


Unification of Agricultural Work Processes On Cloud Based Data Services


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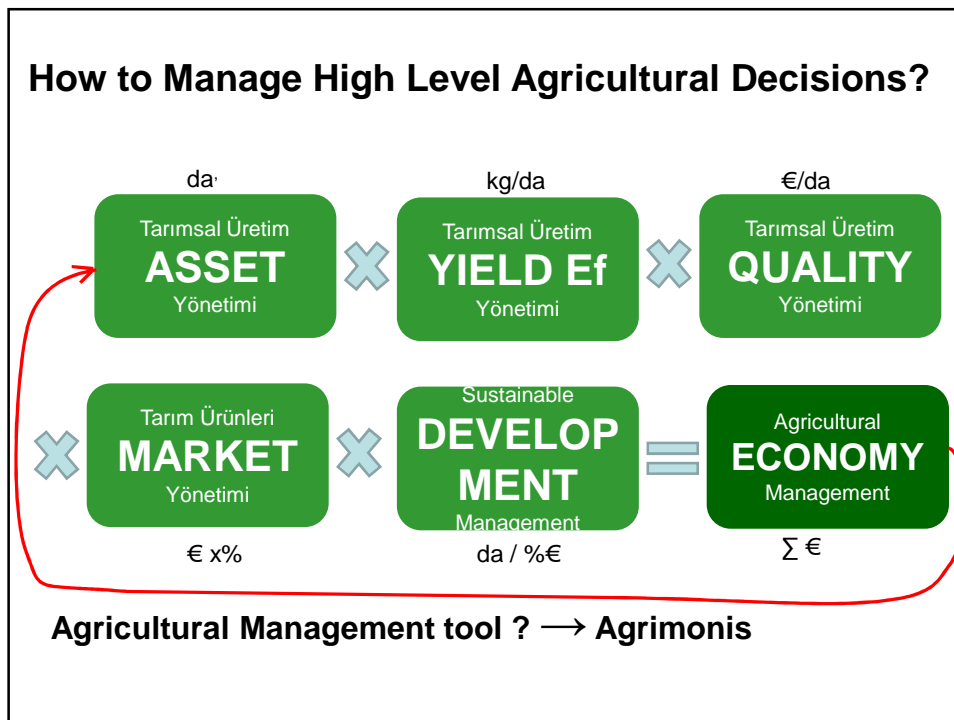
Agricultural Monitoring and Information System (AgriMONIS - TARBİL)

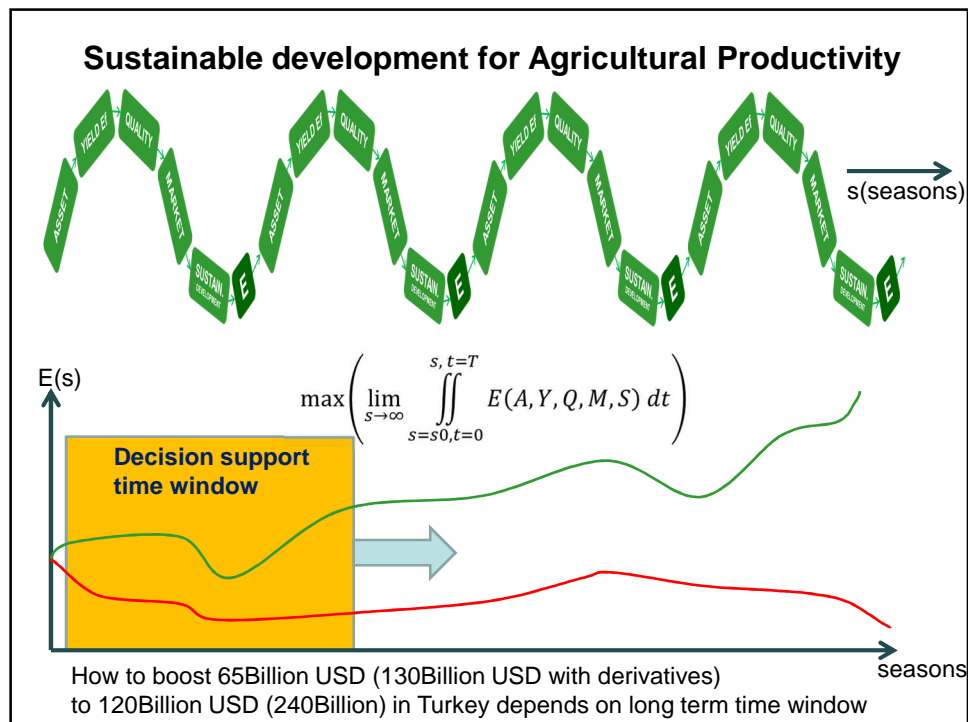


19th/Nov./2014
JRC –
20th MARS
CONFERENCE

DRESDEN

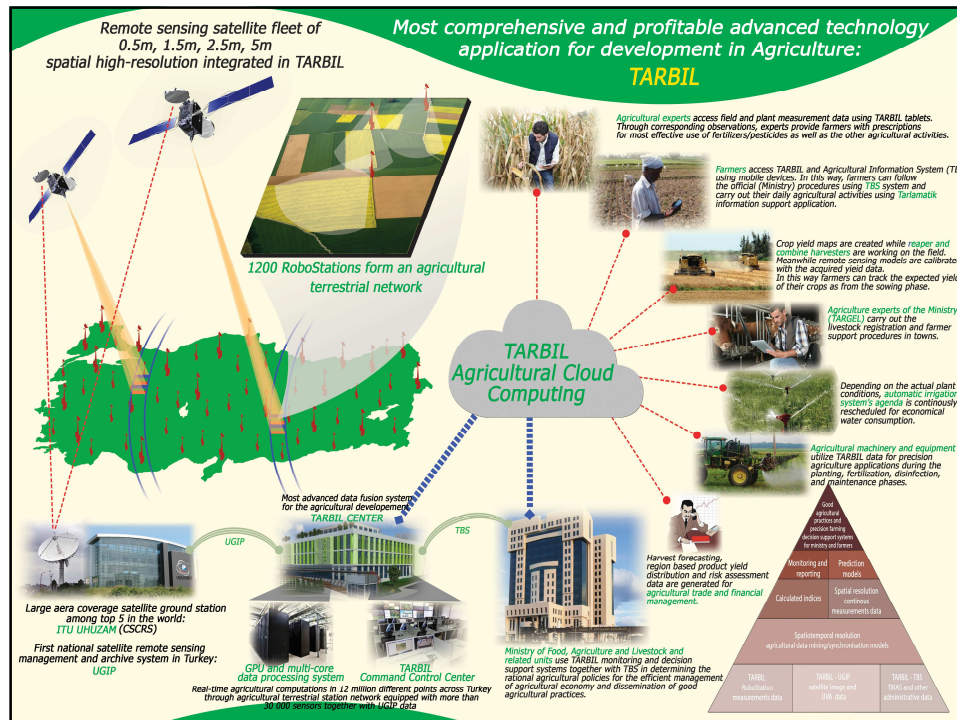






Conclusion:

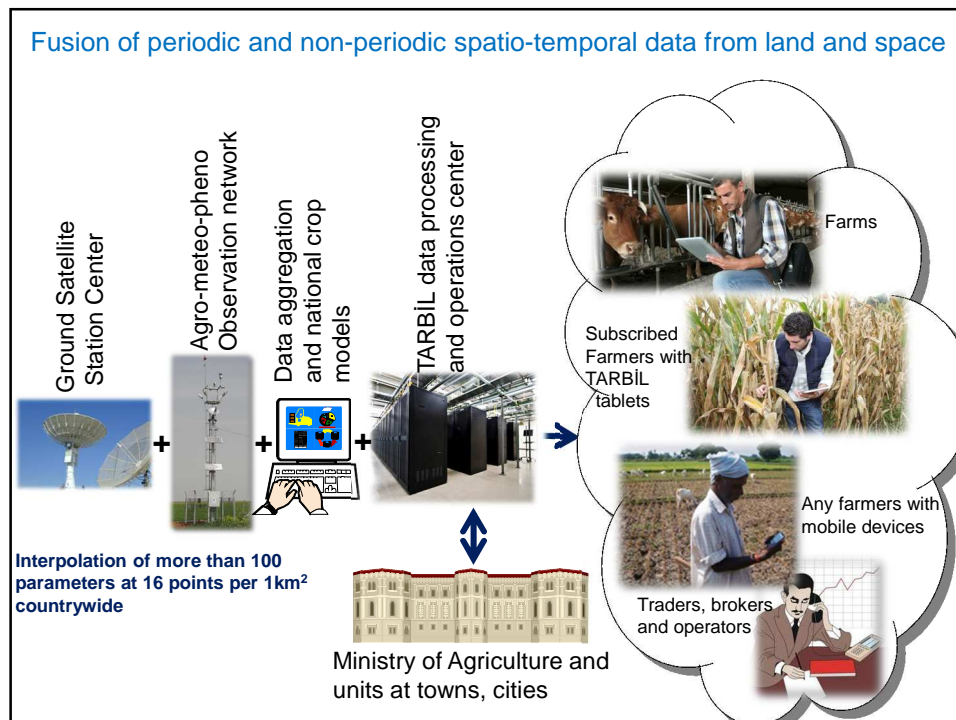
Main independent economic variable is sustainable development

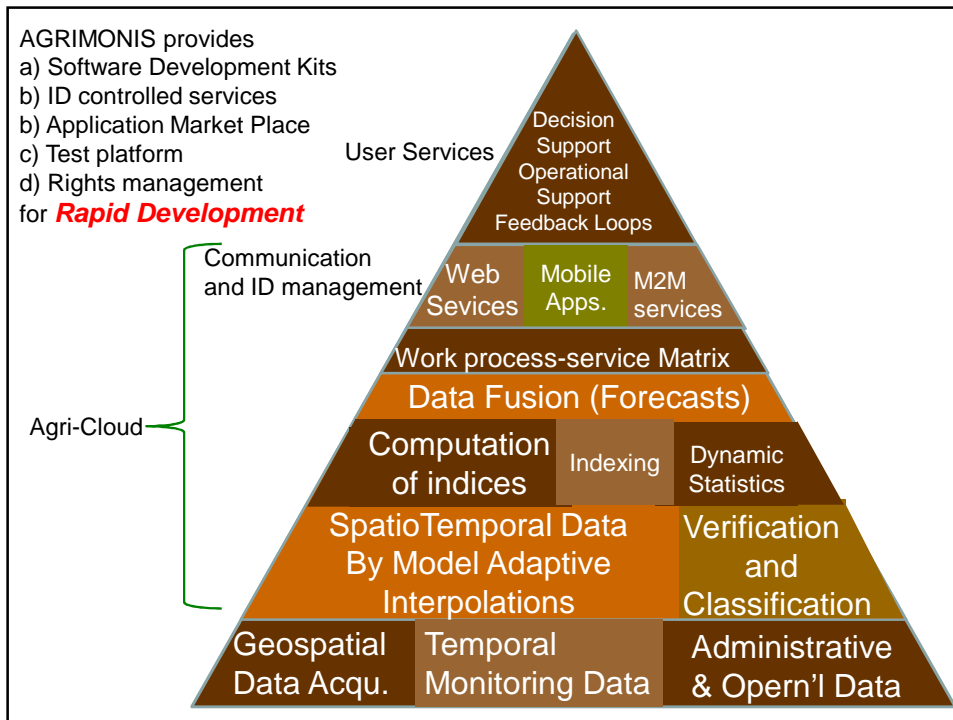


Scale of TARBIL

- 1200 robo-stations
- 2500+ phenological CT sampling fields
- 16.000+ mobile field samplings/seasons
- 250mx250m grid resolution
- 10minutes sampling time for agro-meteo data
- 30minutes sampling time for agro-pheno data
- 230+ computed parameters
- Official declarations data from 2Million+ farmers
- 28 Million Framing parcels

- 28 joint research projects – 84 development projects
- 1050+ field staff, cooperation of 10.000+ ministry staff
- 12.000m² new building for operations and research center
- 200Tflops processing capability over GPUs and mutlicore CPUs





Importance of Phenological Stages base Data Segmentation:

Correlation without phenological stage consideration

	Total GDD	Total VPD	Days to Harvest
	1455.3358	140.503	209
	1372.4989	121.8129	202
	1348.1276	127.9543	197
	1301.5991	122.7043	205
	1274.5447	120.6576	197
	1468.0934	131.4627	215
	1555.6852	139.0374	217
	1550.9453	147.7044	192
	1648.3087	152.6373	173
	1644.9012	146.1434	200
	1728.9313	156.5963	212
	1636.0179	145.3864	199
	1507.9326	146.6447	175
	1516.4662	134.5897	194
	1389.9421	137.4604	184
	1415.6671	140.4512	185
	1769.0184	160.2036	210
	1610.8875	161.6006	194
	1612.9042	162.2743	195
Correlations:	0.0965076	-0.145509	

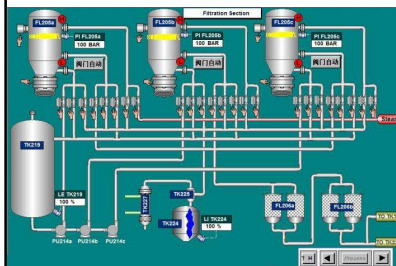
Choice of highest correlating Indices with respect to phonological stages

	VPD	GDD	GDD	GDD	GDD			
	P1	P2	P3	P4	P5	Days	F.Days	ABS Error
	8.421999	21.490538	476.9409	202.8417	723.7167	209	208	1
	8.225791	37.389578	442.8436	494.0968	332.202	202	195	7
	5.319033	25.968342	422.0674	407.3413	472.3738	197	197	0
	5.100211	14.875985	676.3469	369.4729	222.9625	205	200	5
	4.62616	40.572053	487.7521	430.4555	299.6916	197	194	3
	23.22202	28.749995	442.8492	459.0699	347.8089	215	215	0
	26.35864	30.533329	521.5816	486.8939	294.8579	217	215	2
	2.652947	29.979057	614.4851	495.7534	389.422	192	186	6
	0.496025	29.180075	614.4789	410.6542	590.6625	173	185	12
	17.73641	100.43082	551.0017	524.5876	290.5574	200	191	9
	37.4477	138.17475	452.9642	427.4629	364.333	212	212	0
	20.56002	52.816662	555.0183	449.9552	365.1899	199	206	7
	4.304497	87.978147	410.1819	562.5633	415.9355	175	178	3
	20.63425	77.24999	548.7299	449.7428	232.4808	194	204	10
	11.10864	67.381141	427.0417	538.027	284.4919	184	192	8
	11.37531	76.572857	447.8494	542.3694	273.5523	185	190	5
	31.89719	119.23273	482.3507	437.7998	425.4947	210	207	3
	10.97823	72.667918	472.0591	513.5559	475.8583	194	188	6
	11.0123	75.694584	455.1508	447.9059	558.4167	195	190	5
Average:	13.76197	59.312555	500.0891	455.2921	387.3689	197.6316	197.5263	4.842105
Std.Dev.:	10.41668	35.25724	74.71913	80.09929	130.5655	12.41957	10.81855	
Relative eff:	14.73352	-10.30671	-10.8456	-27.169	-7.02642			

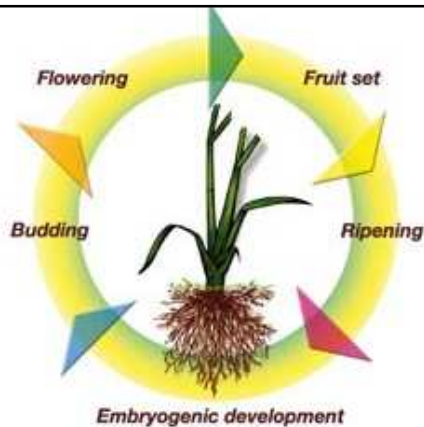
SUMMARY OUTPUT								
Regression Statistics								
Multiple R	0.876878							
R Square	0.768915							
Adjusted R Square								
Standard Error	0.680036							
Observations	7.025177							
	19							
ANOVA								
	df	SS	MS	F	Significance F			
Regression	5	2134.831	426.9661	8.651251	0.000849			
Residual	13	641.5904	49.35311					
Total	18	2776.421						
	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	238.2458	27.61559	8.62722	9.69E-07	178.5859	297.9056	178.5859	297.9056
P1	1.070597	0.230756	4.639511	0.000463	0.572078	1.569116	0.572078	1.569116
P2	-0.17377	0.070334	-2.47062	0.028102	-0.32572	-0.02182	-0.32572	-0.02182
P3	-0.02169	0.025548	-0.84888	0.411308	-0.07688	0.033506	-0.07688	0.033506
P4	-0.05967	0.031337	-1.90429	0.07924	-0.12737	0.008025	-0.12737	0.008025
P5	-0.01814	0.018171	-0.99821	0.336396	-0.0574	0.021118	-0.0574	0.021118

Importance of Phenological Stage Monitoring Agro-Information Systems

Plants are like transformers they have different transfer functions at each phenological stage.
Here we demonstrate that finite state automata is a reasonable representation method.



Yield forecast related parameters, indices are highly correlated to phenological stage. Parcel based or high resolution information extraction requires phenological stage coupled information



Plants' transfer functions change Phenological; chronological time is invalid

Real time yield calculations require coupling of actual phenological distribution stage and update of estimated timing for the next stages. So the IT services must consider PSC

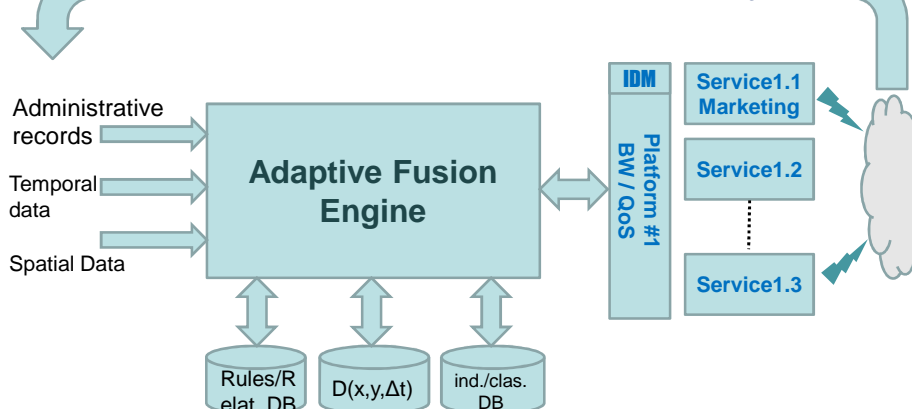
Conclusion:

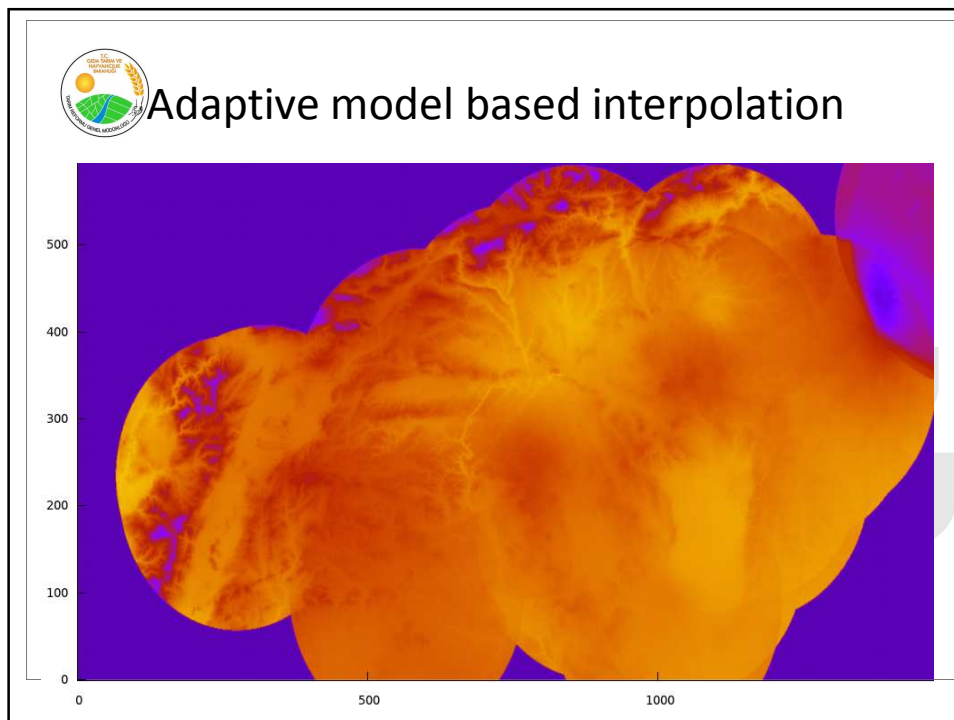
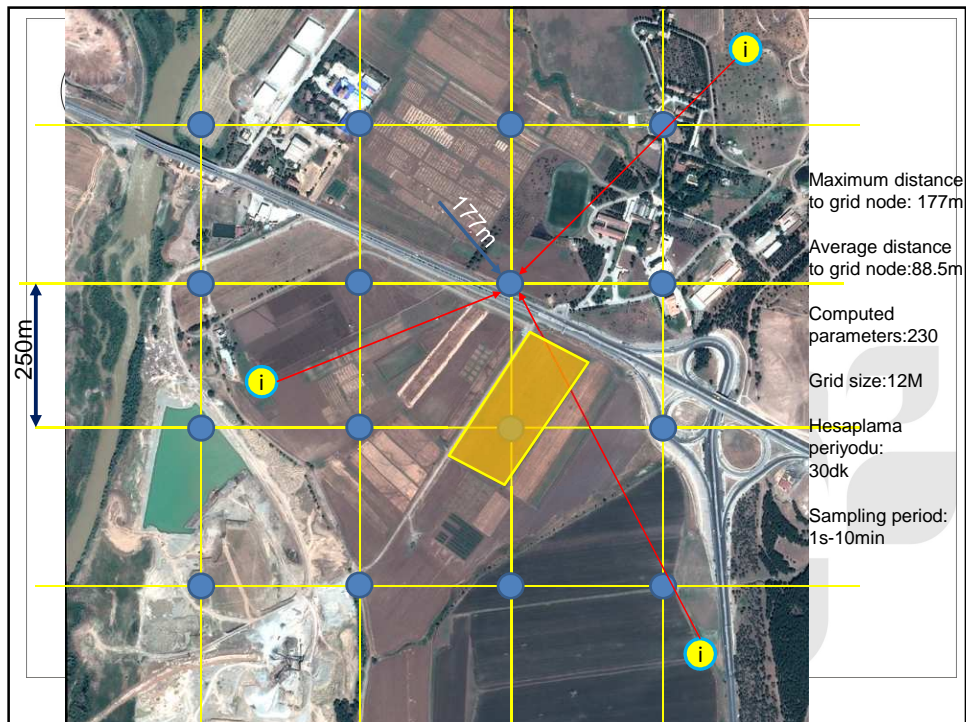
Phenological stage date based data segmentation is Crucial

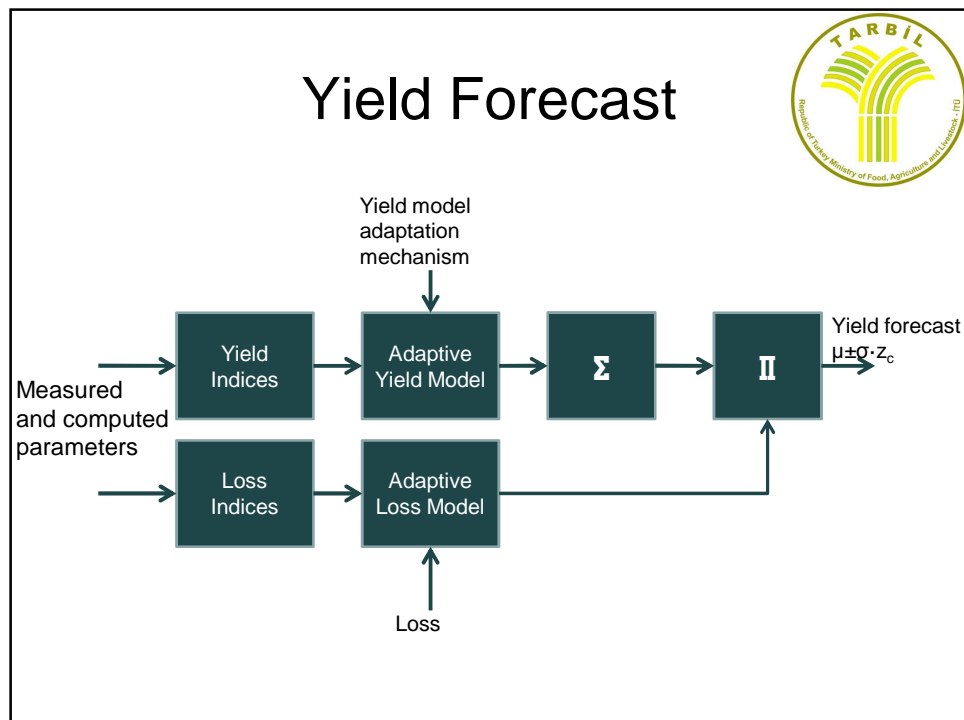
Service Platforms on Real Time Data Fusion and Motivation Management

Integration of the processes and services over cloud provides motivation for **Qualitative** and **Quantitative** improvement of data for decision support systems

Administrative and operational record and data update depending on services







Field Monitoring

10m/2m/int. temperature meas.
 2x 10cm depth soil depth
 2x 15cm depth humidity
 2x 45cm depth humidity
 UV index
 Solar radiation
 Wind speed/direction
 Air pressure
 Precipitation
 Leaf wetness
 NIR spectrum @20nm resolution

Plant height
 Leaf/flower/grain sizing
 RGB color spectral distribution
 Field view
 Plant view

Upon demand :

Plant, farmer, location and time interval

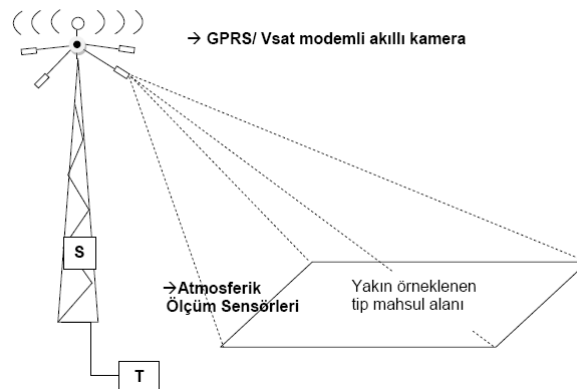
as in the form of

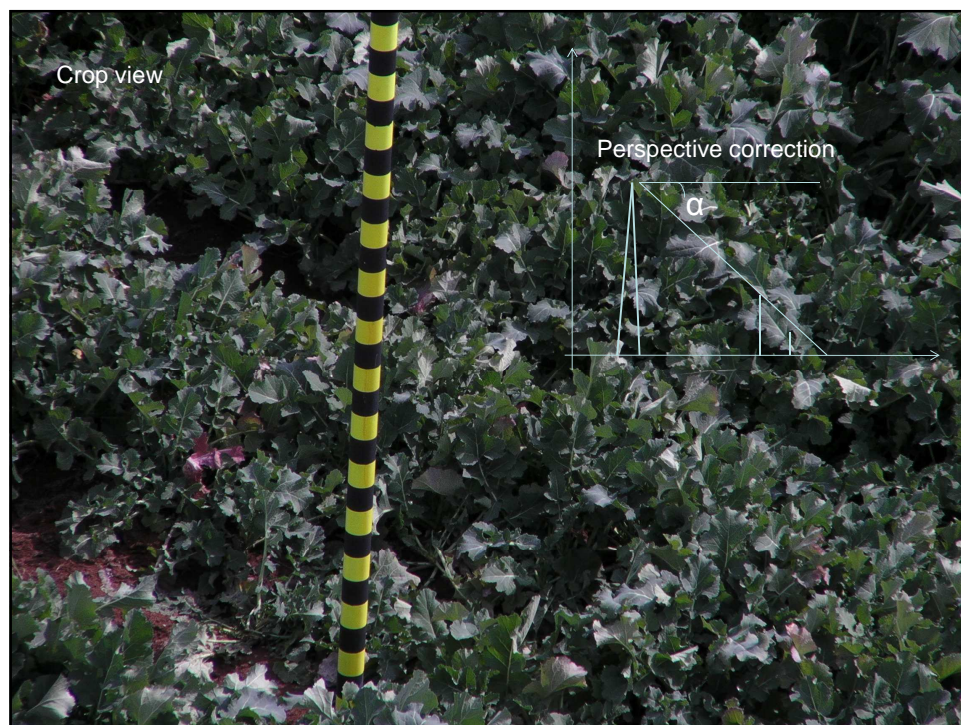
Graphic
 Image
 Real Time & Archive Data

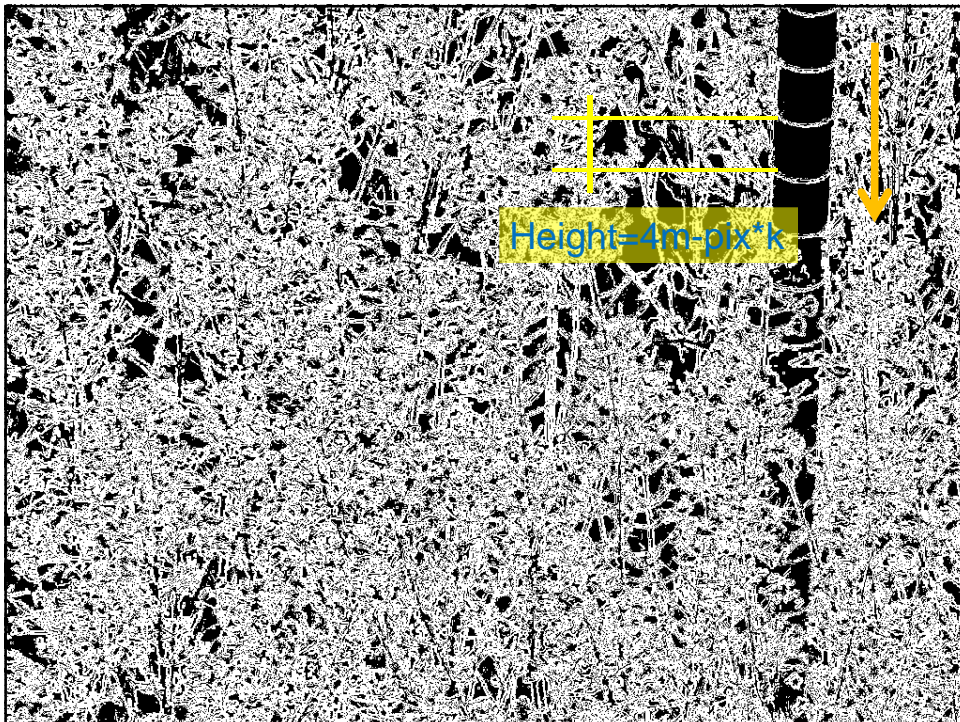


1/2/3 montioring segments

Fotoğrafik veri toplama İstasyon Örneği:



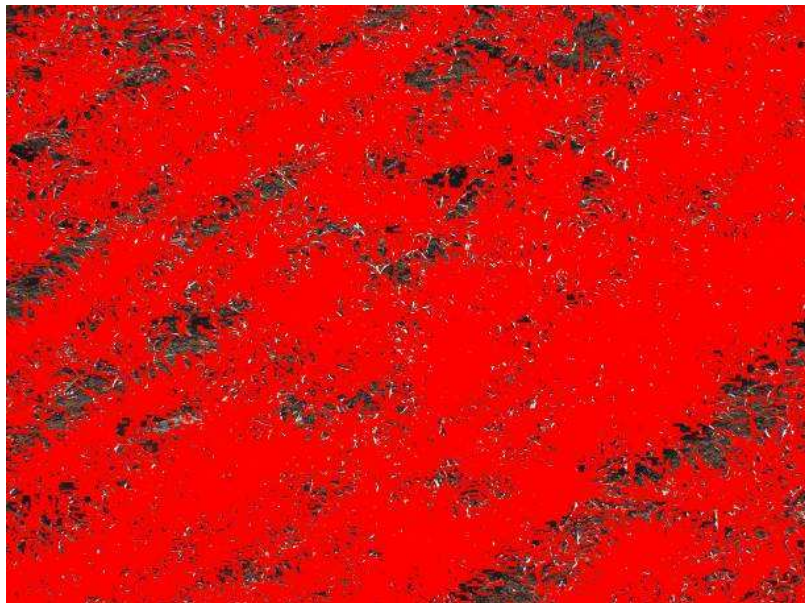


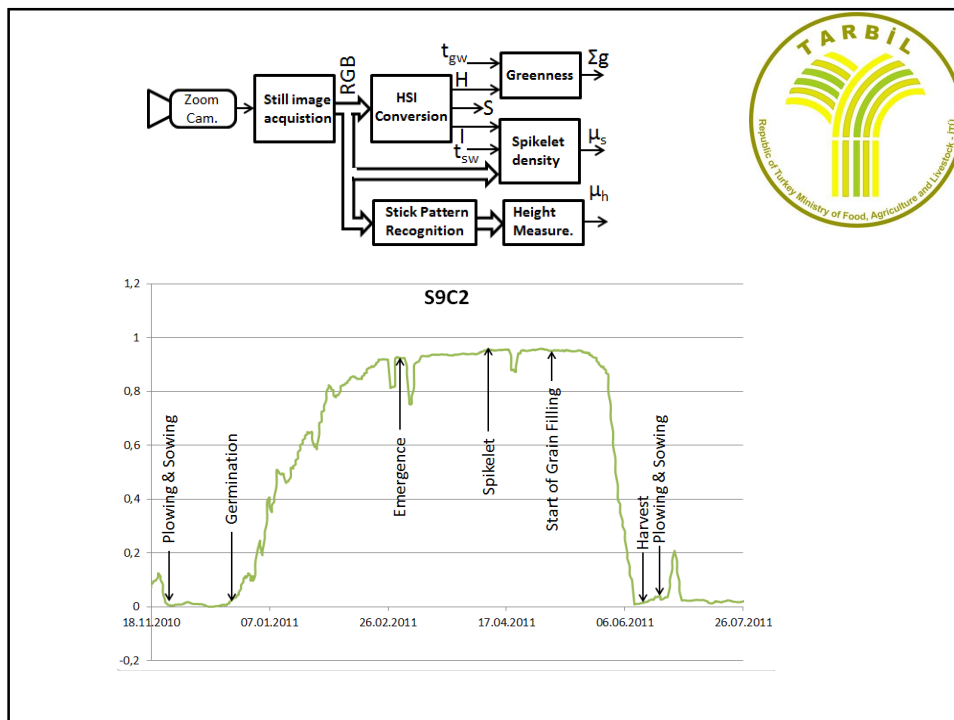
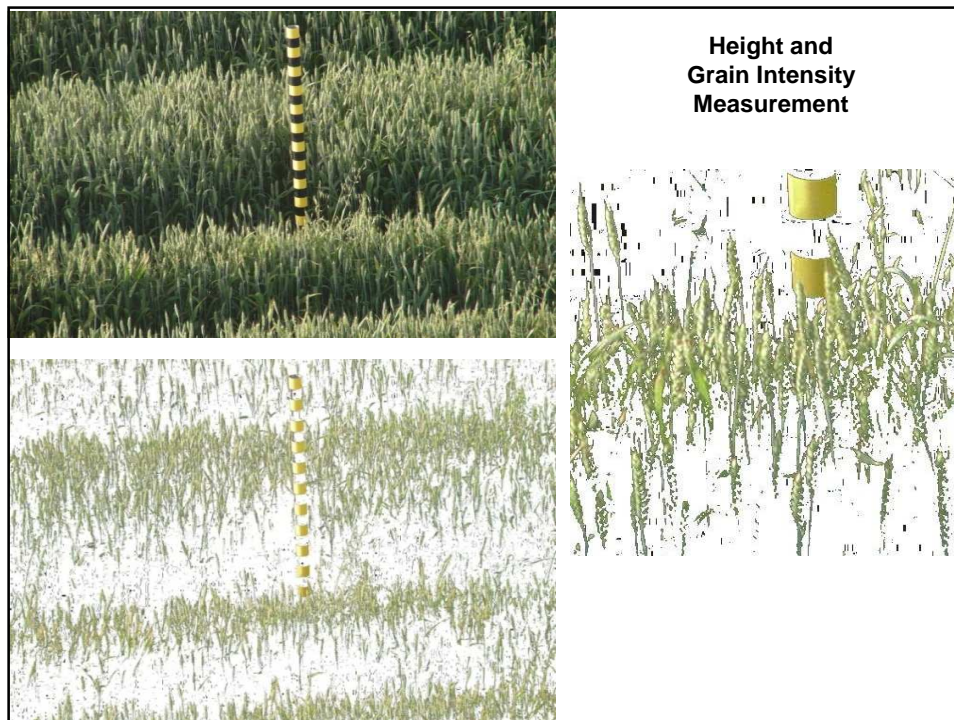


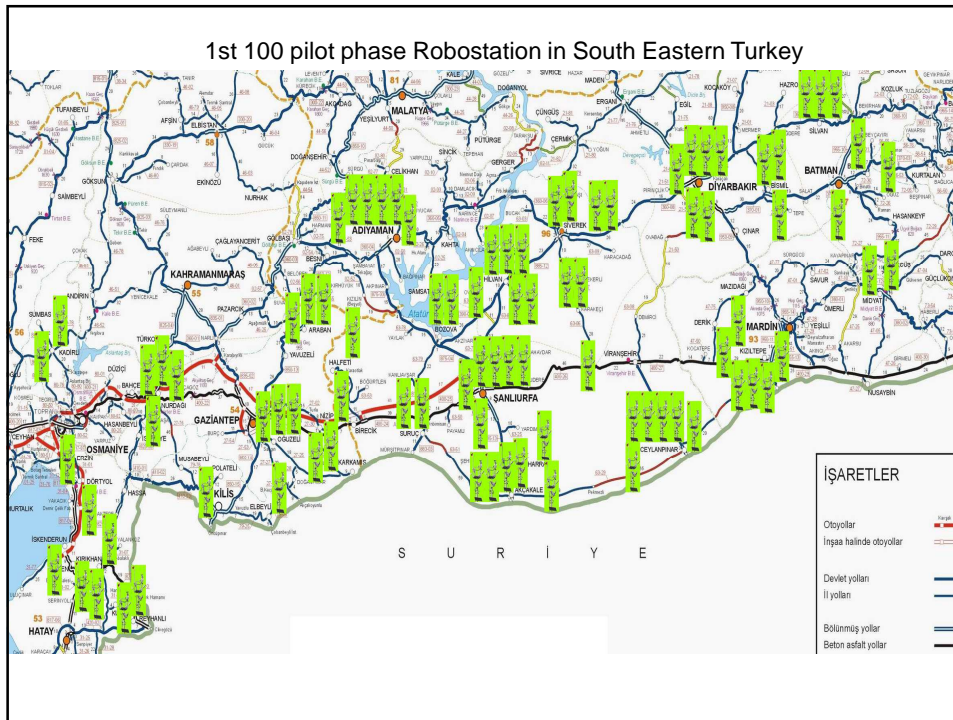
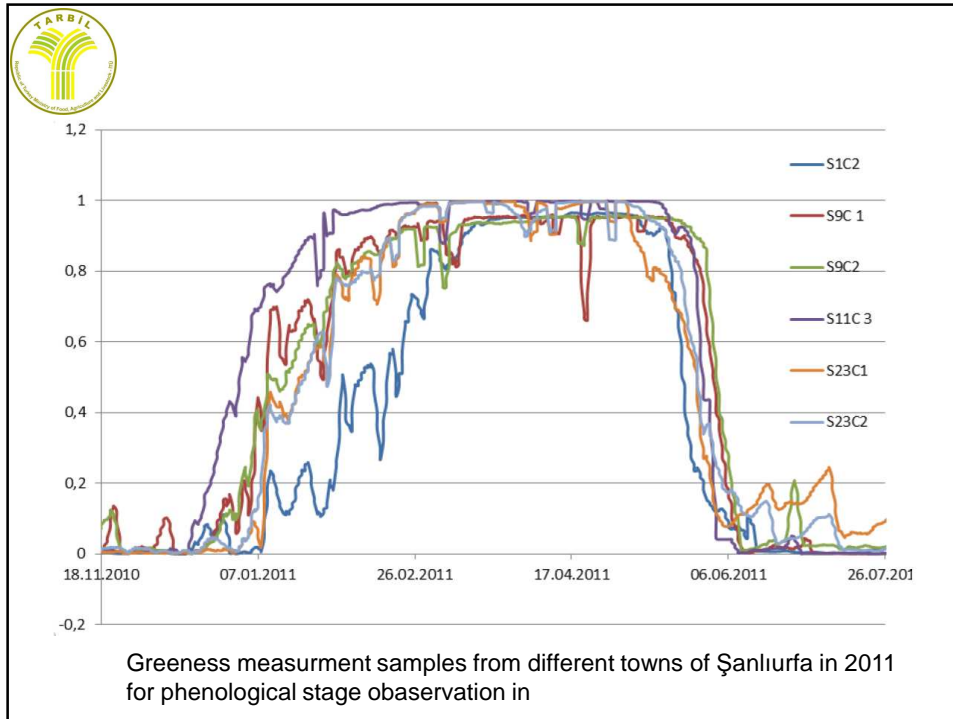
Vegetation marking: RED , Before germination

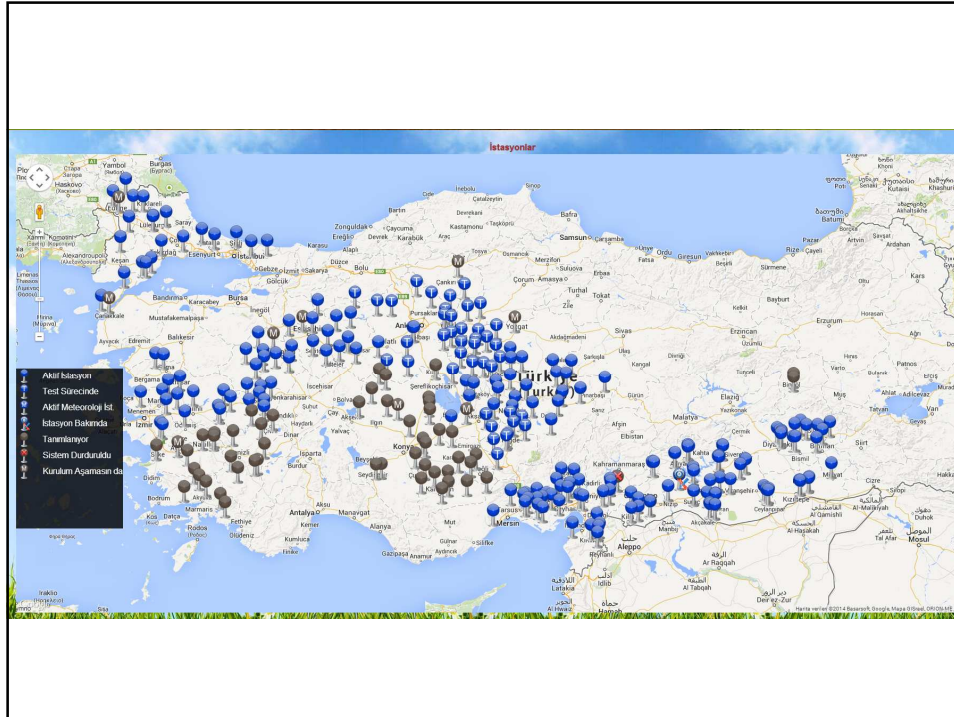


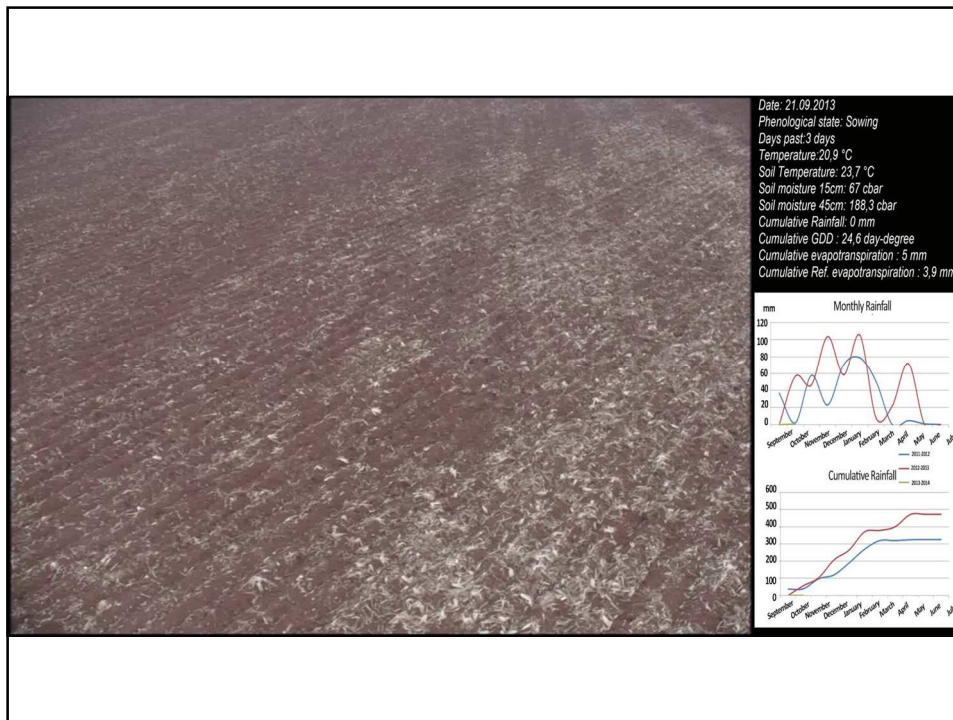
Vegetation marking: RED , After germination



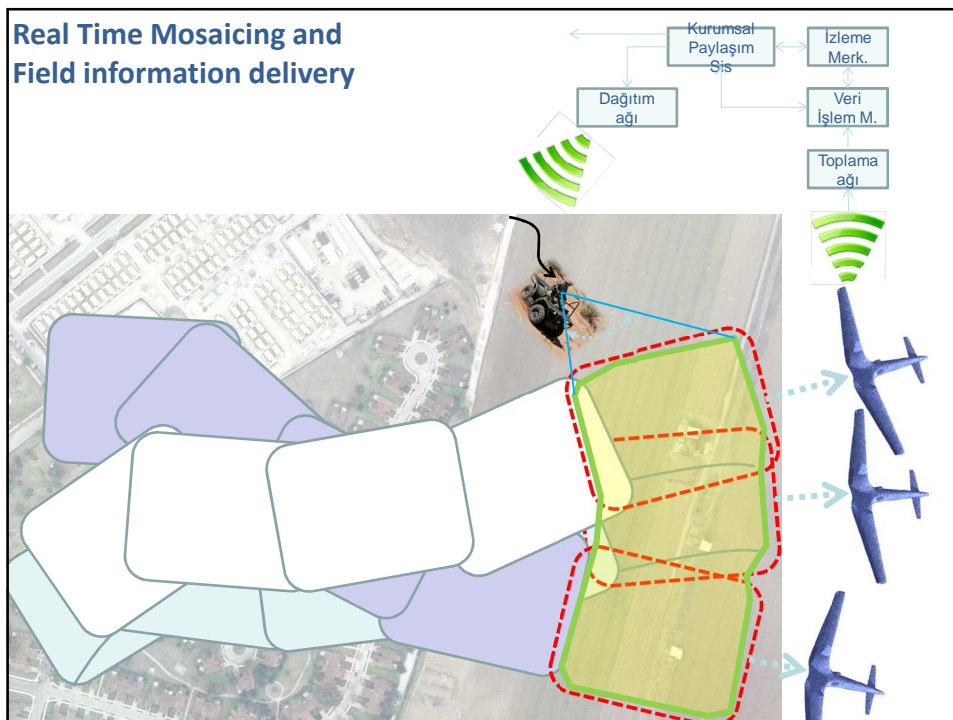




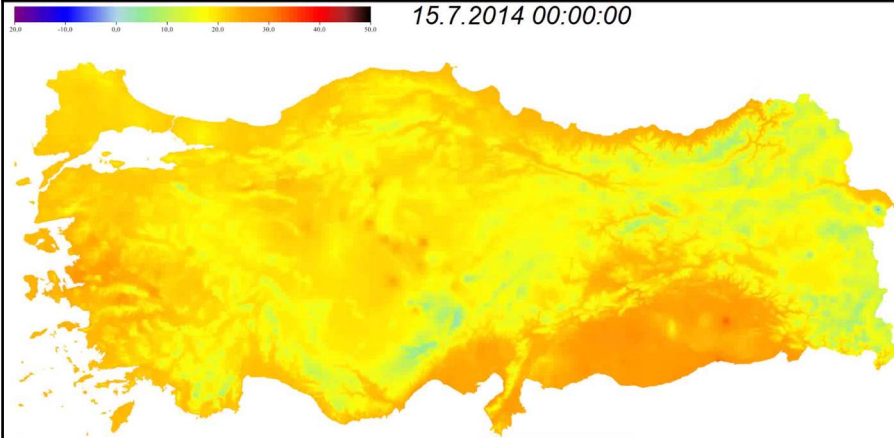




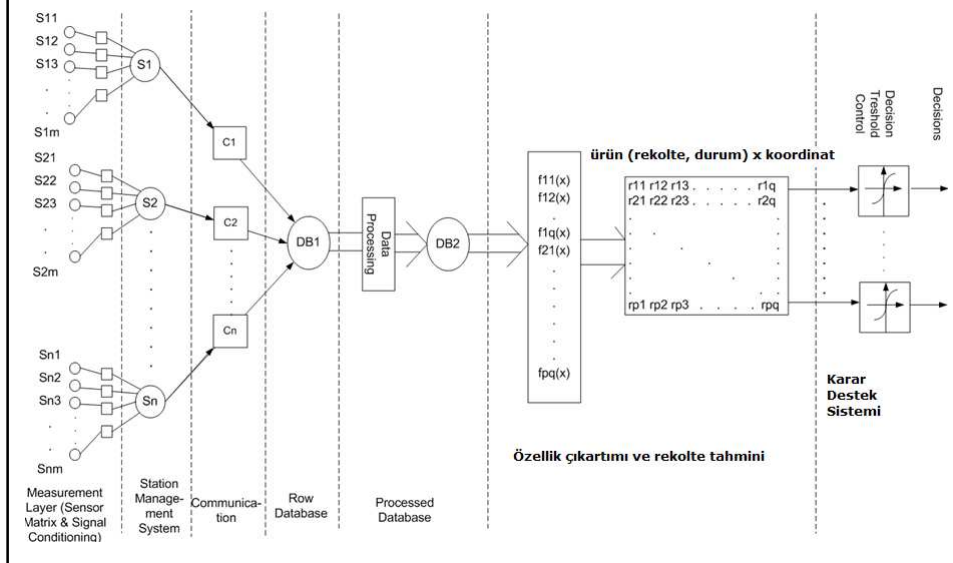
Real Time Mosaicing and Field information delivery



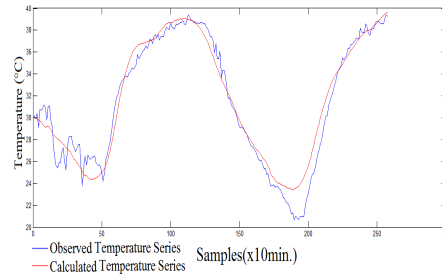
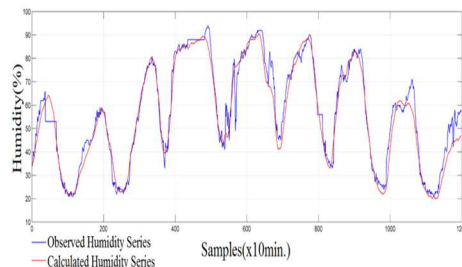
230+ Spatio-temporal Data Layers @250m resolution



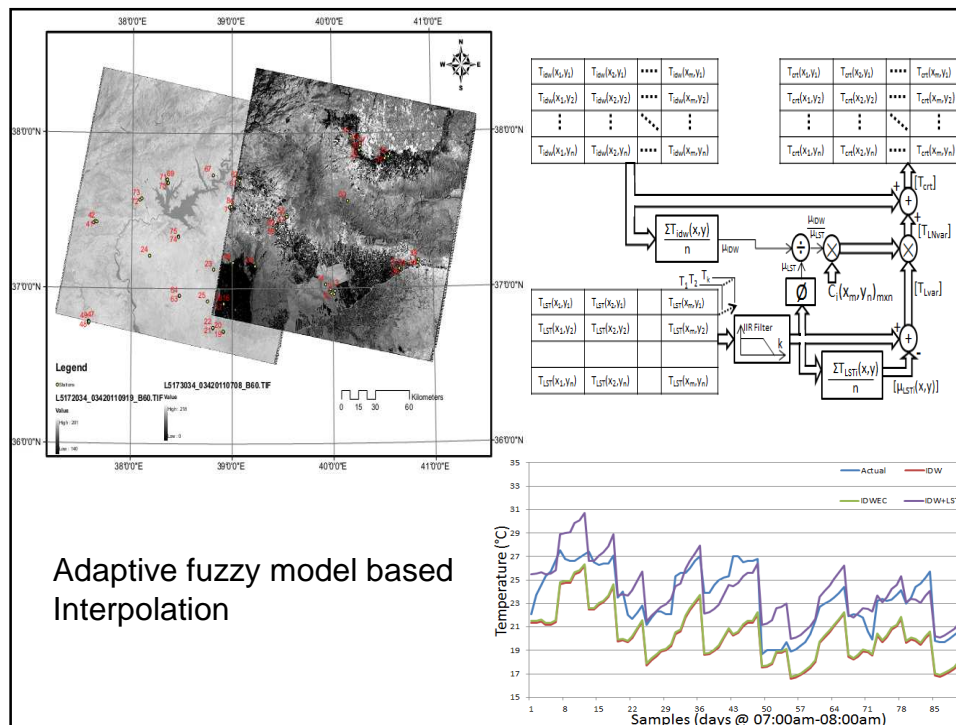
Data Acquisition and pre-processing scheme



Wavelet temporary data repair toolkit



The Linear Regression Model	MSE	MAE
On the Training Set	0,962	0,7523
On the test Set	2,0984	1,0923
The Linear Regression+Wavelet Model	MSE	MAE
On the Training Set	0,7291	0,6995
On the Test Set	1,5323	0,9526

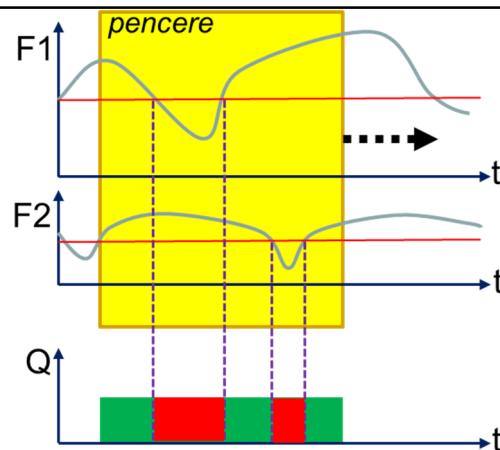


Adaptive fuzzy model based Interpolation

QoS Management

$$QoS = \frac{\sum t_{green}}{T_{frame}}$$

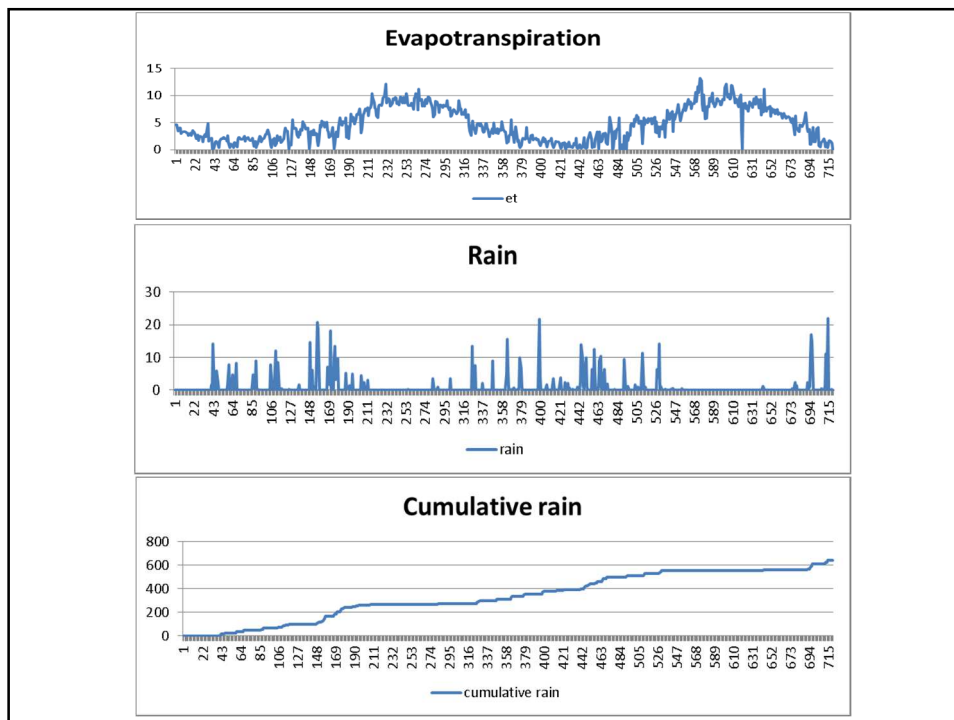
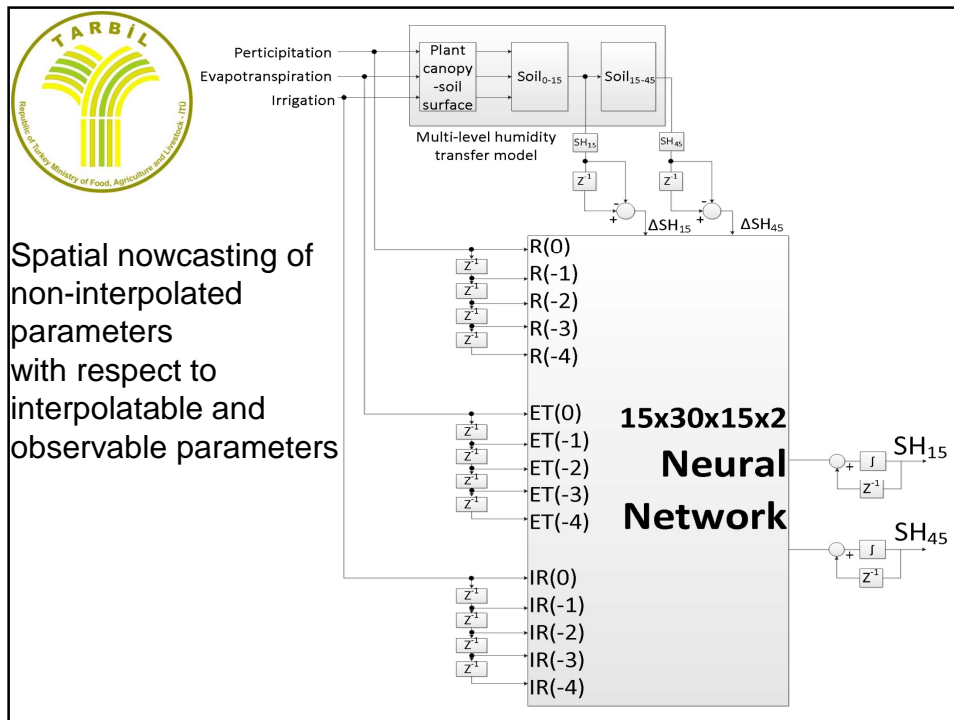
$$\pm Zc \cdot \frac{\sigma}{\sqrt{n}}$$

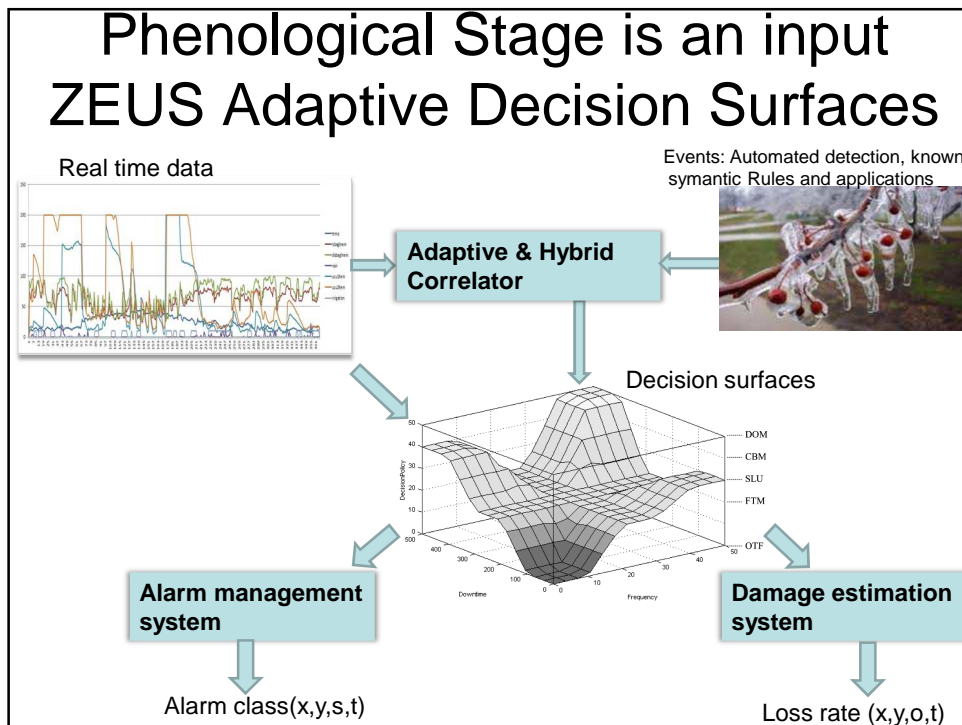
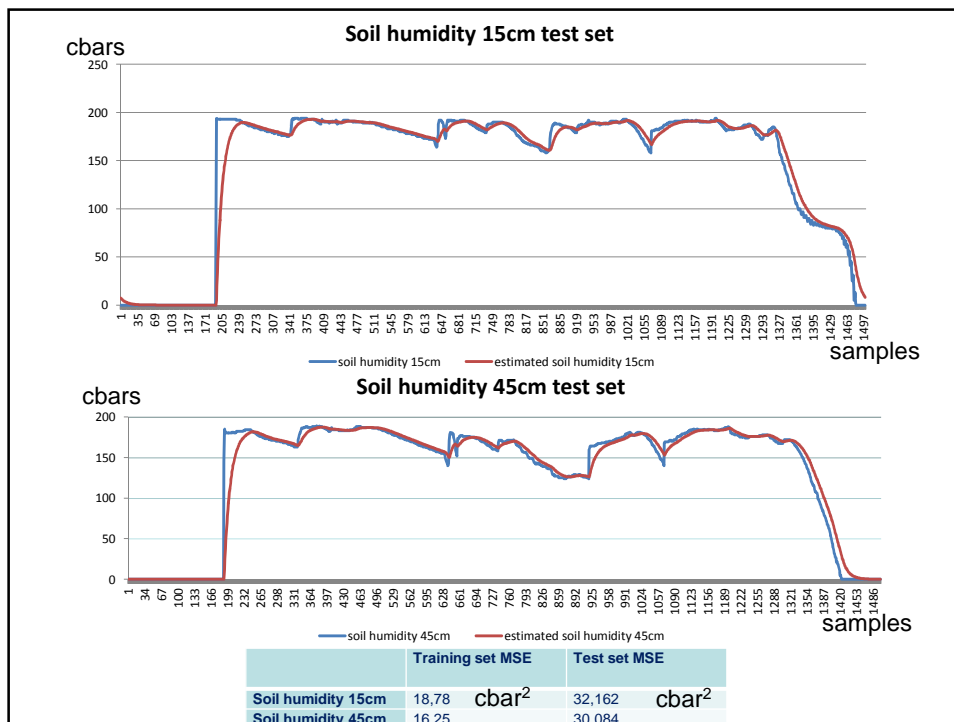


- QoS: Objectives of QoS must be clear with respect to target service performance, merged QoS must be the reference
- QoS: Time window must be defined
- QoS: Tolerance must be considered in calculations
- SLA: SLA must be maintained on QoS and the tolerance for legal applicability

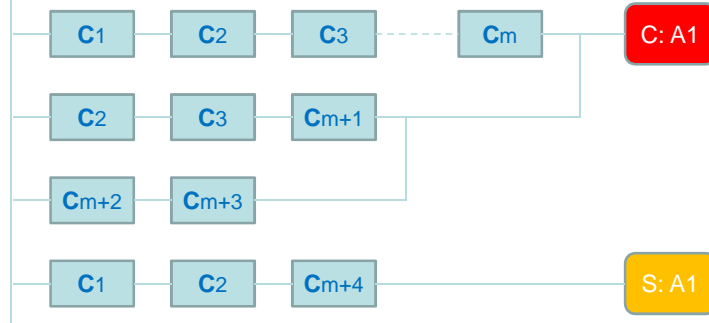
Conclusion:

Data from different resources and different grades can be fused but QoS must be observable and controllable





Logical Conditional Rule Definition



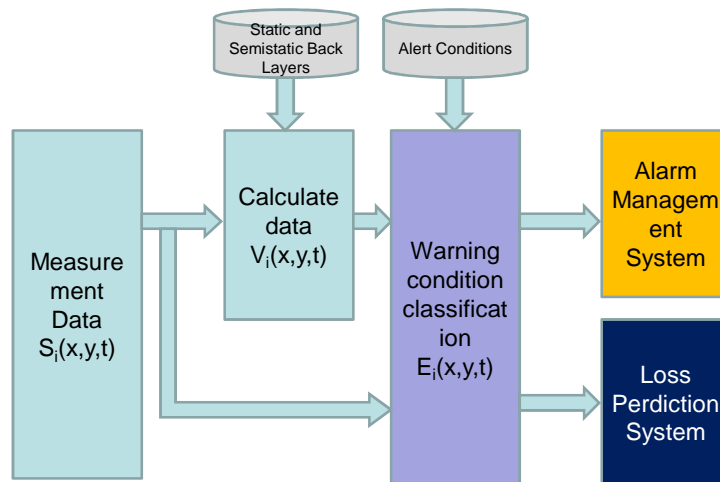
Example: C1: $\Delta t(60\text{min}) < -10^\circ\text{C}$ @ GDD < 900 in 1st March-15th April in terval

Koşul girişleri: a) Eşik değer karşılaştırması b) Zamana göre fark karşılaştırması

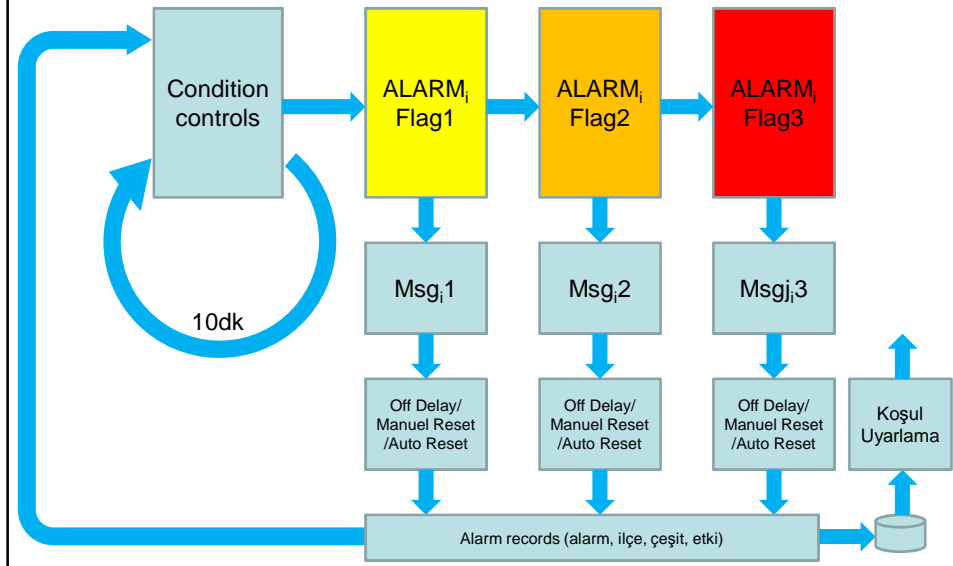
Veri giriş türleri: a) Ölçüm verileri b) Hesapla üretilen endeksler c) Fonksiyonlar

Koşul giriş yöntemi: a) Manuel b) Adaptif c) Süpervizörlü öğrenme d) Veri madenciliği

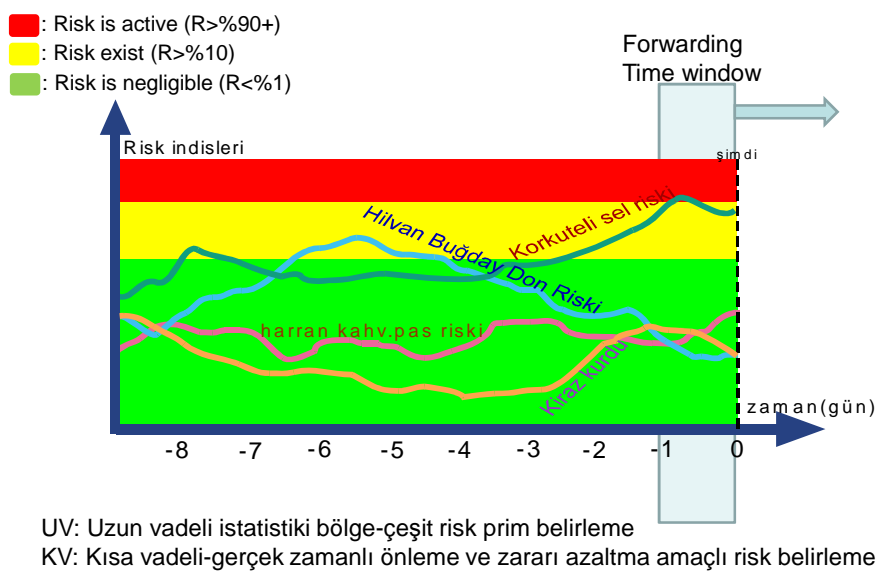
ZEUS: Agricultural Alarm & Risk Management Services

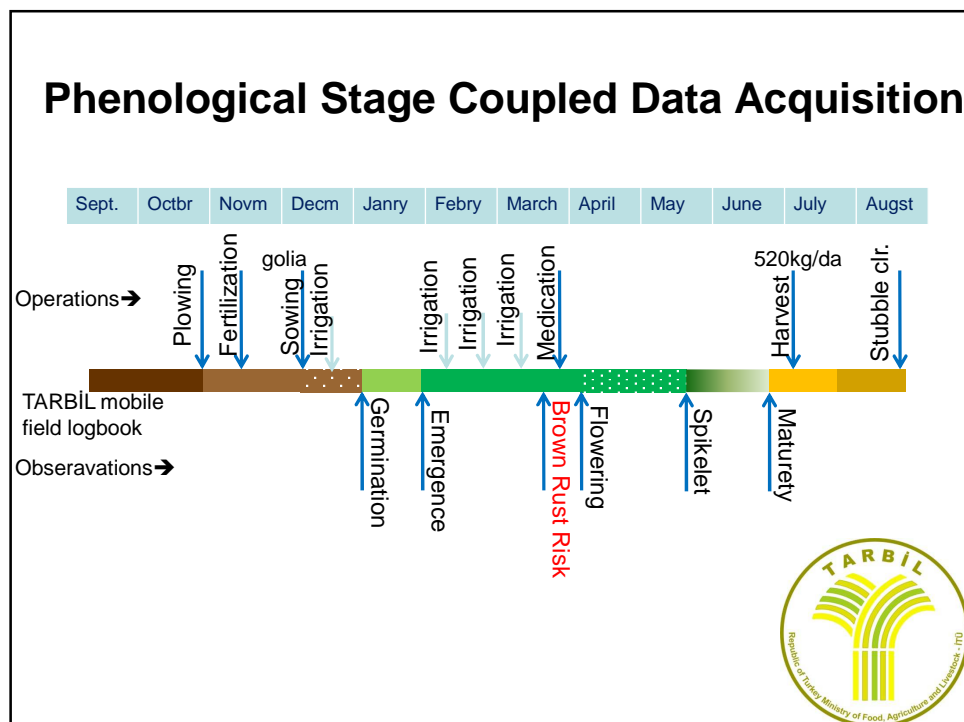
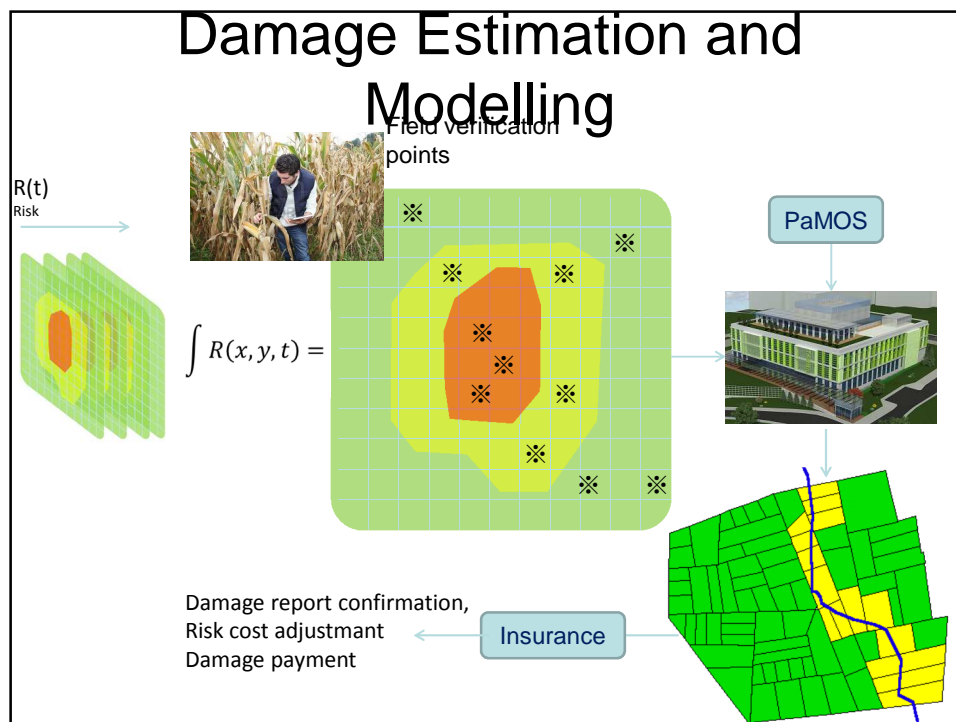


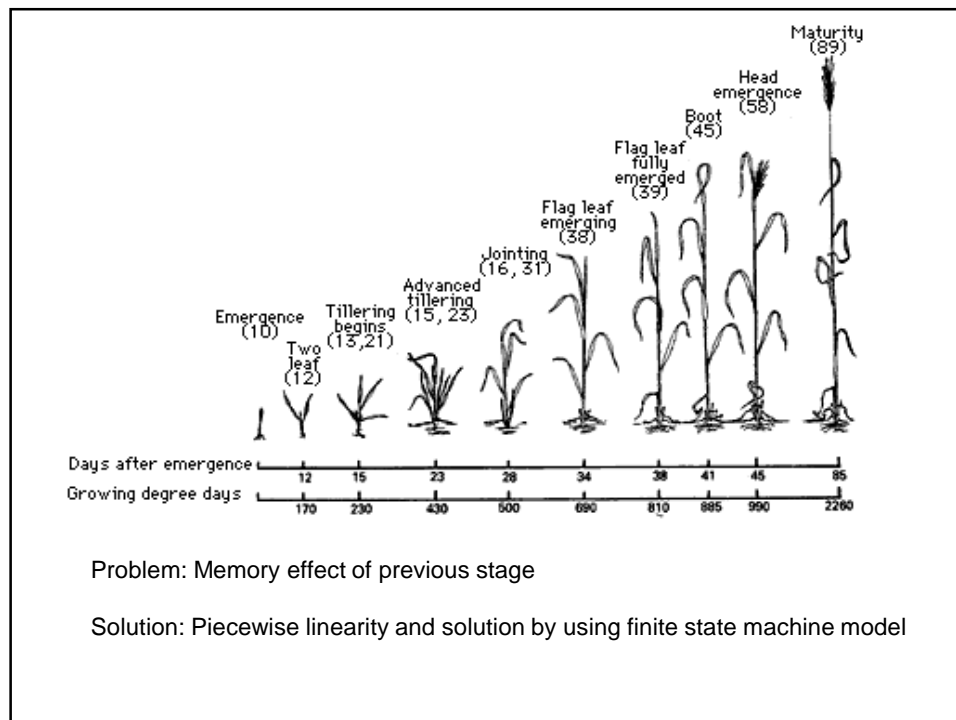
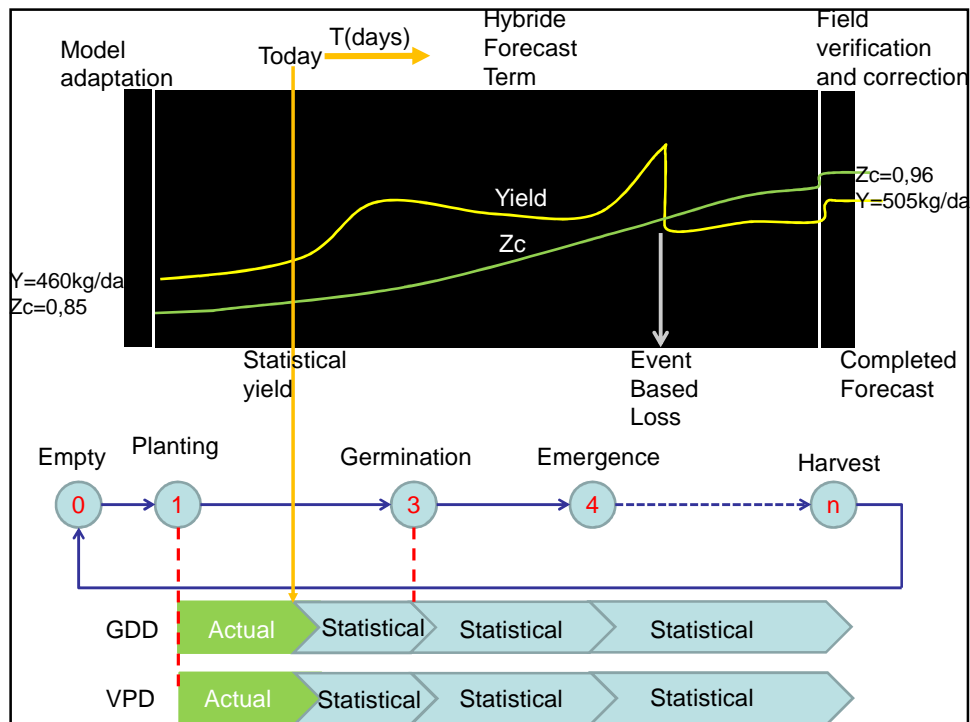
ZEUS Process Scheme



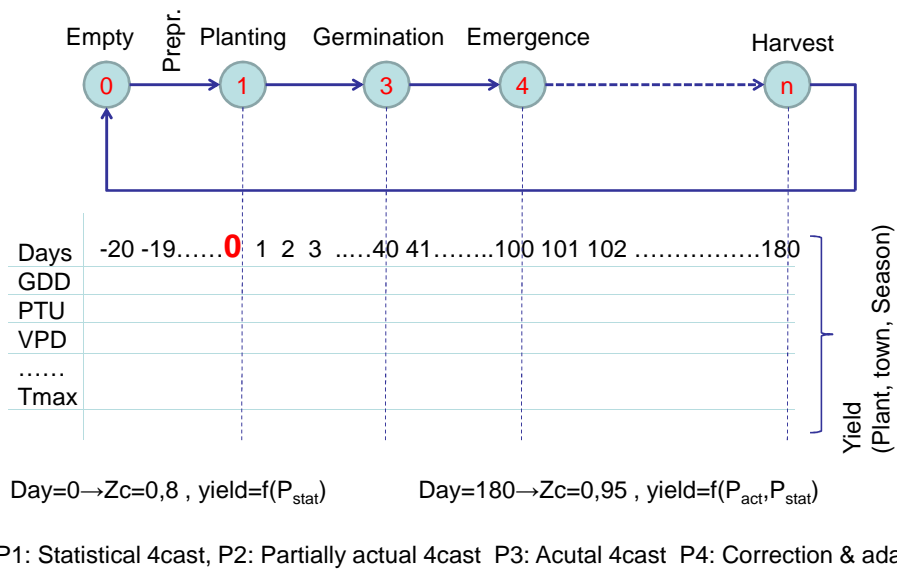
Real Time Risk Management



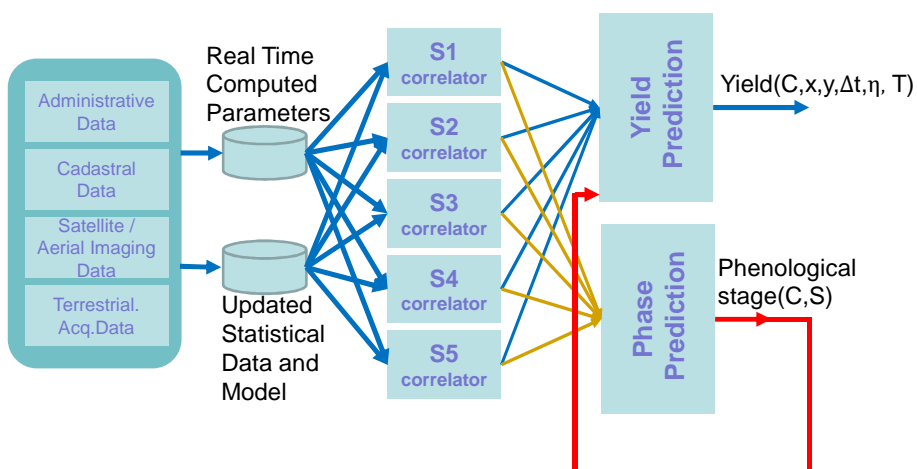




Finite State Machine Model



Continuous time Crop Yield Prediction (Mealy state model like approach)



Winter Wheat Crop Yield Efficiency in Towns of Şanlıurfa
(Amount of calculated Indices and parameters are more than 120)

Town	Index	MAV-4	TD	GDD	15 mayıs	PTU	PET MEAN	MinTemp	PET	Yield (kg/da)
2010	Merkez	267	1522,506	1163,882	209,30	14776,7	9,407953	-5,03571	1441,087	212
	Akçakale	352	1595,619	1211	192,00	15580,96	9,347862	-3,57895	1081,647	338
	Birecik	252	1582,026	1172,031	167,70	14931,31	9,524397	-7,55898	1299,226	182
	Bozova	247	1352,233	1015,592	302,80	12436,11	8,431718	-4,91947	1384,567	254
	Ceylanpın	292	1400,643	1159,808	125,60	14700,6	8,921493	-4,20663	1190,144	258
	Halfeti	240	1579,785	1169,726	167,70	14877,66	9,550238	-7,55805	1404,799	178
	Harran	297	1585,106	1213,554	192,00	15560,86	9,347392	-3,8196	1530,418	273
	Hilvan	330	1366,295	1021,041	302,80	12524,21	8,431969	-4,9836	1128,408	281
	Siverek	270	1409,673	1158,095	273,10	14674,38	8,433835	-6,04281	1200,146	253
	Suruç	215	1566,391	1195,293	192,00	15281,42	9,347355	-4,2391	1492,015	165
	Viranşehir	337	1375,123	1159,335	302,80	14693,22	8,75521	-5,10166	1187,659	282
2011	Merkez	267	1420,324	1284,662	240,561	16582,87	9,30313	-2,39496	1432,682	236,4946
	Akçakale	352	1709,672	1217,619	143,8351	15780,81	9,631943	-4,22234	1483,319	324,4299
	Birecik	252	1456,565	981,6474	331,906	12894,2	9,129901	-4,10641	1406,005	222,0247
	Bozova	247	1759,528	893,1105	267,3888	11802,81	9,248687	-7,33901	1424,298	234,1032
	Ceylanpın	292	1660,353	1180,031	188,7171	15378,32	9,145847	-3,32878	1408,461	293,6867
	Halfeti	240	1448,999	978,1381	348,2355	12851,68	9,138083	-3,78383	1407,265	215,6216
	Harran	297	1735,928	1264,741	137,8218	16370,77	9,96846	-3,06435	1535,143	289,4014
	Hilvan	330	1585,094	989,278	243,6179	12985,36	8,456463	-4,24004	1302,295	323,3761
	Siverek	270	1637,885	1174,842	176,3328	15318,76	9,279695	-3,49174	1429,073	264,2999
	Suruç	215	1605,932	1250,178	181,8705	16173,96	9,961458	-2,56997	1534,064	206,777
	Viranşehir	337	1656,65	1180,378	186,8354	15382,78	9,136148	-3,28149	1406,967	329,443

Regression Statistics

Multiple R	0,952069
R Square	0,906436
Adjusted R Square	0,859653
Standard Error	18,31755
Observations	22

	Coefficient	Standard				Upper	Lower	Upper
	s	Error	t Stat	P-value	Lower 95%	95%	95,0%	95,0%
Intercept	36,87141	180,2055	0,204608	0,840823	-349,63084	423,3737	-349,631	423,3737
TEY	0,796056	0,117568	6,771042	9,01E-06	0,54389817	1,048213	0,543898	1,048213
TD	0,210502	0,0722	2,915557	0,01129	0,05564926	0,365354	0,055649	0,365354
GDD	0,374153	0,325636	1,148991	0,269812	-0,324267	1,072573	-0,32427	1,072573
15 mayıs	0,079296	0,122199	0,648911	0,526898	-0,1827944	0,341387	-0,18279	0,341387
PTU	-0,03024	0,025606	-1,18094	0,257303	-0,0851593	0,024681	-0,08516	0,024681
PET MEAN	-30,1918	17,6997	-1,70578	0,110125	-68,153914	7,770243	-68,1539	7,770243
MinTemp	12,15365	3,593411	3,382204	0,004468	4,44655033	19,86075	4,44655	19,86075

1st year prediction cycle performance measure

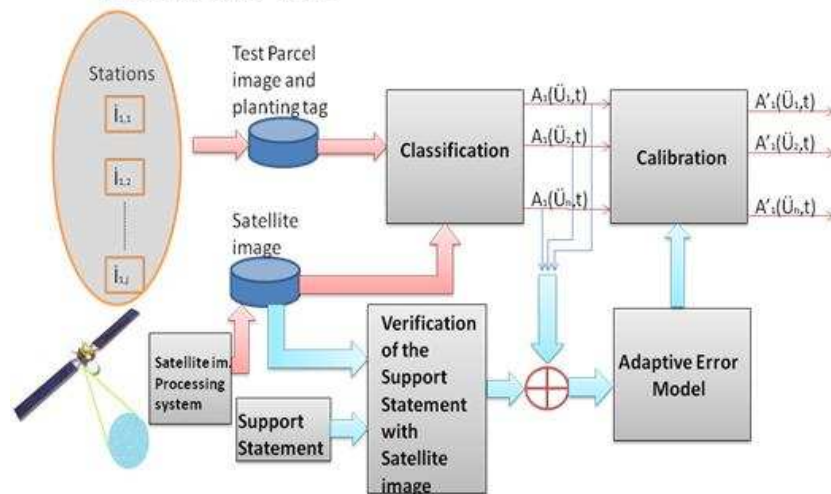
Şanlıurfa Province Winter Wheat @2011

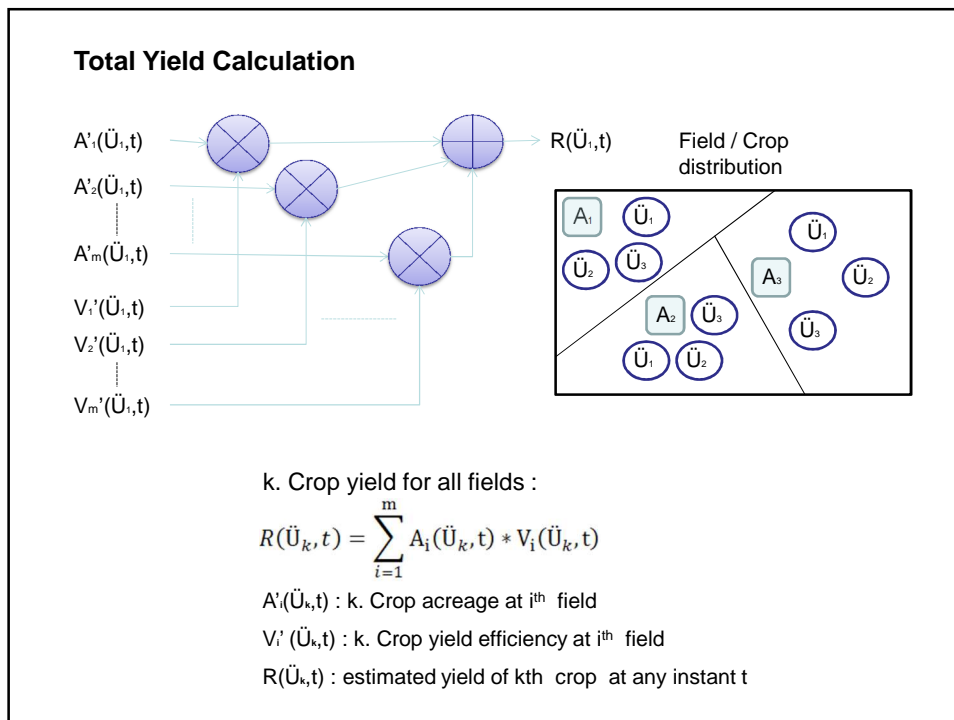
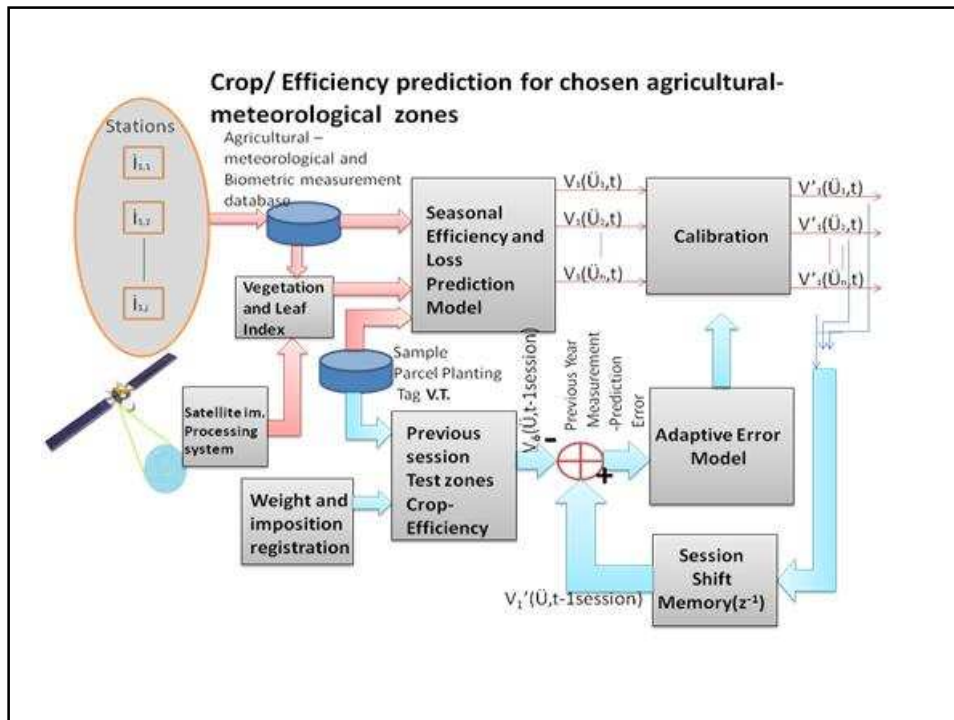
Town	Predicted	Realized	Error
Merkez	236,4946	284,7931	-16,96%
Akçakale	324,4299	321,5415	0,90%
Birecik	222,0247	197,8636	12,21%
Bozova	234,1032	247,3368	-5,35%
Ceylanpınar	293,6867	300,3395	-2,22%
Halfeti	215,6216	212,4884	1,47%
Harran	289,4014	346,2624	-16,42%
Hilvan	323,3761	318,0042	1,69%
Siverek	264,2999	289,7404	-8,78%
Suruç	206,777	197,8925	4,49%
Viranşehir	329,443	332,1607	-0,82%

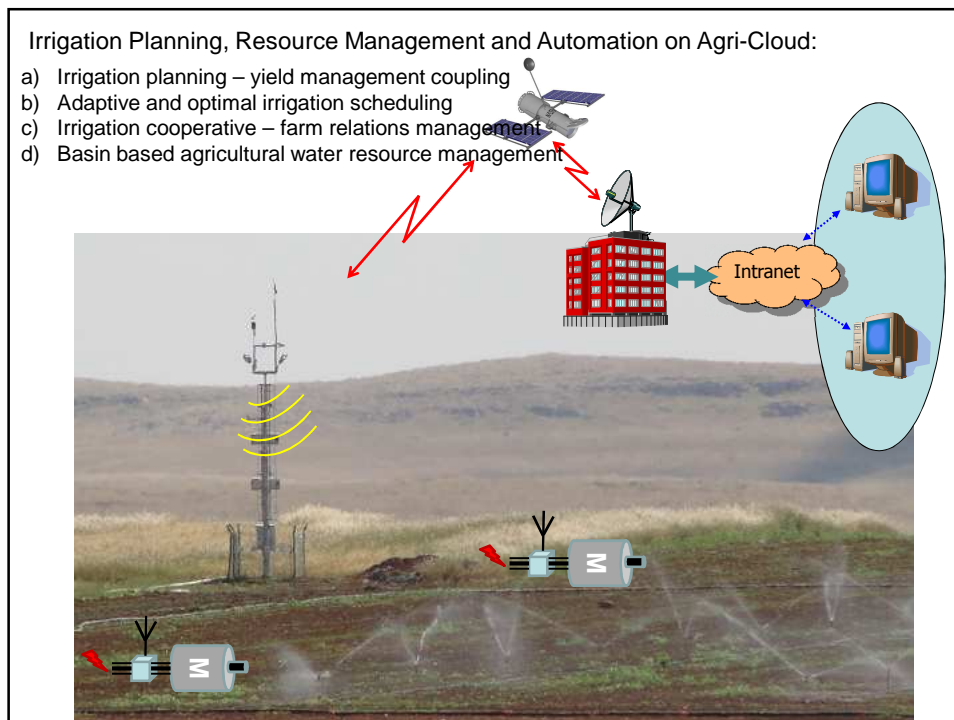
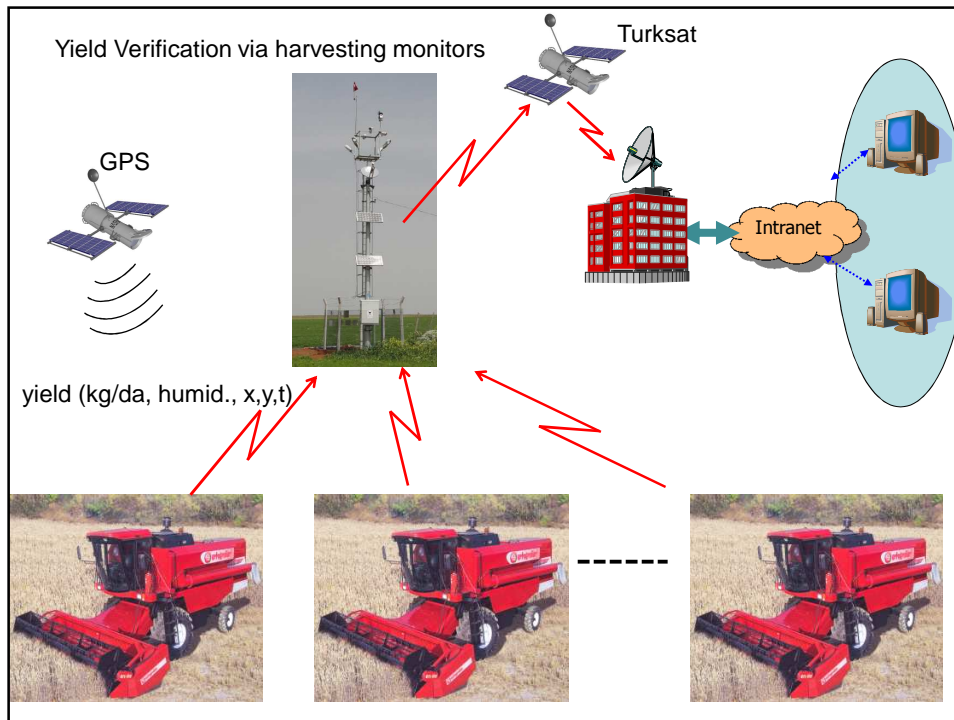
MAE (towns) 6,48%

TotalERR (Province) 3,57%

Crop/Planting Area prediction for chosen agricultural-meteorological zones





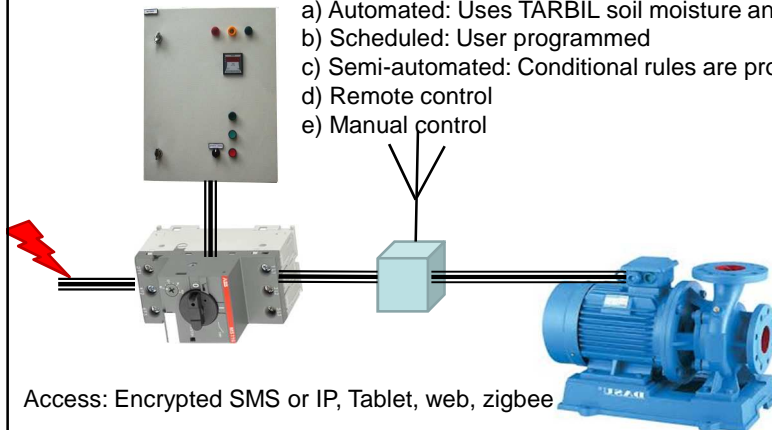


Irrigation controller: Blue box

- Pump and pipe fault diagnostics depending on current feedback signature analysis
- Water amount and schedule optimization for marginal efficiency with respect to TARBIL cloud data
- Regional motor groups' start up control for mains stability
- Protection and line fault diagnostics de

5 Modes operation:

- Automated: Uses TARBIL soil moisture and plant phenology
- Scheduled: User programmed
- Semi-automated: Conditional rules are programed by user
- Remote control
- Manual control



Access: Encrypted SMS or IP, Tablet, web, zigbee

FARMER Services



Farmer: Fuat Çetin
Şanlıurfa – Hilvan
Balkı village
ID: 334234234
User: Urfa Eagle

Messages:

Subsidary rate was announced
Look at risk message at Par.126
Field advisor Murat has notice

Field

Crop

Alert

Report

Expert

Chat

Education

Irrigation

Field: 123
25hectars




Crop: Winter wheat
Seed: Pehlivan
Soil: 15°C
Surface: 22°C
Wind: 10km/h
Soil shl.humidity: 70%
Soil depth humi: 23.5
ET0: 3.5
Solar radiation: 600

Estimated Harvesting: -80days
Estimated yield : 480kg/da±50kg/da
Water man.mode: Maximum yield
Water requirement : 220mm
Estimated precipitation : 80mm
Recommended irrigation: 180mm

Effective Risks:

+2 weeks: wheat rust %25

IRRIGATION MANAGEMENT



Farmer: Fuat Çetin
Şanlıurfa – Hilvan
Balkı Village
TC: 12334234234
User: Urfa Eagle

Parcel: 123
120da

Irrigation Controller

Salinity Control off on

Day time optimization off on

Electrical Energy Saving off on

Drought Risk Protection off on

Manual Control off on

Reduced Tariff Control off on

stop

Mode : Semi-automatic

User Level : Average

Management type : Maximum yield

Remaining water req. : 120mm

Expected precipitation: 40mm

Recommended Irrig. : 80mm

Maximum assignment : 500mm

1.Level consumption : 200mm/200mm= %100

2.Level consumption : 150mm/300mm = %50

TARBİL lets you save

TABLET/Mobile Device Based Real Time Monitoring and Field Management



Uzman Çiftçi

Tarla Defteri
Ekim Planı
Zirai Uyarılar
Sulama
Toprak ve Lab.
Maliyet
İstasyon
Mesajlar

Tarla

MARDİN
KIZILTEPE
Çetinler



28 dekar

Tarla Kodu 00000000515

Pafta 45114

Ada 14547

Parsel 1254

Mevki Çetinler

Arazi Eğimi 320 /1000

Arazi Yönü Doğu

Ekim

Arpa Altısıra

Ekim Tarihi 9 Haziran 2014

Hasat Tarihi 6 Aralık 2014

Geçen Süre 59 gün

Kalan Süre 122 gün var

Crop Status

Toplam Yağış Miktarı 0,00 mm

Toplam Yapılan Sulama 0,0 mm

Birikimli Ref. Bitki Su Tüketimi 42,4 mm

Birikimli Bitki Su Tüketimi 53,0 mm

Kalan Sulama İhtiyacı 623,8 mm

Tahmini Hasat Miktarı 72,0 kg/dekar

Rekolte 4,7 Ton ± %15

(Tavsiye edilen uygulama koşullarına göre)

Water management And yield forecast

Birikimli GDD 0 gün-derece

Birikimli HTU 0 gün-derece-saat

Birikimli PTU 0 gün-derece-saat

Birikimli VPD 157 mbar

Hava Durumu

Tahmin:



Bulutlu

Toprak Sıcaklığı (10cm) 26 °C

Toprak Nemi (15cm) 21 cbar(Çok Islak)

Toprak Nemi (45cm) 35 cbar(Çok Islak)

Hızlı Rüzgar Hızı 11 km/saat

Rüzgar Yönü Kuzey

Son 24 Saat Azami Rüzgar Hızı 27 km/saat

Son 24 Saatlık Yağış 0,0 mm

Son 1 Aylık Yağış 0,0 mm

Son 1 Yıllık Yağış 127,8 mm

Yaprak Islaklık İndisi 0 indis

Hava Basıncı 998 hPa

Güneş Radyasyon Şiddeti 799 W/m²

Ultraviyole İndisi 48 indis

3 Saat İçinde Yağış İhtimali % 70


24 Saat İçinde Yağış İhtimali % 20

Calculated Parameters

Parcel based agricultural activity records


Tarlamatik - Tarla Defteri - 7 Ağustos 2014 11:17 Geri Dön

Uygulama Ekle
Hadise Bildirimi
Gelişme Dönemi




Activity input


Hazırlık ve Bakım




Sulama



Gübreleme



İlaçlama



Hasat

Phenologic info

Ekimden Sonra Geçen Gün Sayısı: 59 gün

Phenomenon input

09.10.2014

Mayıs Haziran Temmuz Ağustos Eylül Ekim Kasım Aralık Ocak Şubat Mart

Activity diary

← Gübreleme

← 1 - Ekim

← 2 - Çiğuş

← 3 - Yaprak

← 4 - Kardeşlenme

← 5 - Sapa Kalkma


Phenological stage

← 6 - Başaklanma


← 7 - Çiçeklenme

← 8 - Olgunlaşma

← 9 - Hasat



Bugüne Git



Düzeltil

11:17

Fertilizer application decision support and activity record screen

Tarlamatik - Ekim Hazırlık - 7 Ağustos 2014 16:27 Geri Dön

Ada

Date of app.

Tarih

Pafta

Type of Fertilization

Gübreleme Tipi

Fertilizer Material


Gübre Çeşidi

Fertilizer app.amount

Miktar

2	Mart	2009			
3	Nisan	2010			
4	Mayıs	2011			
5	Haziran	2012			
6	Temmuz	2013			
7	Ağustos	2014	Üst Gübreleme - Damlama ile	Amonyum Nitrat(%26N)	1 kg/dekar
8	Eylül	2015	Üst Gübreleme - Yağmurlama ile	Amonyum Nitrat(%33N)	2 kg/dekar
9	Ekim	2016	Üst Gübreleme - Çapalama ile	Amonyum Sülfat (%21N)	3 kg/dekar
10	Kasım	2017			
11	Aralık	2018			
12		2019			

Onayla



Cost details

Unit costs

Tarih: 7 Ağustos 2014

Alan: 7 dekar

Gübreleme Birim Maliyeti: 40 TL/kg

İşçilik Birim Maliyeti: 0 TL/dekar

Ekipman Birim Maliyeti: 0 TL/dekar

Total Cost of Activity

Toplam Gübre Miktarı: 7 kg

Toplam Gübre Maliyeti: 280 TL

Toplam İşçilik Maliyeti: 0 TL

Toplam Ekipman Maliyeti: 0 TL

Toplam Maliyet: 280 TL

Medya cihazı olarak bağlandı

Protective Chemical Application Record

Tarlamatik - İlaçlama - 7 Ağustos 2014 12:02 Geri Dön

Ada 152151 Pafta 1215

Tarih			İlaç Gurubu	İlaç Alt Gurubu	İlaç Sınıfı	İlaç	Miktar
2	Mart	2009					
3	Nisan	2010					1 gr/dekar
4	Mayıs	2011					2 gr/dekar
5	Haziran	2012					
6	Temmuz	2013					
7	Ağustos	2014	Mantar ilaçları ve Bakterisidler	İnorganik mantar	Bakır Bileşikler	BORDEAUX MIXTURE	
8	Eylül	2015					
9	Ekim	2016	Herbisitler, Yaprak yıkıcılar ve Yosun	Karbamatlar ve ditiyokarbamat esaslı	İnorganik Kükürt	COPPER HYDROXIDE	
10	Kasım	2017					
11	Aralık	2018	Böcek ve Akarisitler	Benzimidazollerin dayalı Mantar ilaçları	Diğer Anorganik Fungisitler	COPPER (I) OXIDE	
12		2019					

Tarih **7 Ağustos 2014**

Alan **111 dekar**

İlaçlama Birim Maliyeti **87,5 TL/gr**

İşçilik Birim Maliyeti **6 TL/dekar**

Ekipman Birim Maliyeti **5 TL/dekar**

Toplam İlaç Miktarı **111 gr**

Toplam İlaç Maliyeti **9.712,5 TL**

Toplam İşçilik Maliyeti **666 TL**

Toplam Ekipman Maliyeti **555 TL**

Toplam Maliyet **10.933,5TL**

Onayla

Seyreltme

Yok

% 1

Damage Record

Tarlamatik - Dolu - 7 Ağustos 2014 12:00 Geri Dön

Tarih			Tahmini Hasar Oranı
2	Mart	2009	% 10
3	Nisan	2010	% 11
4	Mayıs	2011	% 12
5	Haziran	2012	% 13
6	Temmuz	2013	% 14
7	Ağustos	2014	% 15
8	Eylül	2015	% 16
9	Ekim	2016	
10	Kasım	2017	
11	Aralık	2018	
12		2019	

Onayla

Harvest Record and Cost/Price Comparison

Tarlamatik - Hasat - 7 Ağustos 2014 12:02 Geri Dön

Ada 152151			Pafta 1215		Hektolit	Nem	Toplam Miktar
Tarih			Miktar				
2	Mart	2009	297 kg/dekar				33.078 kg
3	Nisan	2010	298 kg/dekar	1	% 1		33.189 kg
4	Mayıs	2011	299 kg/dekar	2	% 2		33.300 kg
5	Haziran	2012					
6	Temmuz	2013					
7	Ağustos	2014	300 kg/dekar				33.411 kg
8	Eylül	2015	301 kg/dekar	5			33.522 kg
9	Ekim	2016	302 kg/dekar	6	1		33.633 kg
10	Kasım	2017		7	2		
11	Aralık	2018					
12		2019					

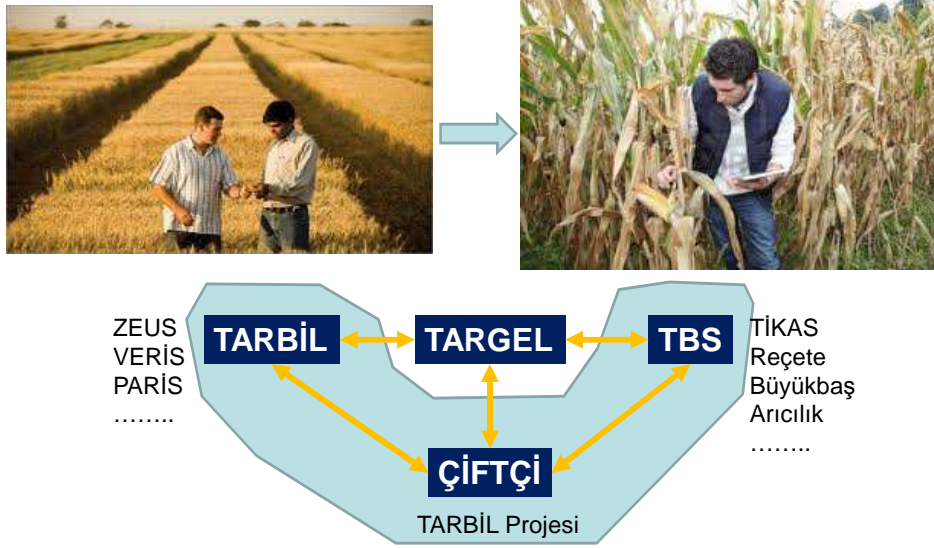
Onayla

İşçilik Birim Maaliyeti	6 TL/dekar	Toplam İşçilik Maaliyeti	666 TL
Alan	111 dekar	Toplam Ekipman Maaliyeti	555 TL
Ekipman Birim Maaliyeti	5 TL/dekar	Toplam Biçerdöver Hasat Maaliyeti	1.332 TL
Tahmini Verim	199,2 kg/dekar	Toplam Nakliye Maaliyeti	10 TL
Gerçekleşen Verim	300 kg/dekar	Toplam Nakliye-İşçilik Maaliyeti	12 TL
Toplam Gerçekleşen Verim	33.411 kg	Toplam Maliyet	2.575 TL
Ürün TMO Fiyatı	1,3 TL/kg		
Toplam Gelir	43.434,3 TL		

Conclusion:

Mobility has increasing role in Agriculture and may boost through sustainable application scenarios on a common platform provides

Mobile Information to Field Experts through Tablet devices

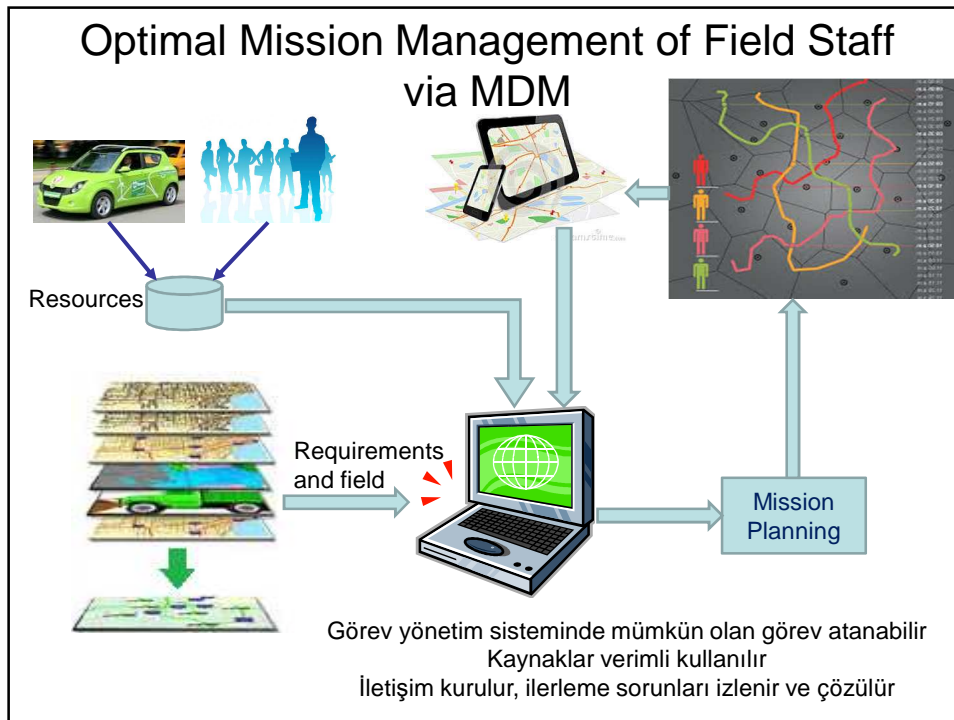


Why TABLET, Why Field Staff ?

Tablet PC is a way to visualize the existing geo-information as a medical doctor of field

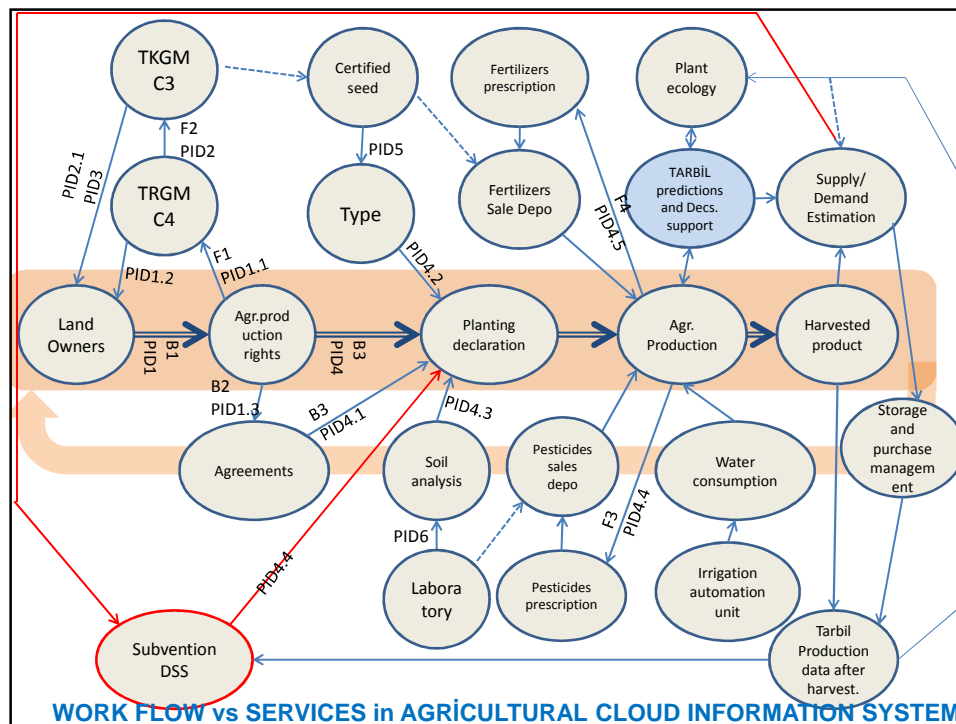


Veri ve bilginin olmadığı bir sistemde TABLET yalnızca kişiler arası bir iletişim aracıdır
İdari kayıt ve ölçüm/gözlem verilerine erişim TABLET'in yönetim aracı olmasını sağlar



Conclusion:

System integration matters but field staff-C4 staff process must also be managed within predefined processes otherwise utilization rate dramatically reduces



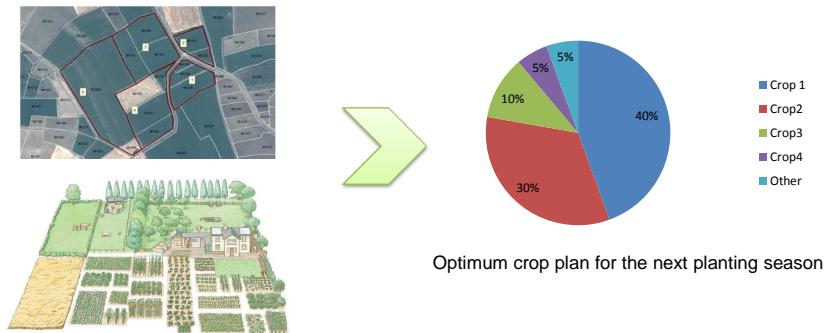
Conclusion:

*Administrative process must be a part of natural progress,
«not in a DB as record, but in terms of functional states»*

*Work flows must meet the services within process management
over cloud*

Regional Optimum Crop Plan

- Parcel based Optimum Crop Plan that maximizes regional net economic value over 10 years is created
- Based on the average yield and market demand , agricultural land is assigned to each plant

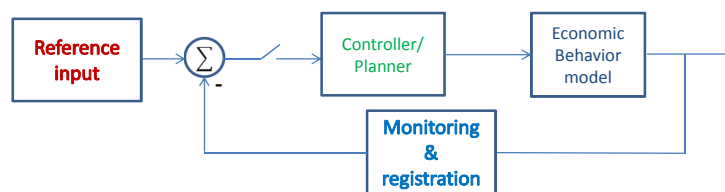


83 | A Global Optimization Model For Macro Economic Planning in Agriculture



Basin based Optimal Crop Pattern Management through Multi-step Subsidy Policy

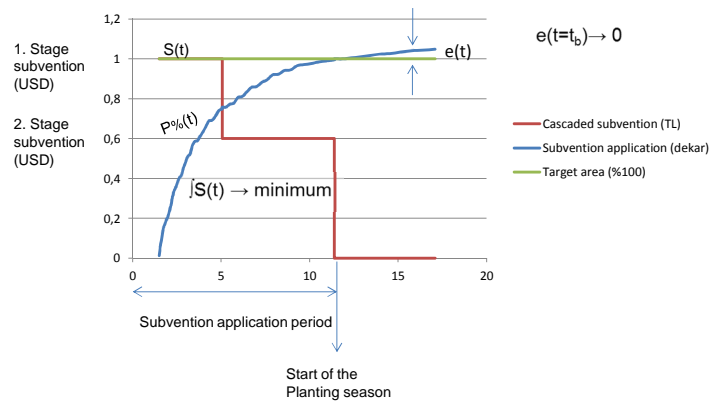
Feedback type closed loop discrete system



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2. Stage – Subsidy Allocation Plan



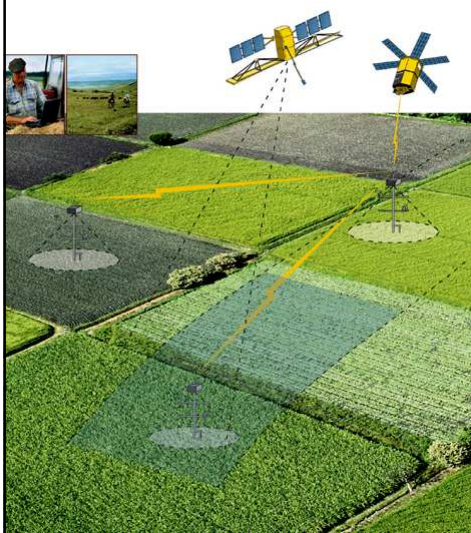
Aim is to reach the optimum crop pattern with the minimum possible subsidy per basin

85 | A Global Optimization Model For Macro Economic Planning in Agriculture



What does a real time agro-Information service cover?

TARBiL Project Targets:



Vital agricultural production process information based on country-wide real time measurements.

Prediction of seasonal and early harvest crop yield

Crop type and field based mobile info.to subscribers

Precision Farming

Reduction of chemical usage

Adaptive land model Decision and Support systems.

Agricultural Insurance: reliable pre-event risk and impact assessment ability

Early warning system

Fair insurance payback by after-event damage reports

Financial and Economic Savings by reducing the telemetry data and satellite remote sensing costs.

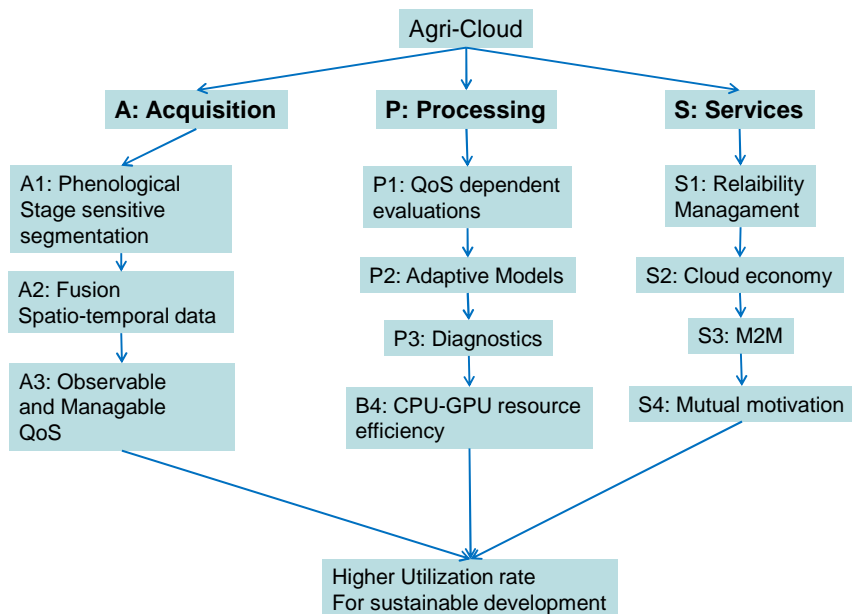
Protection of farmers by on-time preharvest national & intl.market forecast

9.9B€/year save/earn target for TR

Conclusion:

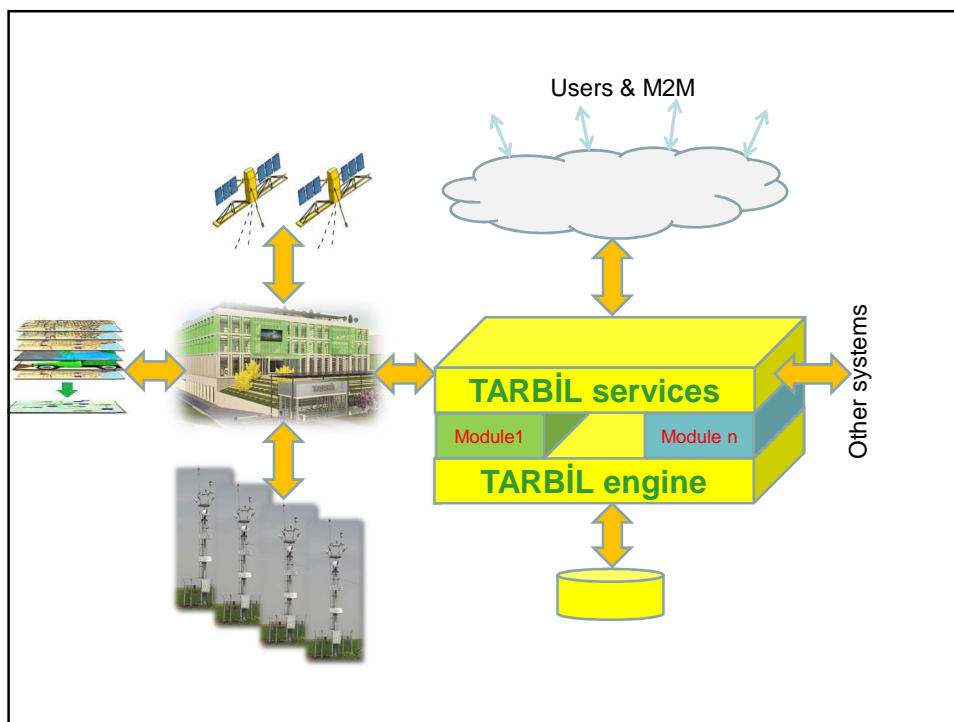
Cloud and Mobile technologies are welcome but PanEuropean Management (C4) that provides aggregation for bridging between acquisition and services

Why Fusion on AgriCloud ?



Agri-Cloud Remarks

- If there is not a reference network, diagnostics and classification of existing networks is also not possible
- If there is not a reference network QoS of aggregated data is not reliable
- If there is not Phenological Stage monitoring, fusion performance dramatically reduces
- Cloud enables better feasibility and redundancy for agricultural computations required at all levels from field applications to decision support for policy making
- M2M on Cloud enables service level compatibility between different systems and manufacturers
- Native Applications on cloud based data services for reliable



Conclusion:

AGRIMONIS is sustainable and innovative integration platform where everybody has either a brick to place and serve or a service to get and use....

**AGRIMONIS
TARBİL**

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Republic of Turkey Ministry of Food Agriculture and Livestock



**TEŞEKKÜRLER
THANK YOU
DANKESCHÖN**

