
Flood modelling and design	5	3 models are from one research institution
System yield modelling	3	One specific model is about groundwater yield while the others are about surface water
Surface water modelling	2	
Water quality modelling	2	
Groundwater modelling	1	
Environmental flows modelling	1	

Note: one specific model covers two fields (flood modelling and design and surface water modelling), hence the total number of models above is 21 because of this double counting.

3.3 Model development

Under this section, the model development time, the status of the development (if the model is finalised or not) and the nature of the development (on the technical content or the packaging).

3.3.1 Development time

Table 6 Development time of models

Duration	Number of models	%
>5 years	9	45
3 to 5 years	6	30
1 to 3 years	4	20
1 year	1	5

Only one model was developed within a year, the developer recognises however that it needs to be upgraded. It appears that most models take more than 5 years to complete. This is stated considering that most models are still under development.

3.3.2 Status of development

15 of the 20 models (or 75%) are still under development. The next section describes the nature of the development.

3.3.3 Nature of development

The technical content of 12 models is still being developed and similarly, the packaging of 12 models is also being developed.

Of the above, development of both the technical content and the packaging is taking place for 9 models.

3.4 Funding

The following points summarise the funding situation for the development of the models with respect to the source of funding.

- 16 of the 20 models (or 80%) are funded by the Water Research Commission.
- 8 of the 16 models funded by the WRC (or 50%) have funding from their own organisations or from another source. The questionnaire did not ask for a distribution (%) of the funding.
- Of the 20 models, 6 (or 30%) have funding from other sources (other than the WRC's or their own), including DWAF.
- None of the models has a joint funding by the WRC and DWAF.

3.5 Model availability

Table 7 summarises the responses on the availability of the models under development.

Table 7 Availability of models

	Number of models
Code freely available	8
Model freely available	7
Model free by arrangement	9
Model free after training	7

Most models, especially those funded by the WRC or public money from elsewhere (such as the USA) are available for free or for a nominal fee (of between R500 and R1200). The bulk of the costs are in the training on the use of the model and can vary from R2400 to thousands of Rands (in this case, it is not only the training but further applications or adaptations of a model for which the code is freely available).

3.6 Training and support

The availability of training and support was assessed as follows:

Table 8 Availability of support and training

Type of support	Number of models
Technical Manual available	11
Model Software Manual available	14
Training available	15
After sales support	13

These responses indicate that in most cases, the training and support is generally available from the model developer's perspective. One specific model developer noted that after sales support could however be time consuming.

3.7 Users profile

This section assesses the number of other organisations involved in the use of the models.

Table 9 Use of developed models

Number organisation using model	Number of models used	Comment
1 to 2	8	
2 to 5	4	
5 to 10	2	
10 to 15	0	
>15	4	3 have funding from the WRC

It appears that the majority of models are used by a limited number of organisations. Two specific models (not included above, hence the total is 17) seem to be used by the developer's organisation alone, but most likely on behalf of his clients.

Of the 4 models used by more than 15 organisations, 3 have funding from the WRC, although one is originally from the USA.

Table 10 The distribution of users by organisation type

Organisation type	Number of models	Comment
Government	7	
Consultants	16	
Researchers	8	
Other	1	The 'other' users for this model are Agriculture Extension Officers who could be seen as part of government.

3.8 Conclusions

With regard to the support of the Water Research Commission in model developments, the following conclusions are drawn from the above responses:

- 75% (3 out of 4) of the models that have a wide user range (>15 organisations) are funded by the WRC. This is however limited to a few models only since the vast majority has lesser users (11 models are used by less than 5 organisations).
- 80% of the models are funded by the WRC
- Models are mostly freely available or at a nominal fee, but training is provided a cost.
- Support is available from the developers.
- Models are likely to be 'living' models since for most of them, their technical content and/or their packaging are under development.
- It is of worth to note that while the majority of respondents were from research institutions, the majority of users are consultants (see section 7 above). This suggests that they might be prepared to carry the costs associated with the use of a model if there are clear benefits for them.
- The conclusions were drawn from the sample of respondents. It is likely that more responses could have yielded different conclusions, but this is not sure either.

4. SECTION D - General attitude and perceptions about commercialization of model software.

4.1 Profile of respondents:

37 useful questionnaires were received and analysed for Section D, the profiles being as given in table 11.

Table 11 Distribution of replies by sector.

Government	Consulting	Research	Other
8	15	11	6
20%	37.5%	27,5%	15%

A number of institutions described themselves with two characteristics, for example Government+Research, University+Research (3), Consulting+Research (2), and CSIR+Research. The "Other" category includes a Water utility, University (3), Technikon, Electricity Suppliers (Eskom), CSIR and Water Board (Amatola Water).

In some instances the respondents indicated clearly that their answers to questions were based on a personal opinion, and that it does not necessarily represent the official viewpoint (if in fact such a viewpoint is available) of the organisation concerned.

Individual general comments on the completion of Section D are:

"My organization, DWAF, is big and with diverse modelling needs. My views in this response are therefore only limited to my Sub-directorate of Systems Operation of the Directorate of Water Resources Planning Systems".

"I am unable to fill in the entire questionnaire, as I have not yet begun to use the models/techniques developed for ecological flow determinations".

4.2 There are sufficient products to meet requirements

Answers are as follows:

Yes	No	Yes & No
17	16	2
49%	46%	6%

For a number of questions respondents either did not indicate a clear preference, or chose both "Yes & No", stating that the answer is conditional, depending on the type of product intended. On this question about half of the respondents are of the opinion that sufficient products are available to meet their requirements.

4.3 Preference for South African developments

Answers are as follows:

Yes	No	Yes & No
28	5	-
85%	15%	

There is a clear consensus that South African developed products are indeed preferred by the majority (85%) of respondents.

4.4 This organization finds overseas software more competitive

Answers are as follows:

Yes	No	Yes & No
13	15	6
38%	44%	18%

Again the split between “yes” and “no” are about equal, with a larger number of “Yes & No” conditional statements.

4.5 Level of satisfaction with available products

Table 12 Satisfaction with available models

The available products are satisfactory:	Yes	No	Yes & No
From a technical point of view.	27	6	4
From a ‘user friendly’ software point of view.	17	13	4
From the point of view of training availability.	14	13	7
From the point of view of support.	14	15	5

Whereas the majority (82%) of respondents find the available products satisfactory from a technical point of view, only slightly more than half (57%) find the products satisfactory from a “user friendly” point of view. As far as product support is concerned, again about half of the respondents do not consider support satisfactory. Of those opting for a “yes & no” conditional response, one respondent stated: *“None of the above can have a single answer.”*

4.6 Most appropriate method of ensuring WRC developments are made available

Preferences are as follows, with a number of respondents opting for more than one option:

Table 13 Preferences for future development

WRC assumes the responsibility for technology transfer.	17	36%
Market the product commercially to generate income for future developments and support.	4	8%
Market the model at minimal cost, but generate income through training and support charges.	23	49%
Market the expertise in the use of the model, but restrict access to the model.	3	6%

There is a clear preference for the third option, with the first option getting only slightly less support. Four respondents indicated a preference for both options 1 and 3. The second and fourth options received very little support.

“Other” possibilities requested resulted in the following proposals:

"I don't know the answer to this question. The adaptation of a model is not only based on its technical attributes but also on easy of use and availability. Cost restricts availability. Easy of use speeds up applications. I also feel that the technical complexity (too many parameters) being built into models is limiting our ability to use them on a regular basis." (ESKOM)

"The WRC should leave the commercialization of models to the private sector. Where there are merits they should assist researcher/developers by financing developments up to a point where these models are ready to commercialize. The WRC should see this as an investment in knowledge and in increasing the efficiency of water resources use. In the long-run these models could in some cases contribute to water savings which in turn will, from a welfare point of view, put money back into the taxpayers pocket even if the commercialization of the model was left to the private sector."

"Including government organizations should provide financial support to ensure that the models/s are available for users especially SA users, together with the necessary national databases." (CSIR Environmentek – Pietermaritzburg)."

"The need for a model must be properly evaluated before it is developed. If the need for the model exists, the rest will be a logical outflow from there. The WRC cannot take responsibility for the technical support – the developer must do that." (Dept of Water Affairs and Forestry).

4.7 Should specialist software companies be used to develop the products?

Yes	No
14	16
47%	53%

Again, there is no conclusive preference here, with slightly more than half the respondents being of the opinion that specialist software companies should not be used to develop the product once the model design is finalised. One respondent, who did not vote on this question, commented: "Yes for WRC, No for DWAF".

PD Naidoo & Associates commented as follows: *"I found the question on whether or not to use specialist software companies in the development of the models very odd. I feel that it is essential to use qualified software people to build software products. Imagine a community of architects wrestling with the problem of making their buildings more commercially viable. Imagine them posing the question: 'Should we use properly qualified civil engineers to build our buildings?' The question would be absurd because the role of a civil engineer in a civil engineering project is beyond question."*

4.8 How much would your organisation be prepared to pay for a software package meeting all your needs?

Table 14 Preferred price range of models

Price range	<R500	R500-1000	R1000-5000	R5000-20000	>R20000
"yes" replies	5	3	13	7	7
	14%	9%	37%	20%	20%

Those opting for the lower price categories included all the universities and a technikon. Some respondents opted for more than one category, indicating that the price depends entirely on the complexity of the model and that they are willing to pay more for a model that

does more. There is a clear indication of a preference for the middle of the above range, i.e. in the region of R1000 – R5000.

This question solicited the following comments:

“This is a loaded question – the answer depends on how much work can be generated using the model and/or how necessary the model is to the work being done. We would not have an issue with >R20000 if answer to above was ‘lots’ and/or ‘very’. Having said that – we get a lot of assistance from cheap/free models that are user-pseudofriendly, have no manuals and little technical support – provided someone can show us how to drive them in the first place.”

“This answer depends entirely on how often it has the potential to be used, i.e. if used once a year on a low budget project then <R500; however, if on a big project dependant on that software package, and used only once, then R20 000 is quite okay.”

4.9 Any other Comments

The invitation for “Any other comments” resulted in the following statements by individuals:

“The cheaper the cost of the program material for the user, the better. It must not restrict development though. We do not physically use all these programs listed above on a daily basis. Future upgrades and improvement is a must”.

“I am not sure you can separate hydrological models from GIS (spatial systems) any longer?” (Eskom).

“Learning how to write a computer program is a simple matter for most people. The critical point for me is that being able to program does not make a person a commercially competitive software developer. In the same way that knowing how to type does not make a person a commercially viable author. Being able to draw does not make one an architect”.

*“Much of the water modelling software that I have seen looks like books that can only be used by the author. These books are unusable by the rest of the community despite the fact that they contain all the correct information. The point that I am trying to make is that the thing that is needed does not come from the author’s knowledge base, it comes from the science of commercial publishing. “Speaking as a software professional working in the field of water modelling systems I feel we should be asking the question: “How do we draw on the science of software development to make our software systems more commercially viable?” As a community, we need to find a way to tap into the lessons learnt by the computer science community. “This questionnaire is, for me, a vivid example of how the water modelling community has undermined its own efforts by ignoring the science of software development. **Despite the fact that this questionnaire deals mainly with the commercialisation of software, it lacks critical questions pertaining to the issues that the software community know have an affect on commercial penetration of software products.**”*

“If the development of a model is funded by the WRC, I believe the source code should be made available to all in South Africa, who may use some of the algorithms in other

applications. I find that when models are developed, the developers hold onto the source code for dear life as a means of ensuring a competitive edge, and ensuring that future developments can only be done by themselves. To me the challenge is integrated water resources modelling, which will require a number of models to potentially interact with one another, or for a model to include a number of routines (algorithms) from different sources. I think this needs to be looked at, and is one of the reasons that models stagnate in South Africa. However, having said this, I do see the danger of having numerous hybrid models floating around."

"A model development aligned with the National Water Act (1998) is essential and beneficial". (GEOSS)

"My organization Optimal Agricultural Business Systems CC (OABS) is a small organization (4 people) but we offer very specialized micro and macro economic modeling services not to be found (or difficult to found) in South Africa. There is probably not more than three Agricultural Economists in South Africa that use the methodologies on a day to day basis. We are more than willing to make our contribution to make these methodologies more accessible."

The comments below are from a group-discussion with members of the Freshwater Research Unit (UCT):

"It is difficult to fill in this questionnaire in that models are not often used at FRU, and when they are this is often for research purposes (and therefore usually once-off). "

"It is important that adequate support and training is available for WRC-funded models. It is therefore a good idea to commercialise models to raise funds for this as long as the cost of the model (and support and training) doesn't then become too expensive (especially for Universities)."

"In the case above a distinction should be made between models that are sold for use in consulting (and therefore to generate income) and models used for research purposes. South African buyers should pay less for a model than SADC buyers. Overseas buyers should pay considerably more."

"It wasn't clear from the questionnaire if only modeling software is being considered or databases as well. It is also important that databases (e.g. the "Biobase" a biological and chemical database developed by Dallas, Day et. Al.) be curated and updated."

"If a model is commercialised, royalties should be paid to WRC which will pay for the original project in which the model was developed (and for future development of the model through WRC-funded projects)."

"Some models (e.g. DRIFT) are based on EXCEL. This makes it difficult to protect the software so it can't be copied."

"The original developers of the models must be made responsible to market the software. Future funding from the WRC can be used as a stick/carrot approach. The training component of the software should cover their expenses and would at the same time increase the advertisement and product knowledge to potential users." (Dept of Water Affairs & Forestry)

"My experience with water-related models is limited to Spatsim, a model for blackfly control, and the River Health Database (all WRC funded). I found Spatsim powerful and useful, but

the structure of the programme as it interfaces with the user is not intuitive, which makes it difficult to learn and remember. The help menu, for example, is not always where one would expect to find it. It may be useful to have a second professional programmer make it more user friendly.

The blackfly control programme was developed by Americo Bonkewitz. The code was written in Spanish, and he is likely to be the only person able to modify it. It was never applied because there was only one target user (Dept Agriculture) and they were simply not interested. In retrospect this was a waste of money, and highlights that models should only be developed where there is sufficient user interest.

The Rivers Health Database, although not a model as such, is software that was developed with WRC funding, and has huge potential advantages for many users. I have tried to load various versions onto my computer and it always causes havoc. I have not been able to use it, and I refuse to load any further versions on my computer until others start using it without complaining. I get the impression that it aims to achieve too much and is unnecessarily complicated. Again, the need for professional programmers, who understand the user needs, is essential to make it work.” (AfriDev)

“Software developed for / by the WRC needs to be properly promoted and training courses set up. It is not good enough to simply develop the software then think everyone will use it.” (Parsons & Associates).

“We also need models that look at issues of climate change impacts on water resources. The user-friendliness of the systems analysis models, especially regarding source codes, needs to be improved. Not all models have user-support systems in place, we suggest that WRC takes a leading role in making sure that these systems are put in place. Training courses should focus more on practical problems and the modeling issues like model set-up should be addressed in detail. We support the idea that WRC assumes responsibility for technology and skills transfer and in so doing there would be a dedicated focus on training and support issues.” (Umgeni Water)

“Models have to be developed. This costs money. The Clients pay for the models we use either directly or indirectly (DWAF etc). Commercial distribution of models and upgrades could result in reluctance to upgrade. Clients could specify version to be used and pay upgrade cost as disbursement.” (Knight Piésold Consulting)

“Models should be able to do “What if” scenarios regarding water quality. For example impacts with specific license conditions, etc to have a legal standing Water Quality Planning, foresight, scenario planning.” (RQS - previously IWQS)

4.10 Conclusions

- There clearly is a need for products to be made available to meet South African requirements, since only half of the respondents are satisfied that this is indeed the case.
- There is a clear preference (85%) for products to be developed in South Africa in an effort to produce products that meet domestic demands.

- Half of the respondents are of the opinion that overseas products are more competitive than domestic models. This refers primarily to price competitiveness, but may include quality factors as well.
- The great majority (82%) of respondents are satisfied from a technical point of view with the available models, but only slightly more than half find them user friendly. User friendliness, the availability of training, and ongoing support is clearly a need, with half of the respondents not satisfied with the present levels of these aspects.
- Two approaches stand out as the preferred ways of making WRC funded models and software developments available, these being:
 - The WRC itself should assume responsibility for technology transfer; and
 - There is a clear preference to market models at minimal cost, and to generate income through training and support charges.
- There is little support to market the product commercially to generate income for future developments and support, and also little support to market the expertise in the use of the model, but to restrict access to the model.
- Only half of the respondents are of the opinion that specialist software companies should be used to develop a product once the model design has been finalised, although some respondents regard this as a necessity.
- Regarding the price users are willing to pay for models, there is a clear preference for the price range R1k – R5k; however, users are willing to pay upwards of R20k if the quality of the model warrants it.
- Higher educational institutions (HEI's) have a preference for lower cost models (<R1k), which raises the possibility of making models available at a special price (or even free) for educational purposes (provided it is not used for consultancy work or commercial gain).
- Model development should be:
 - aligned with the National Water Act (1998), and
 - take into consideration that hydrological models cannot be separated from GIS (spatial systems).

APPENDIX – The Questionnaire

SECTION A - General

The details can be filled in for a complete organisation, while in some cases it may be more convenient to submit returns for individual sections, divisions or regional offices. The choice is up to the organisation as long as the source of the reply is made clear.

Organisation				
Business (Mark with an x)	Government	Consulting	Research	Other (Indicate)
Contact Name				
Contact Phone			Contact Fax	
Contact E-Mail				

Existing user of model software

Yes / No

Involved in the development of models and model software

Yes / No

If the answers to both these questions is No then skip the rest of this section and ignore sections B and C

No of technical/scientific/engineering staff involved in the use of model software:

1-2

2-5

5-10

10-15

>15

Main fields of model software use (Mark with an X the boxes to the right of each number for ALL areas of involvement):

Surface water modelling

System yield modelling

Groundwater modelling

Ground water abstraction design

Flood modelling and design

Urban stormwater design

Water quality modelling

1	
2	
3	
4	
5	
6	
7	

Sewage reticulation design

Water supply reticulation design

Hydraulics/hydrodynamics modelling

Environmental flows modelling

Agricultural water management

Morphological/sediment transport

Other (specify)

8	
9	
10	
11	
12	
13	
14	

SECTION B – Existing use of modelling software.

Please complete one entry for each model or modelling software package being used by your organisation (copy a blank entry if not enough are provided in the document). **When finished move down to Section C if your organisation is involved in model development.**

Section B (ENTRY 1)

Name of model or modelling package	
Developer / Obtained from	

Main field of model software: Please refer to number in section A above; (i.e. Surface water modelling is 1, System yield modelling is 2, Groundwater modelling is 3, etc.). **Mark with an X as appropriate.**

1	2	3	4	5	6	7	8	9	10	11	12	13	14
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Costs:

Price range	Free	<R50 0	R500- 1000	R1000-5000	R5000- 20000	>R2000 0
Purchase costs						
Maintenance/user support per year						

Use:

No of users in your organisation	1-2		2-5		5-10		10-15		>15	
Frequency of use	Infrequent (less than once a month)		Moderately frequent (weekly)		Frequent (once a day)					

Model upgrades:

How many times (approximately) has the model been upgraded in the last 10 years

Last year of upgrade (e.g. 1999)

Are you using the latest version?

1	2	3	4
YES		NO (which version are you using)?	

Satisfaction with Software and Support: **Mark with an X as appropriate.**

Level of satisfaction	Excellent	Good	Fair	Poor	No support	Comment
Software						
Support						

Nature of support provided by developers:

	Yes	No	Comment
Email			
Telephone			
Website			
Training course			

Model use and code protection:

	Yes	No	Comment
Is the model source code provided?			
Is the model use protected with a dongle?			

SECTION C – Information on model development.

Please complete the sections below if your organisation is or has been involved in the development of models and/or associated software. Please complete one entry for each model or modelling software package being developed by your organisation (copy a blank entry if not enough are provided in the document). **When finished move down to Section D.**

Section C (ENTRY 1)

Name of model or modeling package

Main field of model software: Please refer to number in section A above; (i.e. Surface water modelling is 1, System yield modelling is 2, Groundwater modelling is 3, etc.). **Mark with an X as appropriate.**

1	2	3	4	5	6	7	8	9	10	11	12	13	14
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Brief description of model type or purpose:

Development details:

Approximate Development time

<1 yr

1 – 3 yrs

3 – 5 yrs

> 5 yrs

Is the development of the model? Yes No Comment (if any)

Finalised

Continuing

If **continuing**, are the upgrades related to technical content and/or packaging (user friendliness)

Yes

Technical content

Packaging

Development funded by (Tick more than one box if necessary)

WRC

NRF

Own Organisation

Specific Client

Other (specify)

Current availability:

Source code available (Y or N)

Model freely available

Model free by arrangement

Model free after training

At a cost of

Comments on availability:

Section C (ENTRY 1 – Continued)

Training and support: **Delete the answers that do not apply**

Model technical manual available	Y/N	Hardcopy / Online
Software manual available	Y/N	Hardcopy / Online
Training available	Y/N	By arrangement / Regular courses
After sales support	Y/N	Free / At Cost / Limited / By Arrangement / Routine

Number of other organisations using this product:

1-2 ☐ 2-5 ☐ 5-10 ☐ 10-15 ☐ >15 ☐

Type of other organisation using this product: **Mark with an X**

Business	<input type="checkbox"/> Government	<input type="checkbox"/> Consulting	<input type="checkbox"/> Research	<input type="checkbox"/> Other (Indicate)
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SECTION D – General attitude and perceptions about commercialisation of model software.

Please indicate which of the responses best reflects your organisation's attitudes towards models and software.

There are sufficient products available to meet your requirements.

Yes / No

This organisation prefers to use South African developed products when available.

Yes / No

This organisation finds overseas software more competitive.

Yes / No

The available products are satisfactory:

From a technical point of view.

Yes / No

From a 'user friendly' software point of view.

Yes / No

From the point of view of training availability.

Yes / No

From the point of view of support.

Yes / No

What do you consider is the most appropriate method of ensuring that WRC funded model and software developments are made available to other users in a sustainable way (tick the most appropriate answer or offer a further suggestion)?

WRC assumes the responsibility for technology transfer.

Market the product commercially to generate income for future developments and support.

Market the model at minimal cost, but generate income through training and support charges.

Market the expertise in the use of the model, but restrict access to the model.

Other:

Do you think that specialist software companies should be used to develop the product once the model design is finalised?

Yes / No

How much would your organisation be prepared to pay for a software package meeting all your needs on technical content, user manuals, technical support and user friendliness?

Price range <R500 R500-1000 R1000-5000 R5000-20000 >R20000

Mark with an X

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Are there members of your organisation who believe that they have more comments and opinions to contribute and would like to be considered for participation in one or more of the following focus groups (fill in the table below)?

Focus group

Nominated person

E-mail Address

Surface Hydrology

Groundwater hydrology

Water Resources Planning

Water Quality

Hydraulics/Hydrodynamics

Agriculture water use
Commercial Software

Any other comments: