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Deliverable 2.7 Final version of Conceptual Models and narrative storylines, and analysis over all Pilot Areas

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SCENES
Water Scenarios for Europe and for Neighbouring States
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Deliverable 2.7
(WorkPackage 2, scenarios)

Final version of Conceptual Models and narrative storylines, and analysis over all Pilot Areas

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With contributions from all Pilot Area organisers

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Introduction

This report contains the meta-analysis of the results from the second round of Pilot Area workshops of the SCENES project (PAWS2).
It does not contain all the results from the Pilot Areas, nor an analysis of the individual workshops; these can be found in Deliverable IA2.3. The aim of this deliverable is to seek for similarities and differences between the Pilot Areas and draw conclusions about the used methodology.

The set-up of this deliverable is as follows. It starts with an overall comparison of the different workshops to see which methods have been used in which workshop, after which we take a look at the finalised FCMs of the present. On basis of the FCMs of the present some Pilot Areas developed indicators, these are analysed in chapter 3. In chapter 4 the storylines of the scenarios are studied and in chapter 5 the Fuzzy Cognitive Maps of the Future are described. In chapter 6 some short remarks are given on the process of the workshop. In the last chapter some overall conclusions are drawn.

Figure 1; Participants in the Crimea PAWS2 working on the FCM of the Future.

1. Overview of workshops

Most Pilot Areas held their second workshops between late October 2008 and March 2009. The Seyhan workshop was late, as they follow a delayed schedule due to a change in Pilot Area after comments from the EC. An overview of the used methods is given in table 1.

Table 1; Overview of methods used in the second round of workshops

Pilot Area	date WS2	FCM present updated	aggregated FCM created	FCM future	indicators developed	storylines updated	scenarios used			
							MF	SeF	SuF	PF
Baltic region	19/20-02-'09	yes	yes [1)]	yes	no	yes	x	x	x	x
Narew	8/9-01-'09	no	no	yes	no	yes	3		3	
Peipsi	22/23-01-'09	yes	yes	near future	no	yes	x		x	x
Danube Delta	23/24-10-'08	yes	yes [2)]	yes	yes	yes	x	x	x	x
Tisza	28/29-01-'09	yes	yes [3)]	yes	no	yes	x	x	x	x
Crimea	28/29-10-'08	yes	yes [1)]	yes	yes	yes	x	x	x	x
Lower Don	05-11-'08	yes	yes	yes	yes	yes	x	x		x
Candelaro	1/2-12-'08	yes	yes [1)]	yes	yes	yes		x		x
Guadiana	06-03-'09	yes	yes	yes [4)]	yes	yes	*PF+MF and PF+SuF [5)]*			
Seyhan	23/10/2009	yes	yes	yes [2)]	no	no	*free scenarios [6)]*			

[1)] created by Pilot Area coordinators after workshop
[2)] worked with one only
[3)] worked with Causal Loop Diagrams
[4)] already created in PAWS1
[5)] scenarios were a combination of the two fast-track scenarios mentioned
[6)]Scenarios in Seyhan were not connected to the fast-track scenarios
MF = Markets First, SeF = Security First, SuF = Sustainability First, PF = Policy First

In most Pilot Areas the methodology that was proposed in Deliverable 2.1 (Vliet *et al.*, 2007) was executed in a two-day workshop. Some organisers felt the need to change the set-up to a limited extent in order to fit better to the local culture / customs or previous work. For instance, two Pilot Areas decided to have a one day workshop. Others decided to leave out some of the tools or use the tools in a slightly different way. The main new methodology (Fuzzy Cognitive Maps of the future) was used in almost all Pilot Areas. Indicators were developed in five Pilot Areas.

1.1. Goal of PAWS2

Goal of the second round of Pilot Area workshops[1] was to enrich the visions and system description of the first workshop. Stakeholders were asked to critically review the developed visions. The stakeholders were confronted with their own work and with new input from other work packages and local models. As was expected this lead to changes in the visions and a more thorough story behind the visions.

[1] The goal of the Baltic regional panel meeting was slightly different as much more attention was given to enrichment of the Pan-European panel storylines and adding a regional perspective to it.

1.2. Methodology

The workshop did not use new tools compared to the first Pilot Area workshops. The main goal of the workshops was to improve the quality of the results, which was achieved in all Pilot Areas. Although no new tools were used a new methodology has been tested; namely the use of FCMs to describe the future system as depicted in the scenarios. This is a completely new use of FCMs that (as far as known by the author) has not been tried before. Fuzzy Cognitive Maps of the Future were developed with good results in almost all Pilot Areas. An analysis of the FCMs of the Future can be found in chapter 5.

2. FCM of the present

In seven workshops the FCMs of the present, created in PAWS1, were readdressed by the participants. In some of the workshops the different FCMs were beforehand aggregated into one overall FCM of the present, which was then discussed in groups. In most workshops an aggregated FCM was (also) created after PAWS 2. An overview of the results is given in table 2.

Table 2; overview of results for the FCM of the present.

Pilot Area	results PAWS1 readdressed?	scale of changes	consensus FCM created	(average) number of boxes	(average) number of arrows	(average) Density
Baltic region	yes	high, quite many new arrows and 3 new boxes	yes	16	73	0.29
Narew	no	not applicable	no	13.3 *	50 *	0.28
Peipsi	yes, new FCMs created from scratch	high, new list of boxes used	yes	13	33	0.20
Danube Delta	yes	low, very little changes (only values)	yes	19	39	0.11
Crimea	yes	high, new boxes and arrows, based on one of the 3 old FCMs	yes	12	26	0.18
Lower Don	yes	medium, no new boxes, but many changes in arrows	no	10	25.3	0.25
Candelaro	yes	medium, new boxes and arrows, but basis remained	yes	20	44	0.11
Guadiana	yes	high, new boxes and arrows	yes	26	49	0.07

Density = number of arrows / (number of boxes)^2
** average of the separate FCMs*

In the Baltic region each group focussed on one part of an aggregated FCM, which was prepared by the organisers based on the PAWS1 results. As all groups had time to study their specific part in detail this exercise resulted in very dense FCM, with quite many changes.
In Peipsi the old FCMs were presented, but a new list of main issues was developed that linked better to the regional and Pan-European panel lists. Therefore new FCMs of the present were created. Also FCMs of the near future were created. Both types of

FCMs were very different from the ones of PAWS1, mainly due to the new starting points (the new list of main issues).
In the Danube Delta there were very little changes compared to PAWS1.
In Crimea one of the FCMs from the previous workshops was chosen as the best FCM (most complexity of issues and best relationships). The three groups then worked on this FCM.
The boxes in the Lower Don remained the same, but the arrows were 'quite thoroughly' changed.
In the Candelaro each group readdressed the FCM they worked on the previous time. This greatly improved all FCMs, more boxes and arrows were added and more feedbacks were discovered. The three FCMs were afterwards combined into one aggregated FCM.
In the Guadiana an aggregated FCM was created by the organisers on basis of the results of PAWS1. This FCM was used as starting point for the exercise.

Overall the discussions on the FCMs of PAWS1 were very fruitful. In many Pilot Areas it led to a high number of changes, although the core of the FCMs stayed intact. From the reports it became clear that ideas from the presentations on PEP and model results have been taken into account in the finalisation of the FCMs. Most FCMs now provide a clear description of how the stakeholders perceive the current system. FCMs also formed a good way to structure discussions among the participants.

2.1. Comparison with FCMs PAWS1

The results of the analysis of PAWS2 can be compared with the results of PAWS1.
A short overview is given in table 3.

Table 3; comparision of FCMs from PAWS1 and PAWS2

	PAWS1			**PAWS2**		
Pilot Area	**number of boxes**	**number of arrows**	**Density**	**number of boxes**	**number of arrows**	**Density**
Baltic region	14	58	0.30	16	73	0.29
Peipsi	11	26	0.22	13	33	0.20
Danube Delta	19	37	0.10	19	39	0.11
Crimea	11	24.7	0.21	12	26	0.18
Lower Don	10	26.7	0.27	10	25.3	0.25
Candelaro	12.7	21.3	0.15	20	44	0.11
Guadiana	20	27	0.07	26	49	0.07
avg	*13.5*	*31.8*	*0.20*	*17*	*44.9*	*0.18*

Density = number of arrows / (number of boxes)^2

Overall the FCMs have become more complex; they contain more boxes and have a higher number of arrows. The density of the FCMs has become a bit lower. With extra time to discuss the FCMs participants had more time to reconsider some of the double arrows, and effects of direct and indirect arrows. They also had time to add boxes that were overlooked in the first round.
All in all it seems that the FCMs give a better system description and have become more realistic in this workshop.

2.2. Conclusions

The FCMs after the PAWS1 were often quite schematic and not finished. Even though time was limited again in PAWS2 the results have improved. Most Pilot Area coordinators also report that participants felt more confident with the method when doing it a second time. This has probably also made the creation of FCMs of the Future easier, as all of the participants had by then worked at least once with the FCM technique. It does however become clear that FCM is quit a demanding tool that needs good facilitation and enthusiastic participants. When done well it leads to good discussions and a good system description.

3. Indicators

As input for WP4 and local models in 5 Pilot Areas indicators were developed. This process also led to a better defined understanding of the main issues, In general the boxes of the FCMs were used as starting points and indicators were developed for each of the boxes. In some workshops also a proposed lists of indicators (from WP4) was used.

In the Crimea a list of 15 indicators, divided over 13 headings, was developed.
In the Lower Don the indicators developed in PAWS1 were shortly discussed, but there was no need to make any changes.
In the Candelaro indicators were developed at the end of the work on the FCM of the present. This led to a list of 71 indicators, divided over 35 headings, ranging form cost of water to globalisation and from tourism to agricultural planning and policies.
In the Guadiana indicators were developed for five areas important to the basin; policy, economy, society, environment and technology. These areas were divided into issues, and for each issue one or more indicators were developed. In total 40 indicators were developed.
In the Danube Delta a bit a different approach was used in the discussion of indicators. In the first Workshop a list of indicators was developed. In this second workshops the relevance these indicators for each of the four scenarios were analysed.
The Baltic regional meeting planned to work on indicators, but other points on the agenda took more time as expected and therefore no indicators were developed.

The development of indicators was not always easy, as not all issues addressed could be captured in quantitative indicators. Participants developed creative indicators to address those vaguer issues. In the Crimea for instance an indicator was developed for system of government and state policy, which was focussed on the efficiency of policy implementation. The indicator developed was the “Ratio of number of implemented programs to number of approved programs in general”. The tasks of developing such an indicator makes it much more explicit what is meant by a general heading.
As another example of the resourcefulness of the participants of the workshops, in the Candelaro a set of indicators was developed for the issue of “Awareness of historical and environmental worth”. This set included indicators like number of local festival, number of farms producing biological products and recipe books.

3.1. Conclusions

Overall this process made the issues that the Pilot Areas are dealing with more explicit. It also shows that for some issues it is hard to define quantitative and straight forward indicators, for instance for issues like international influences. However, participants developed interesting solutions for this type of issues.

4. Storylines

In all Pilot Areas, except for Seyhan, the storylines developed in the first PAWS were readdressed. This was mainly done via discussion of the storylines developed in the previous workshop. The products of the previous workshops (collages, timelines, FCMs) were also used. The result in all cases was an updated storyline.

Table 4; overview of results for the storylines

Pilot Area	method in PAWS1	method in PAWS2	(average) length of storyline per scenario MF	SeF	SuF	PF	average length [1] storyline PAWS2	average length [1] storyline PAWS1
Baltic region	timetrends	enrichment of PEP storylines[2]	42	33	64	58	49.3	19.5
Narew	collages	discussion	56.0		47.3		51.7	42.3
Peipsi [3]	timetrends	discussion	29		36	29	31.3	19.0
Danube Delta	storylines	discussion	28	31	31	26	29	19.0
Crimea	collages	discussion	49	87	89	77	75.5	22.5
Lower Don	collages	discussion	24	17		19	20	35.3
Candelaro	collages	FCM of future		21		16	18.5	20.5
Guadiana	FCMs of Future	discussion	39		41		40	15.5
average			*38.1*	*37.8*	*51.4*	*37.5*	*39.4*	*24.2*

1) length of storyline in lines of text (Trebuchet MS 11pnt)
2) The Baltic region commented on the PEP storylines, but also added regional specific storylines to the PEP storylines (cross-scale enrichment).
3) The storylines of Peipsi consisted of bullet points.
4) The storylines in Del IA2.3 of the Crimea are an add-on to the storylines presented in Del IA2.2. The length given here is of the combined storylines.

Besides the products from PAWS1 input from local models, WaterGAP, other Pilot Areas and regions has been used. The PEP2 storylines were also presented in most Pilot Areas.
Often this information was used by the participants. In the Candelaro for instance reference was made to the changes in storylines after PEP2. The stakeholders did not believe in the break-up of Europe as envisioned in the original Security First scenario, and were therefore glad that they could follow the updated Fortress Europe storyline.

The Baltic regional panel has a special place in all this as it is the only regional panel in SCENES. One of its goals is to link the Pilot Area level with the Pan-European level. Therefore the updating of the storylines was strongly linked to the PEP-storylines. The PEP storylines were commented and separate Baltic region storylines were created.

Overall the storylines become much longer (circa 60%, see table 4). Interesting is to note that the Sustainability First storylines are often the longest of the storylines created, and their average length is clearly higher than the averages of the other three storylines. A hypothesis to explain this might be that Sustainability First was often the most desired scenario. This can have spurred extra enthusiasm among the participants, which lead to more creativity and therefore longer storylines.

4.1. Conclusions

All storylines have been improved. Most storylines became longer. In the Candelaro workshop only little time was allocated to discussing the storylines, which were created on the basis of the FCMs of the future. In PAWS1 the same was done in the Guadiana, which than resulted in quite short storylines as well. In the Guadiana, in PAWS2, the storylines of PAWS1 were discussed and became much longer.
The storylines not only became longer, but many coordinators also noted that they became better, clearer and more coherent.

5. FCM of the Future

In PAWS2 a new way of using FCMs has been tested, which we called FCMs of the Future. In this approach FCMs are used to describe the future system as depicted in the scenarios. This way the underlying assumptions of the scenarios are made visible. Stakeholders have to be specific on how they perceive the future, much more than when working with collages. This is a completely new use of FCMs that (as far as known by the authors) has not been tried before.
The FCMs of the Future were developed in two different ways. They were either based on the present system, or they were created from scratch. In the latter case they were more based on the scenario stereotype. The results are summarised in table 5.

The storylines created in PAWS1 and enriched during this workshop formed the main information source for the creation of the FCM of the Future. The FCMs of the present were also used, either as starting point or as background information. Further background information was provided by for instance PEP storylines and local and WaterGAP output data.

In most Pilot Areas one FCM for each scenario was created. In the Narew each group worked on two scenarios, SuF and MF. All three groups created two FCMs, one for each scenario, resulting in three FCMs per scenario.

Table 5; analysis of the results of the FCMs of the future

Pilot Area	**based on present?**	**(average) number of boxes**				**(average) number of arrows**				**average density**
		MF	SeF	SuF	PF	MF	SeF	SuF	PF	
Baltic region	yes, boxes and arrows	16	16	17	16	80	79	81	75	0.30
Narew	partly, some boxes	13		13		35		35		0.20
Danube Delta	yes, only small changes	20	20	20	20	47	47	47	47	0.12
Crimea	little, many new boxes and arrows	15	15	14	15	27	27	24	25	0.12
Lower Don	yes, boxes and arrows same as present	10	10	-	10	26	23	-	27	0.25
Candelaro	little, many new boxes and arrows		19		26		35		47	0.08
Guadiana	partly, new boxes and arrows	17		17		21		26		0.07

The differences per scenario were large most of the times (see table 6). Many had different boxes in each FCM. The FCMs that were more based on the present often had the least diversity between the scenarios. The ones that were created from scratch had larger differences between the scenarios.

Table 6; overview of the differences per scenario

Pilot Area	scenarios used MF	SeF	SuF	PF	based on present?	Differences between scenarios
Baltic region	x	x	x	x	yes	medium: almost all have the same boxes, more changes in arrows and values
Narew	x		x		no	medium: some different boxes and many different arrows
Danube Delta	x	x	x	x	yes	small: mainly differences in the values and very limited differences in arrows
Crimea	x	x	x	x	no	large: many different boxes and arrows
Lower Don	x	x		x	yes	small: only arrows different
Candelaro		x		x	no	large: many different boxes and arrows
Guadiana	x		x		no	large: many different boxes and arrows

5.1. Comparison with FCMs of the present

5.1.1. FCMs on basis of FCM of present

In the Baltic region the FCM of the future was developed with the FCMs of the present as starting point. Changes needed to represent the future system were marked on a flip-over. The changes were presented separately (see figures 2 and 3), which made the differences between the scenarios very clear. This approach made it unnecessary to discuss many existing linkages again. Focus could be given to exactly those relations that needed to change a lot to represent the future system. The results of computing the FCMs in Excel were also good.
In the Danube Delta the work also started on basis of the FCM of the present. One extra box was added in all scenarios, namely agriculture as an external driver. In all scenarios the same feedbacks were added. The main changes were in the values of the arrows, which differed per scenario.
In the Lower Don the FCMs of the Future contained only two new arrows and two arrows were taken out. There were, however, large changes in the values of the arrows.

5.1.2. FCMs of the future developed from scratch

In Crimea FCMs of the future were created by studying the collages and storylines from PAWS1. First a list of issues was made, which included issues from the FCM of the present, but also other issues based on collages and storylines. These issues were then used to develop a FCM of the Future. The FCMs of the future were very different from the FCMs of the present, although some boxes remained the same. The FCMs clearly showed the core aspects of the scenarios, with for instance finances in a very central position in the FCM of the Market First scenario (see figure 6). The system description, however, might be a bit too much a caricature, and therefore less useful as such.
In the Candelaro FCMs were developed for Policy First and Security First (figures 4 and 5). Although the boxes from the FCM of the present were taken as a starting point the FCMs of the Future became very different. All arrows were created from scratch, but the FCM of the present was available for inspiration. New boxes were developed and other boxes were not used. There were also a lot of new arrows.
In the Narew the FCMs of the Future were only slightly based on the present. There were some boxes similar, but many changed. There were also a lot of new relations, but the FCMs became less dense as the FCMs of the present. Differences between the

scenarios were quite clear, also due to specific naming of boxes like 'agriculture (sustainable)' in Sustainability First and 'agriculture (GMO)' and 'rich tourist' in Markets First.

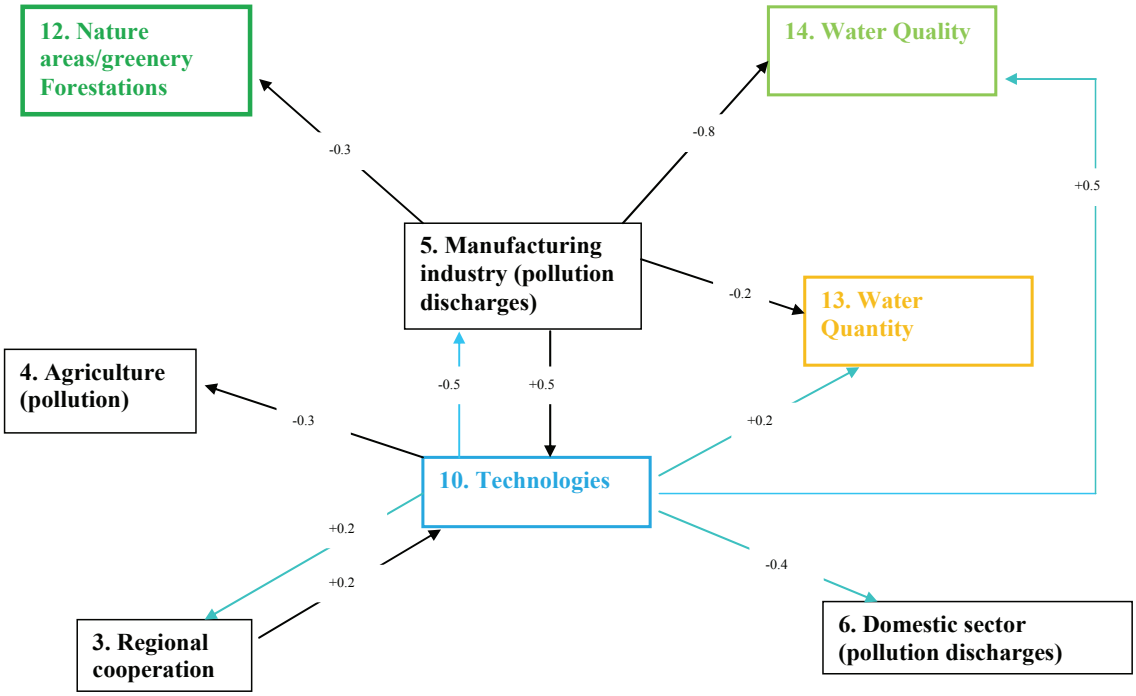

Figure 2; Economy first, Baltic region (as add-on on the FCM of present, colours relate to the FCM of the present)

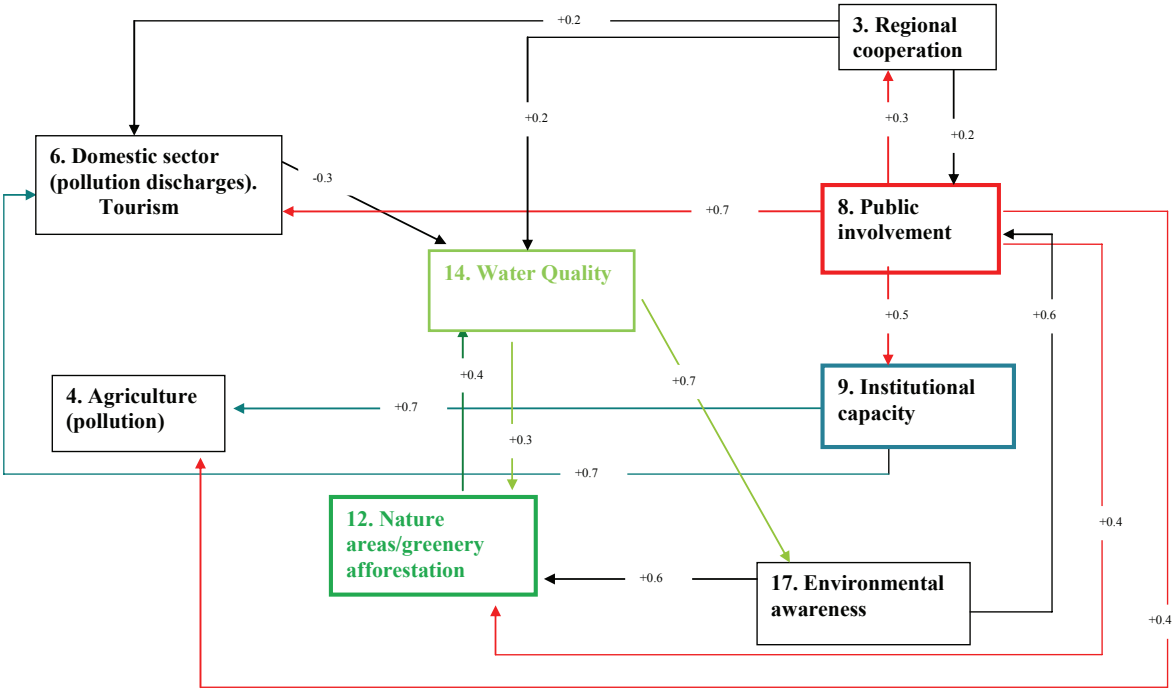

Figure 3; Sustainability First, Baltic region (as add-on on the FCM of present, colours relate to the FCM of the present)

5.2. Some examples of FCMs of the Future

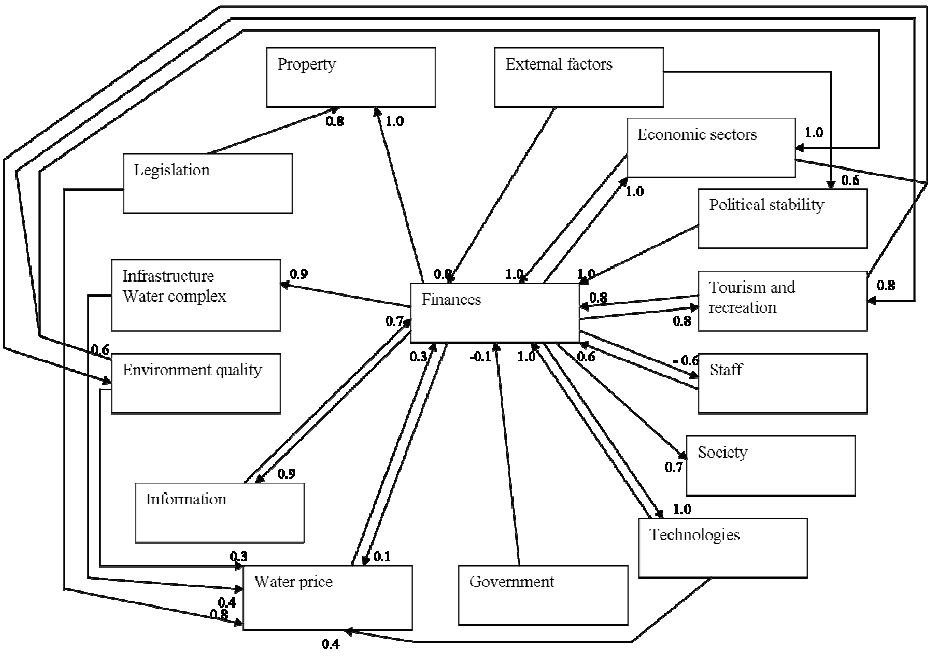

Figure 4; Economy First, Crimea (with a central position for finances)

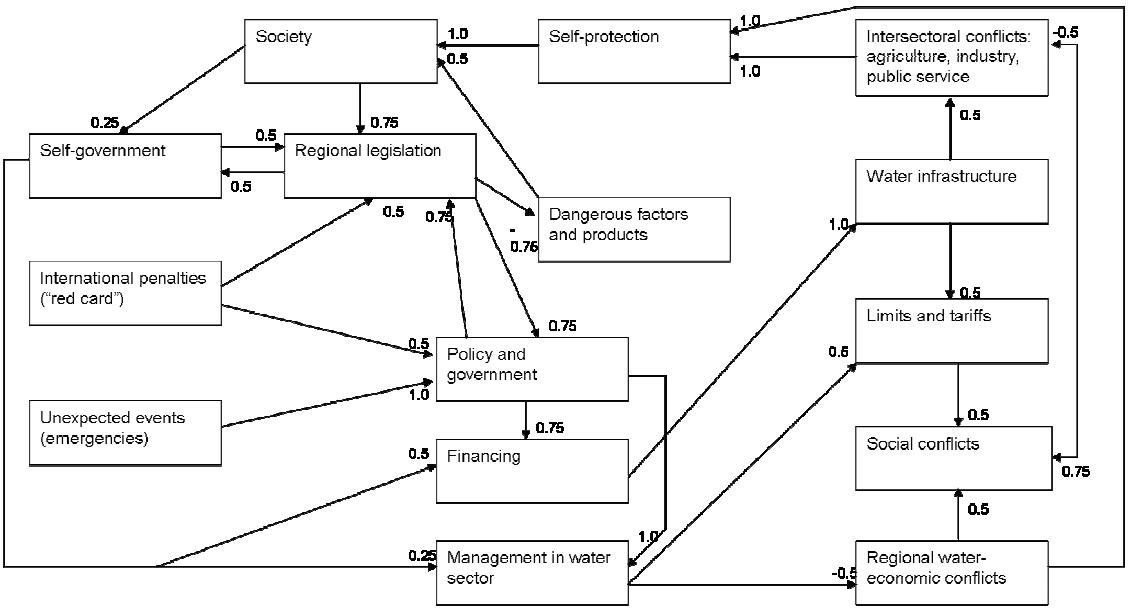

Figure 5; Security First, Crimea (created from scratch, with much attention to scenario specific elements like self-protection, self-government and conflicts)

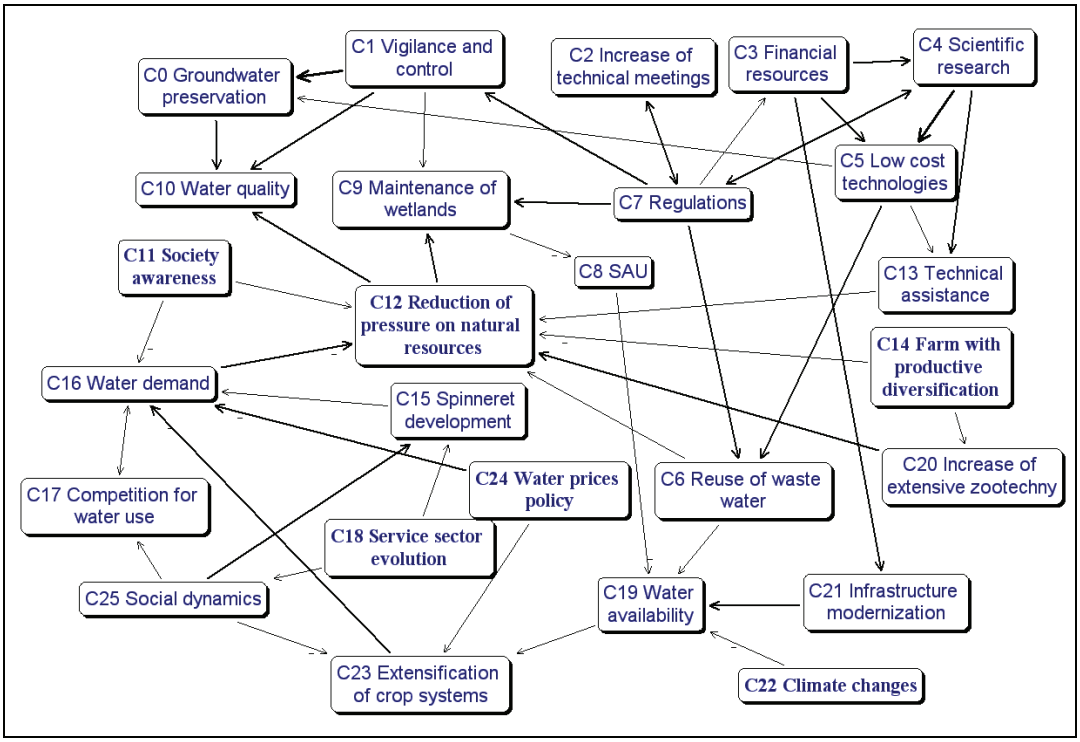

Figure 6; Policy First, Candelaro, (with a central position for regulations and reduction of pressure on natural resources boxes).

5.3. Conclusions

In those FCMs of the Future that were based on the FCM of the present, changes compared to the FCMs of the present were small. They showed the main changes that were needed to get a system description that fitted the ideas of the storylines.
In the FCMs of the future that were created from scratch the changes compared to the FCMs of the present were often very large. These FCMs might not have always given a very realistic system description, but did show the particularities of the system. In this type of FCM of the future it was often clearer what the scenario entails, but from a system perspective view they were less accurate, as there was often not enough time to discuss the whole system in detail.
It seems that taking the FCMs of the present and than solemnly focus on the most important relations that need to be changed gave the best results. By only showing the changes a clear and simple figure arises that shows the scenario specifics, but with the use of the FCM of the present, it still gives a good system representation.

6. Process

During two of the workshops mood-o-meters were used to get a quick feeling of the stakeholders' satisfaction during the workshop. The results of both mood-o-meters were good, with only happy or neutral 'smilies'. From the reports of the other Pilot Areas it also showed that participants enjoyed the workshops and found them interesting. The Lower Don reported that people were less interested as the agenda for PAWS2 was rather similar to PAWS1. At the end of each workshop a questionnaire was handed out to the participants. Feedback on the questionnaires and other process relevant information can be found in SCENES deliverable 5.7.

6.1. General feedback of Pilot Area coordinators on PAWS 2

Besides asking the participants on their opinion, we also asked the Pilot Area coordinators their opinion. During the all partner meeting in Bari (Oct. '09) they were asked to give a short reaction on PAWS2. Three questions were asked:

1. How would you grade PAWS2 on a scale of 1 to 5?
   With 1 being a bad and 5 a good score
2. Is that mark higher or lower than that you would have graded PAWS1?
   - Higher
   - The same
   - Lower
3. Did PAWS2 made the results from PAWS1 better?
   5. Yes quality increased a lot
   4. Yes quality increased a little
   3. Quality remained the same
   2. No, quality decreased a little
   1. No, quality decreased a lot.

The results of the questionnaire can be found in table 7.

Table 7; results of the questionnaire among the Pilot Area coordinators

Pilot Area	grade for PAWS 2	higher/lower than you would have graded PAWS1 *	Did PAWS2 make the results from PAWS1 better?
Baltic region	4	+	4
Narew	4	o	4
Peipsi	4	o	3
Tisza	4.5	+	5
Crimea	4	+	4
Lower Don	4	-	3
Candelaro	4	o	5
Guadina	4	o	4
Seyhan	4.5	o	3
averages	*4.1*	*o/+*	*3.9*

** + is higher score, o same score, - lower score*

Overall the second workshop was graded well. Most of the Pilot Areas graded PAWS2 the same or better than PAWS1. The results on average increased their quality a little. Three Pilot Areas reported that the quality did not increase, there are some reasons for this. In Seyhan the attention was mainly focussed on other things than enriching

PAWS1, this might be the reason why the quality did not increase. In the Lower Don they had a very successful PAWS 1, which reached the highest scores from participants. The second one therefore could almost only score lower. In Peipsi they used a new list to create new FCMs of the present. Therefore the old FCM could not be refined.

7. Conclusions

Overall we can conclude that the second round of Pilot Area workshops was a success. The materials from PAWS1 were improved and enriched, and new products such as indicators and Fuzzy Cognitive Maps of the Future were developed.

The fact that a large part of the program was dedicated to revisiting the products from PAWS1 might have made some participants less interested. However, most Pilot Areas report that participants were enthusiastic. They especially liked the presentations on what had been done with the results of PAWS1 after that workshop. One should, however, take care that the workshop does not become a rehearsal of the previous one.

The presentations of Pan-European panel and regional results, as well as modelling results were interesting for the participants. These presentations also gave new input for the discussions, which led to a further improvement of the results.

The use of FCMs to describe the future system was a success. It was a new way to discuss about the future and forced participants to be more explicit about their assumptions. The resulting FCMs did not always give a very 'true' system description, but do often clearly show the main assumptions behind the storylines.