



# Analytical DSS module - how to support decisions in the analytical lab

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# Analytical DSS model

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Decision support for evaluation of the methods:

Methods developed within WP5&6

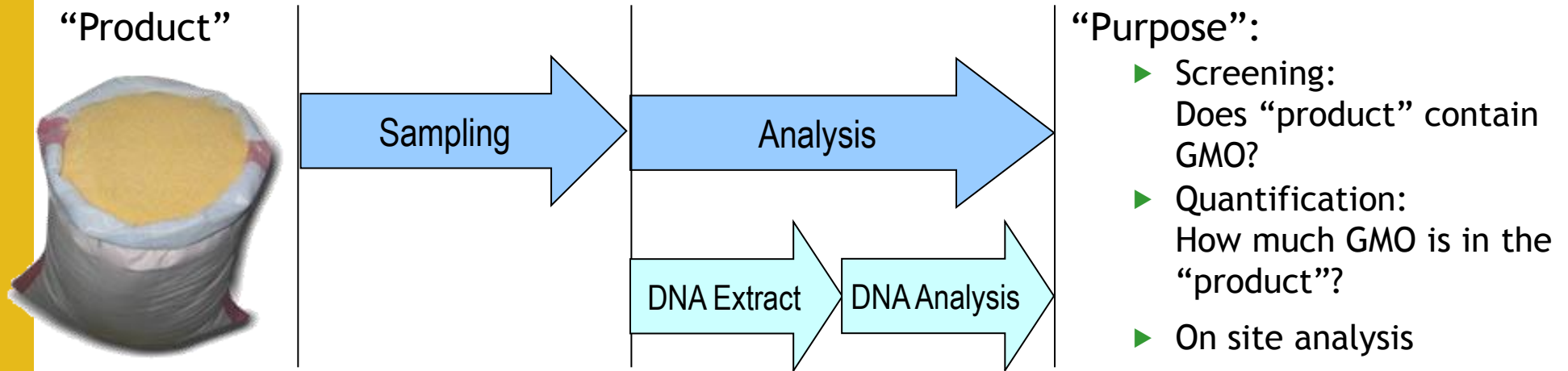
- ▶ How to evaluate which is the most promising for routine analysis?

Can be generalised - question asked in the routine detection lab

- ▶ Which methods are best applied in our lab?
- ▶ For certain sample type?



# Analytical DSS model



## Decision Questions:

- ▶ Is a given method “fit for purpose”?
- ▶ Which method is “best for purpose”?
- ▶ Which new method is “best for development”?





# Analytical DSS model

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Objective to cope with diverse methods:

- DNA extraction/detection
- Simplex/multiplex
- PCR/nonPCR based





# Analytical DSS model

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Parameters behind decision:

- ▶ Applicability
- ▶ Performance
- ▶ Cost
- ▶ Practicability





# Analytical DSS model

	characteristic	evaluation
Performance LOD	2 copies	+++
Performance LOQ	50 - 10000 copies	+++
Equipment required	Real-time PCR	+
Time per sample analysis	2h	++
Cost of chemicals		
Method implementation		
....		

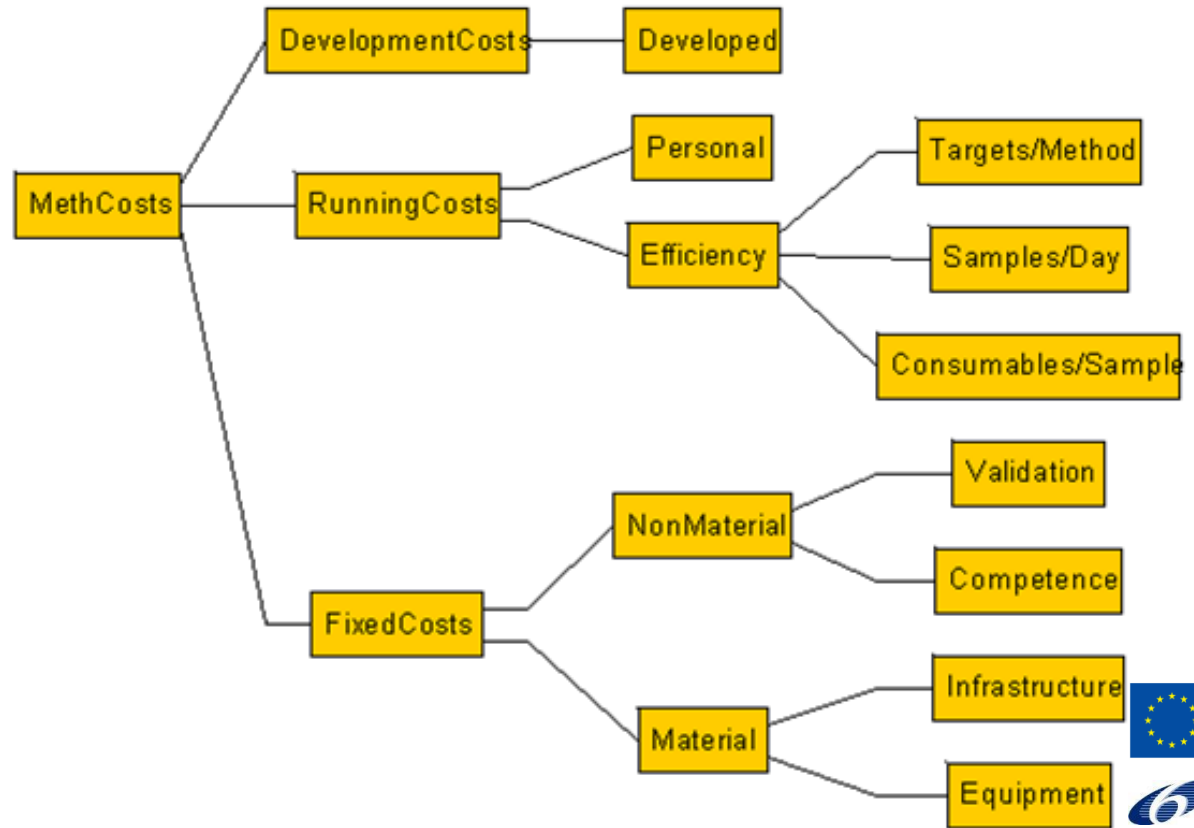


# Decision rules - method costs

	Material	NonMaterial	FixedCosts
	67%	33%	
1	<b>high</b>	*	<b>high</b>
2	<=med	<b>high</b>	<b>high</b>
3	med	>=med	med
4	>=med	med	med
5	<b>low</b>	<=med	med
6	<b>low</b>	<b>low</b>	<b>low</b>

	Equipment	Infrastructure	Material
	50%	50%	
1	<b>high</b>	*	<b>high</b>
2	*	<b>high</b>	<b>high</b>
3	med	>=med	med
4	>=med	med	med
5	<b>low</b>	<b>low</b>	<b>low</b>

	Competence	Validation	NonMaterial
	67%	33%	
1	<b>high</b>	<=med	<b>high</b>
2	<=med	<b>low</b>	med
3	med	*	med
4	>=med	<b>high</b>	med
5	<b>low</b>	>=med	<b>low</b>



# Decision rules - Fit for screening

Context: *Analytical Method Assessment Model*

Purposes: DNA Extraction, Screening, Quantification

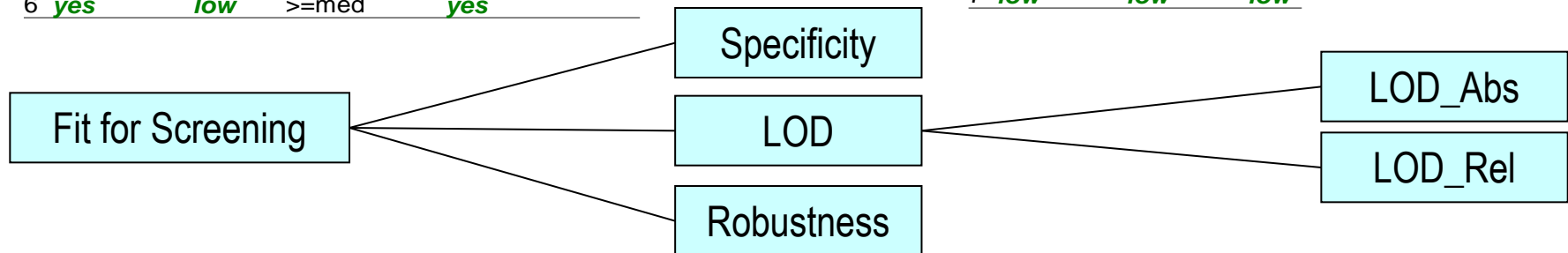
A *Screening method* is “fit for purpose”, if it:

- ▶ is *specific*,
- ▶ has sufficiently low limit of detection (*LOD*), and
- ▶ is sufficiently *robust*.

## Decision rules

	Specificity	LOD	Robustness	FitForScreening
1	<b>no</b>	*	*	<b>no</b>
2	*	<b>high</b>	<=med	<b>no</b>
3	*	*	<b>low</b>	<b>no</b>
4	<b>yes</b>	<=med	<b>high</b>	partly
5	<b>yes</b>	med	>=med	partly
6	<b>yes</b>	<b>low</b>	>=med	<b>yes</b>

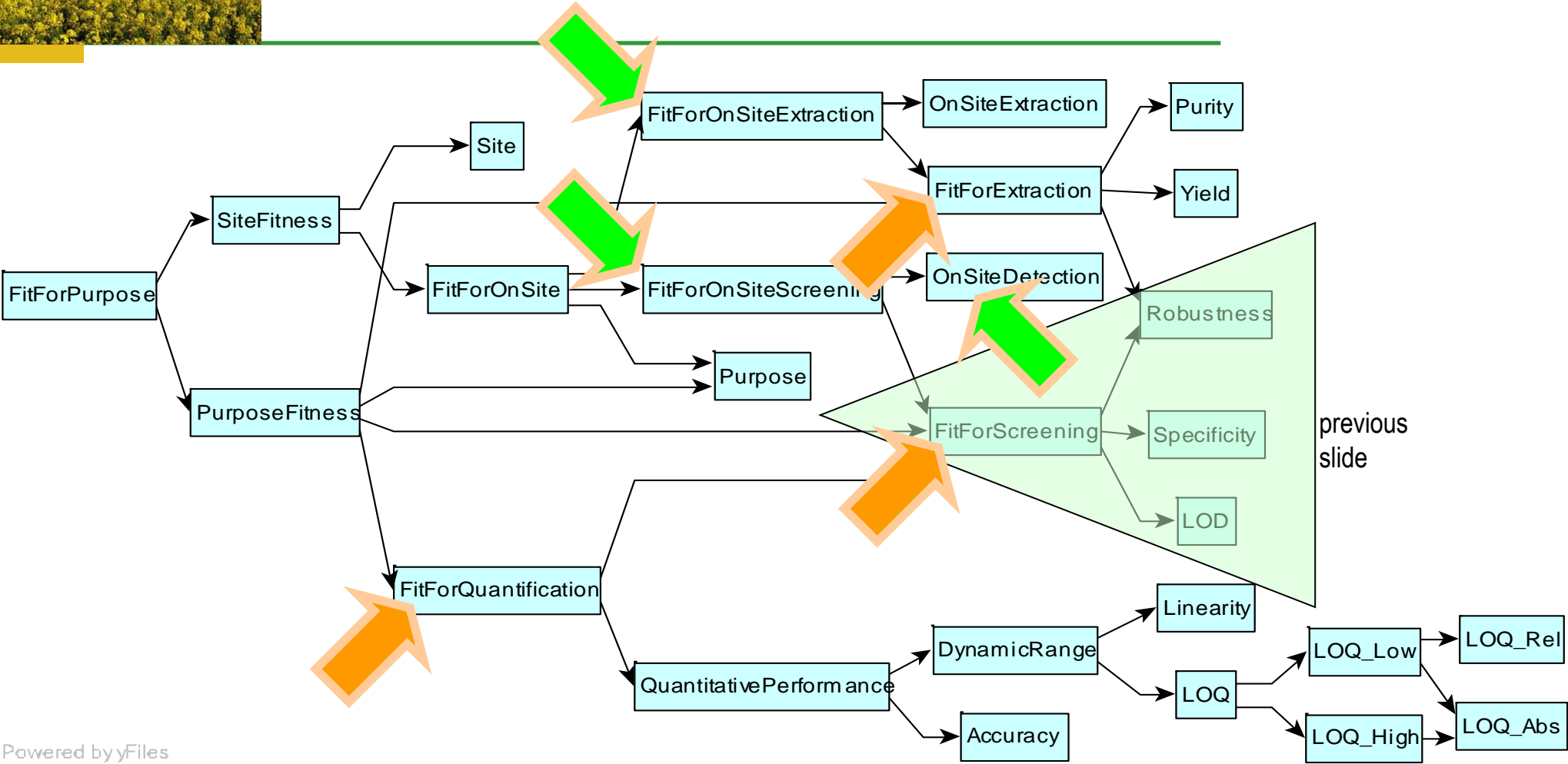
	LOD_Abs	LOD_Rel	LOD
1	<b>high</b>	<=med	<b>high</b>
2	<=med	<b>high</b>	<b>high</b>
3	<=med	<b>low</b>	med
4	med	>=med	med
5	>=med	med	med
6	<b>low</b>	<=med	med
7	<b>low</b>	<b>low</b>	<b>low</b>







# Decision rules - Fit for purpose



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# Analytical DSS module - validation

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- DNAEx methods:
  - NucleoSpin, CTAB, Biolytix lecithin method
  - In combination with different sample types: maize grains, compound feed, soya tofu, soya lecithin
  
- DNA Detection:
  - real-time PCR lec1, real-time PCR 35S
  - real-time PCR triplex 35S-lec1-IPC
  - pentaplex-CGE, SIMQUANT, EAT DualChip
  - LAMP-BART



# Analytical DSS module - validation

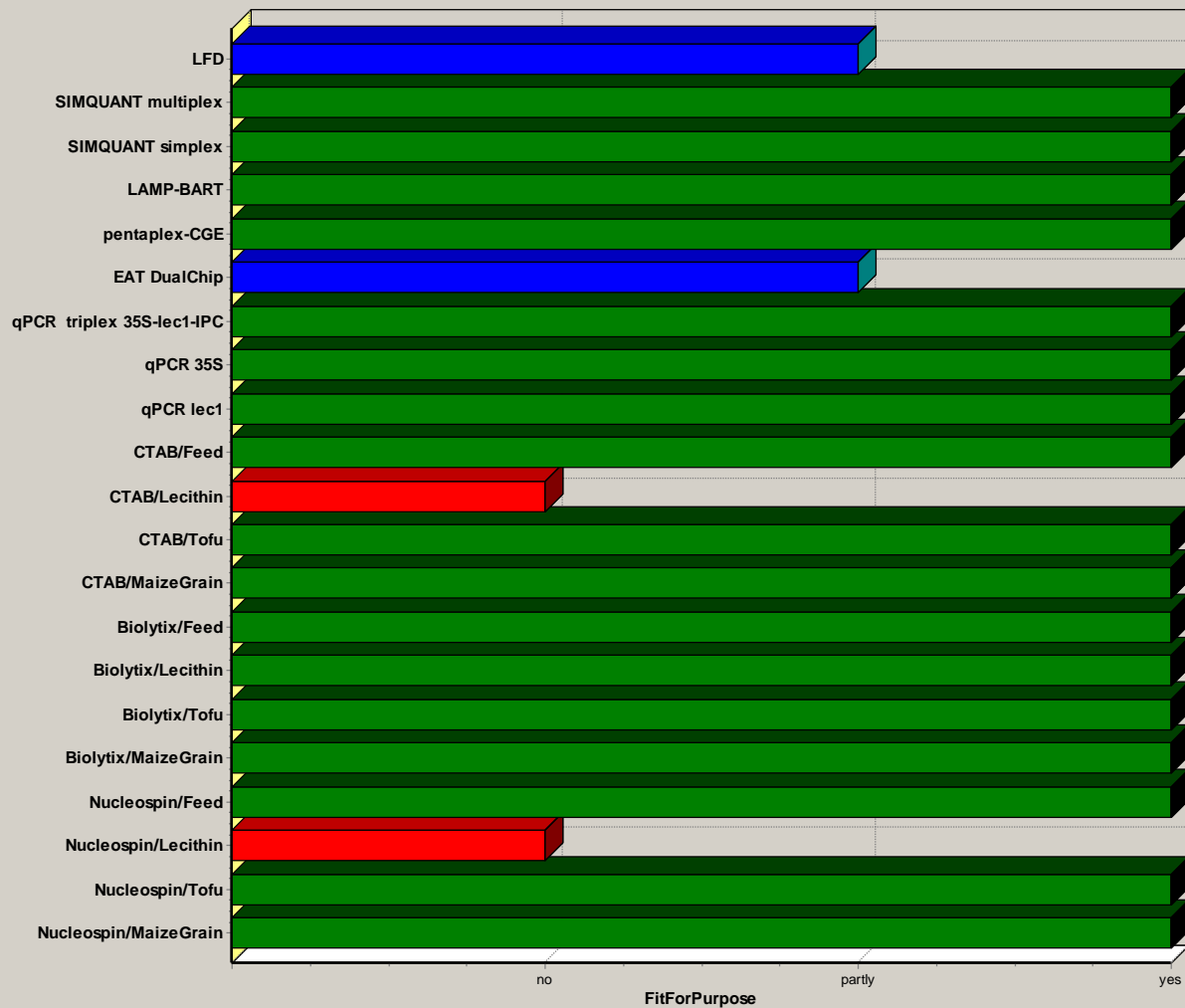
Basic Attribute	Scale	Precise description of scale	Description
<i>Equipment</i>	<b>high</b> , med, <b>low</b>	Range of qPCR, range of conv. PCR, basic lab or even on-site	Costs of required equipment, including maintenance
<i>Infrastructure</i>	<b>high</b> , med, <b>low</b>	Mol.lab with some special equipm, basic mol. lab, no lab needed	Cost of infrastructure
<i>Competence</i>	<b>high</b> , med, <b>low</b>	Experienced tech., any techn. or student, not qualified personnel	Personal competence required for method
<i>Validation</i>	<b>high</b> , med, <b>low</b>	Range of multiplex methods, range of simplex qPCR, lower	Cost of in-house validation (implementation in the lab)
<i>Consumables/Sample</i>	<b>high</b> , med, <b>low</b>	Higher than PCR or column based extraction, as in PCR or column based extraction, lower than PCR or column based extraction	Costs of consumables per sample
<i>Samples/Day</i>	<b>low</b> , med, <b>high</b>	Under 10, 10-50, more than 50	Number of samples that can be analysed in one working day
<i>Targets/Method</i>	<b>low</b> , med, <b>high</b>	1, 2 to 5, more than 5	Number of targets that can be detected simultaneously
<i>Personal</i>	<b>high</b> , med, <b>low</b>	More than 3h, 30 min to 3h, less than 30 min	Costs of labour per sample = working hours needed per sample
<i>DevelopmentStage</i>	<b>proof</b> , opt. assay, tested, prevalidation, <b>validation</b>		Current state of method development





# Evaluation of methods

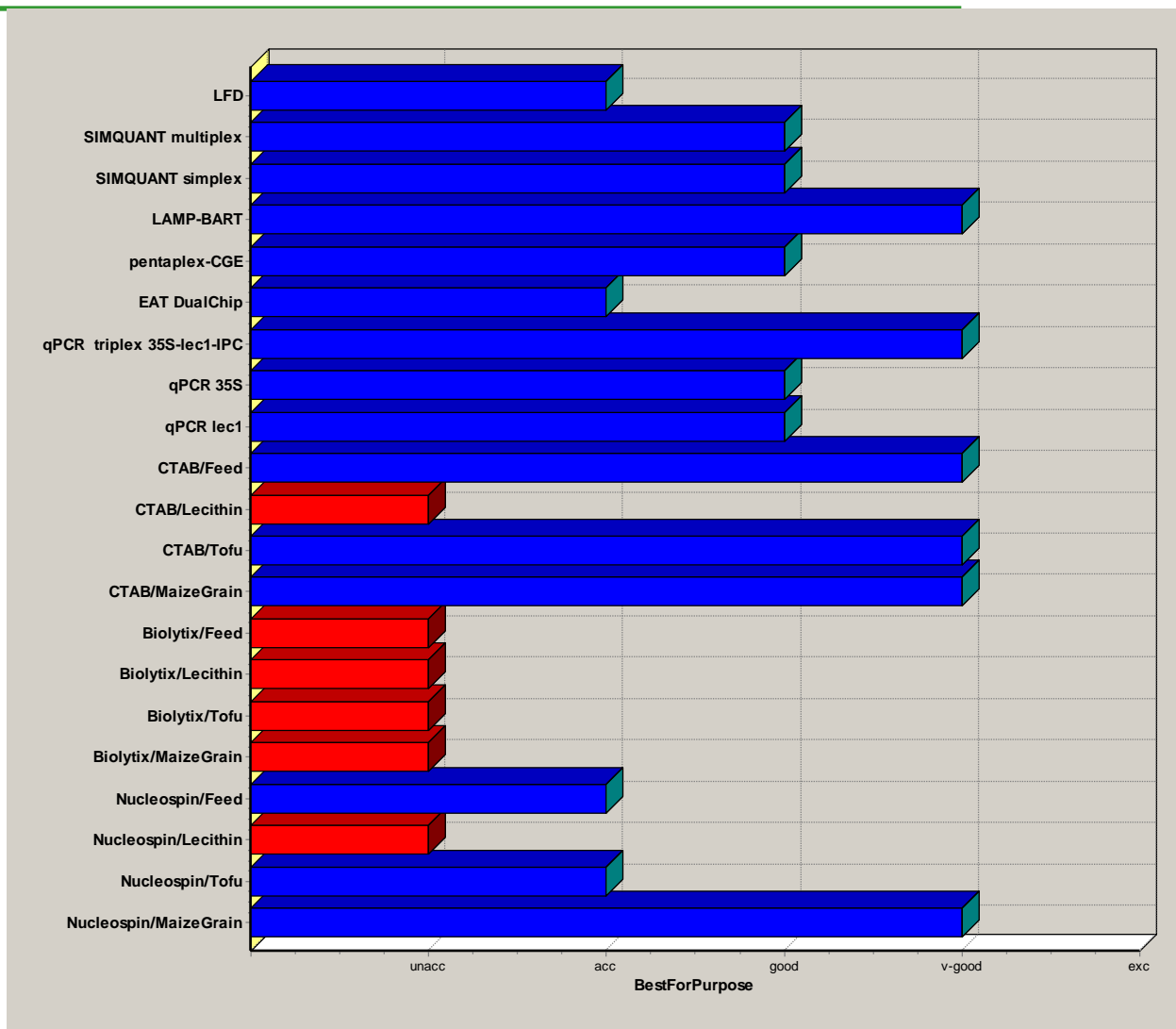
Fit for purpose





# Evaluation of methods

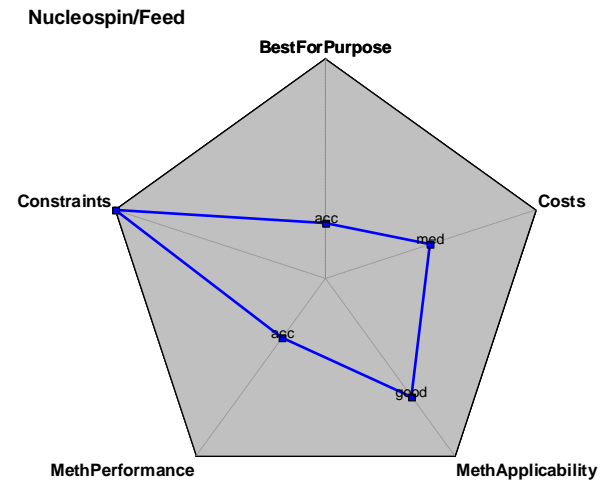
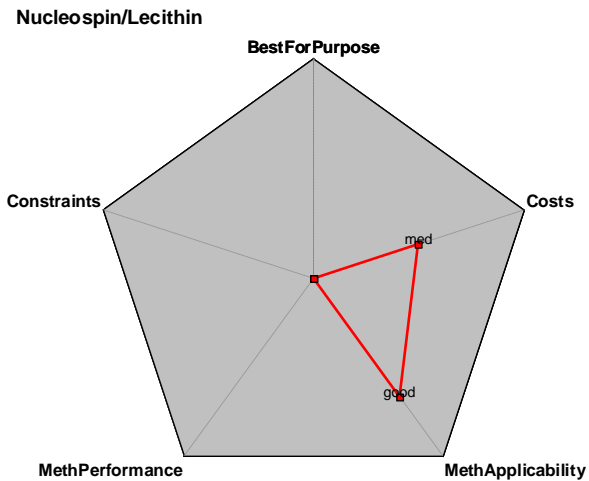
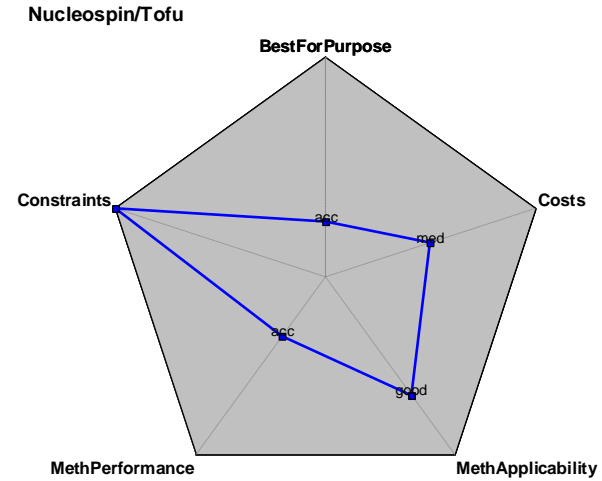
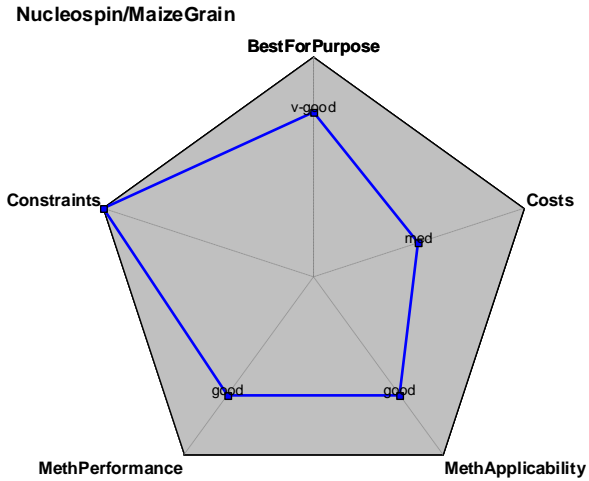
Best for purpose





# Evaluation of methods

## Nucleospin

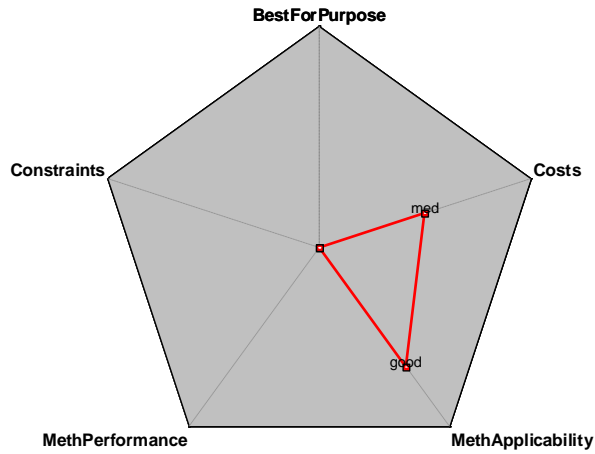




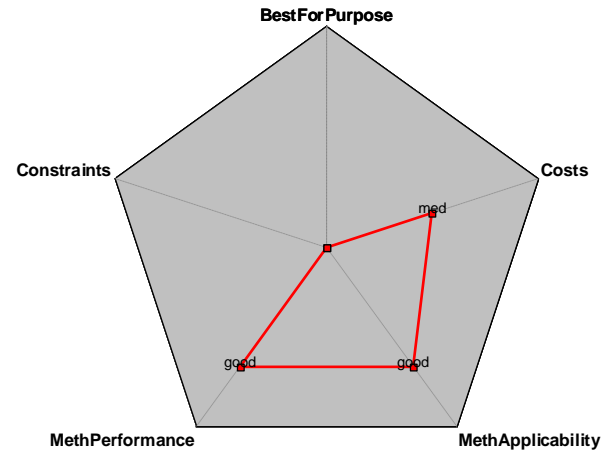
# Evaluation of methods

## Lecithin

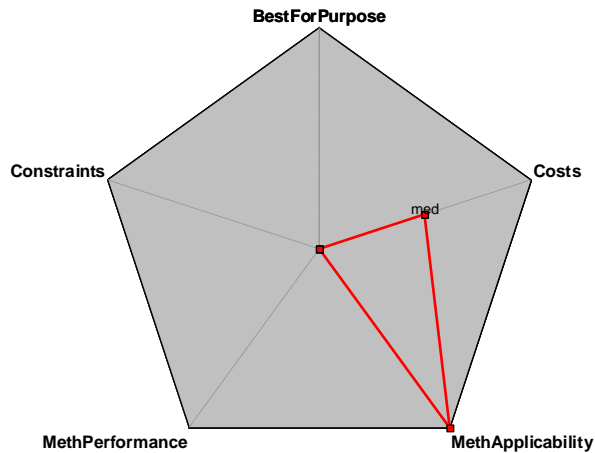
Nucleospin/Lecithin



Biolytix/Lecithin



CTAB/Lecithin



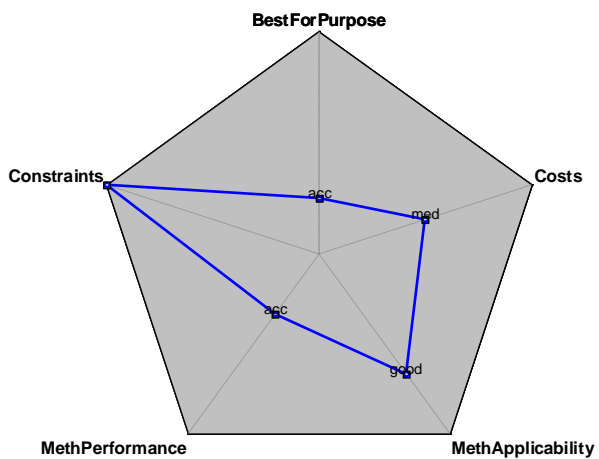




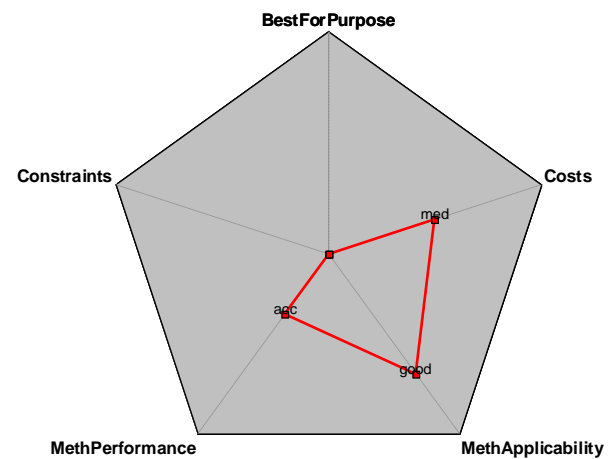
# Evaluation of methods

Tofu

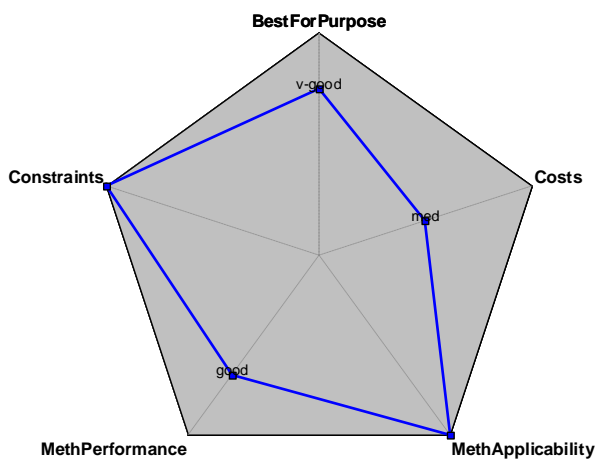
Nucleospin/Tofu



Biolytix/Tofu



CTAB/Tofu

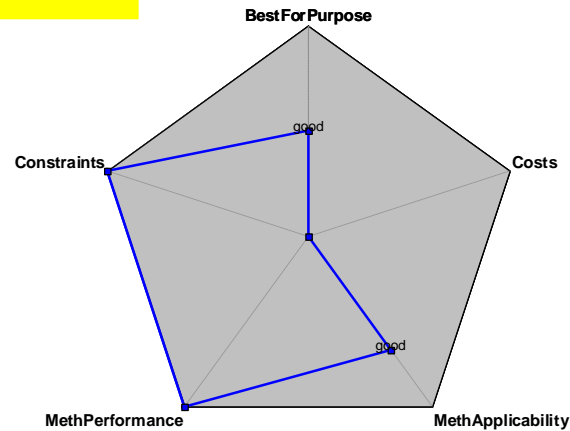




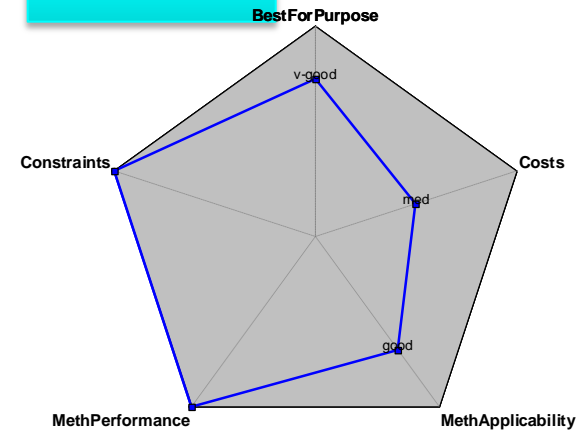
# Evaluation of methods

## Multiplexing methods

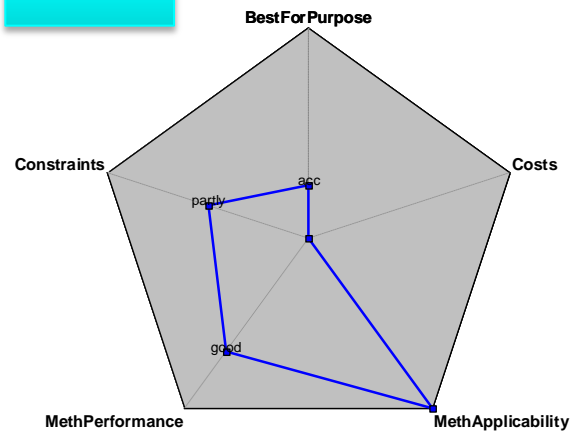
qPCR 35S



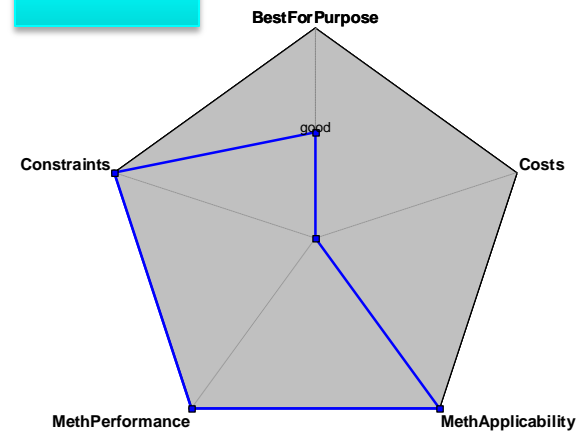
qPCR triplex 35S-lec1-IPC



EAT DualChip



pentaplex-CGE

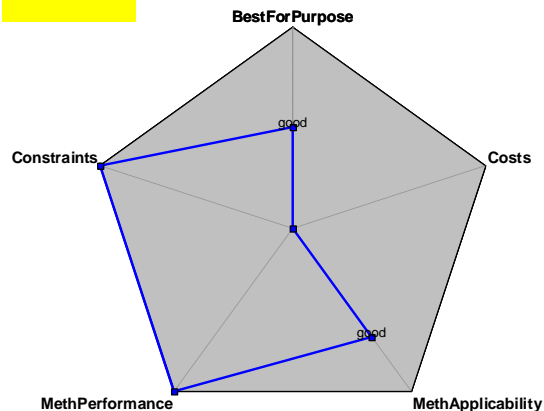




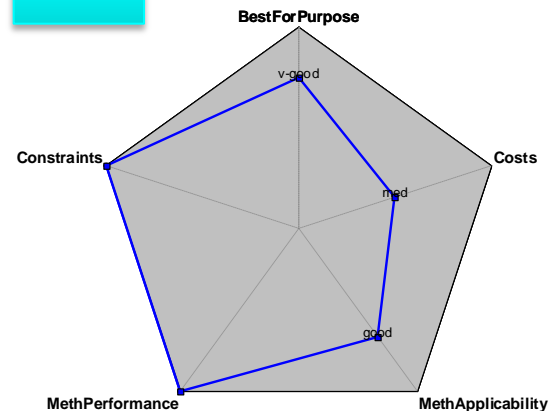
# Evaluation of methods

## Alternatives

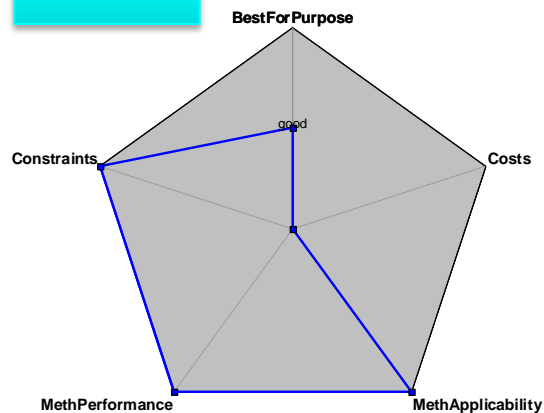
qPCR 35S



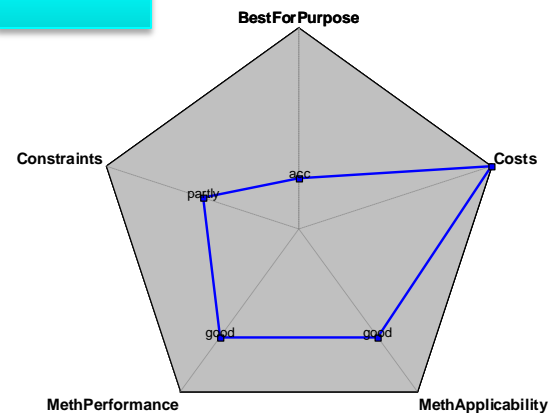
LAMP-BART



SIMQUANT simplex



LFD





# Analytical DSS module - conclusions

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- DSS is working nicely for evaluation of DNA extraction methods
- some „Fine-tuning“ of Detection method model

## Further activities:

- ▶ User friendly interface
- ▶ Validation by different users





# Acknowledgments

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