Workflow management and standardisation of the printing industry

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international circle
of educational institutes for graphic arts: technology and management

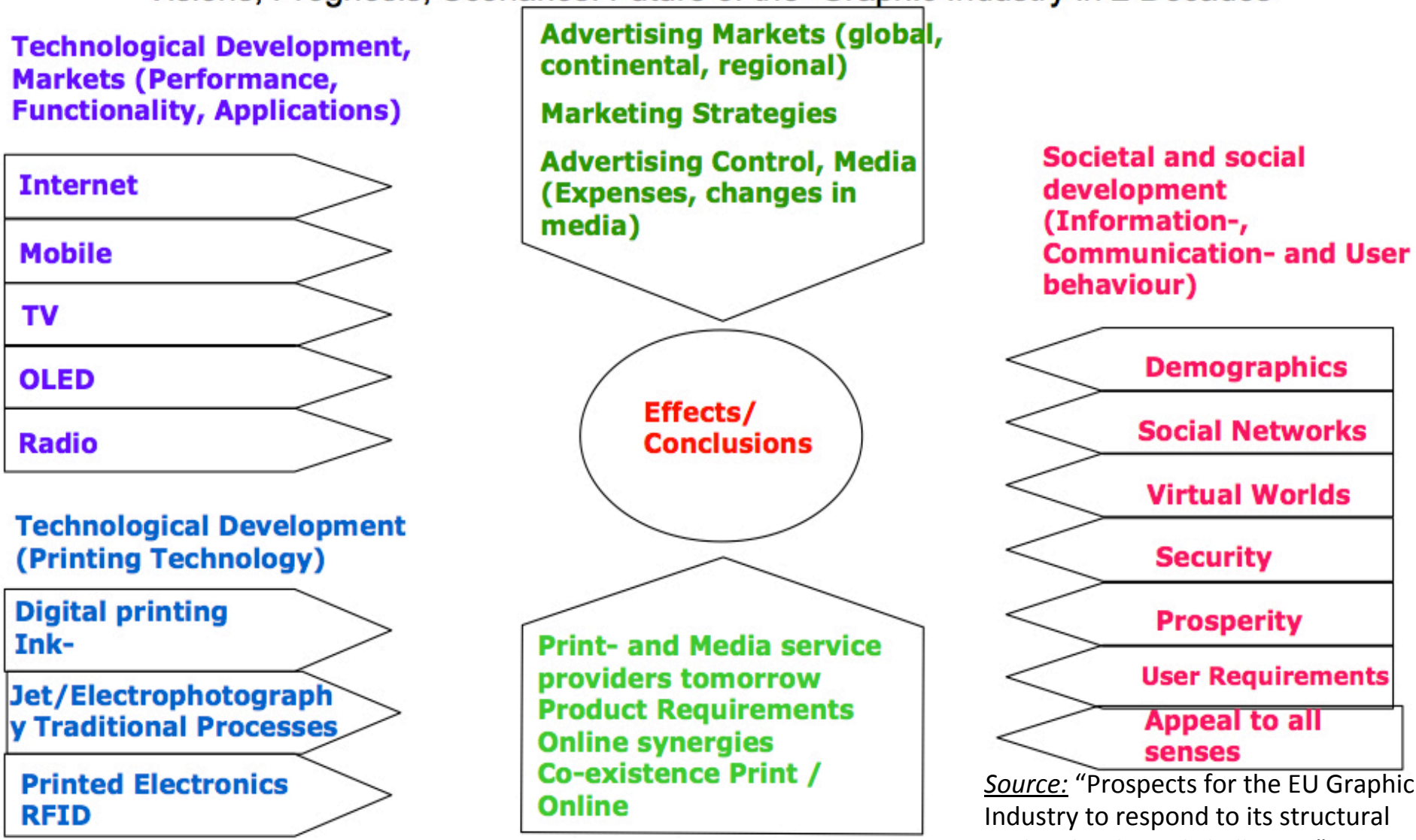
A brief background:
- MSc technology engineer,
graduated 1987 from the
Moscow State University of Printing Arts
- followed by an update of the flexo technology
*at **DFTA** and **HDM Stuttgart** lead by Prof. Meyer*
Updated competencies and diploma studies:
*- **Tallinn University**, in the field of vocational and adult teaching*
*- **Tallinn University of Technology**, in the field of production management, leadership and coaching*
*- associated **Fogra** PSO Partner*
*- board member of the **Estonian Association of Engineers***

Content:

- *Market trends*
- *Process analyse*
- *Substrates*
- *ISO CMYK Inks*
- *Conclusions*

Accompany the dynamic of the EU Graphic Industry

Visions, Prognosis, Scenarios: Future of the Graphic Industry in 2 Decades



Source: "Prospects for the EU Graphic Industry to respond to its structural And technological challenges" by EU Commission, 2009/ pg. 16

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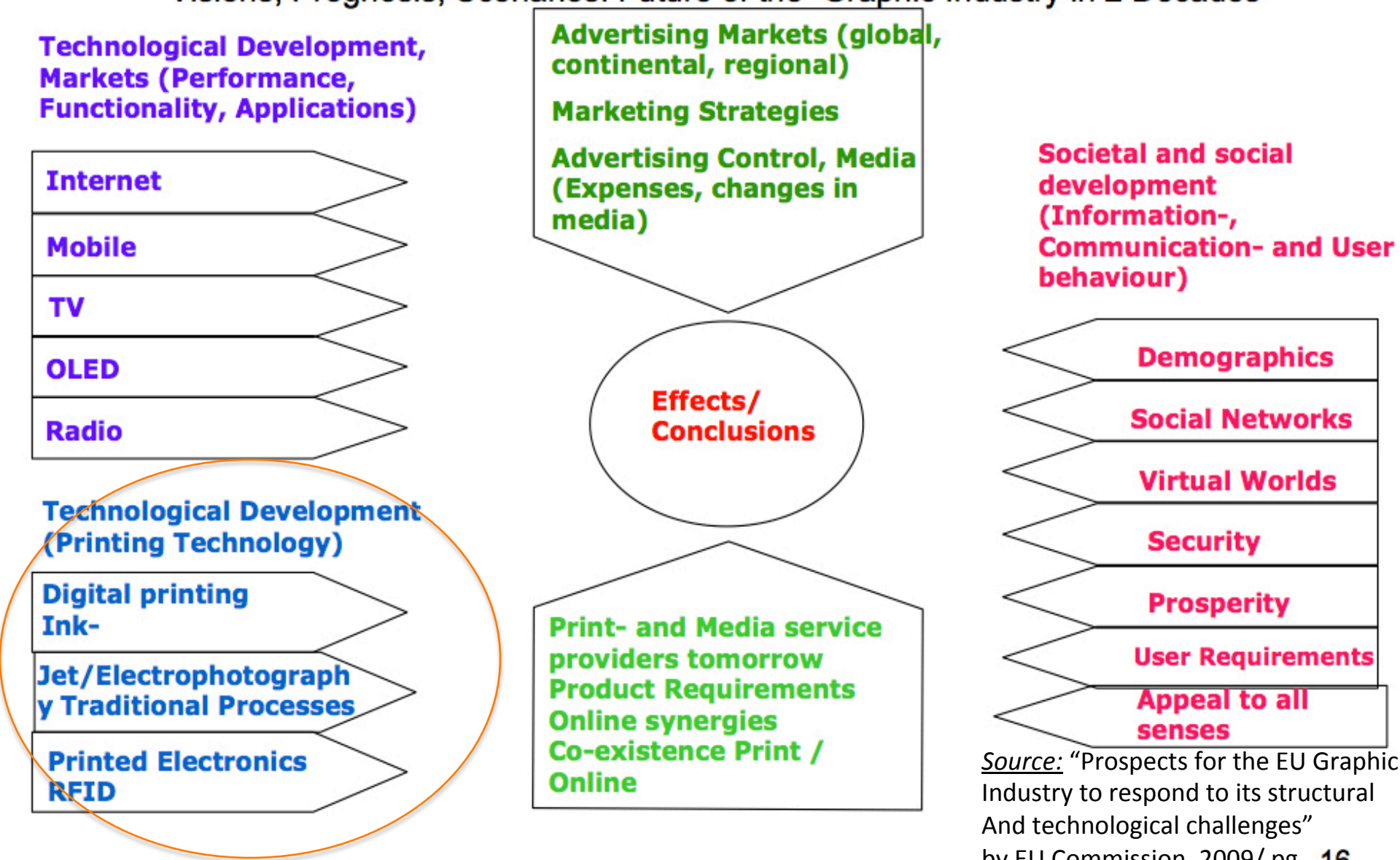


Source: "Prospects for the EU Graphic Industry to respond to its structural And technological challenges" by EU Commission, 2009/ pg. 16

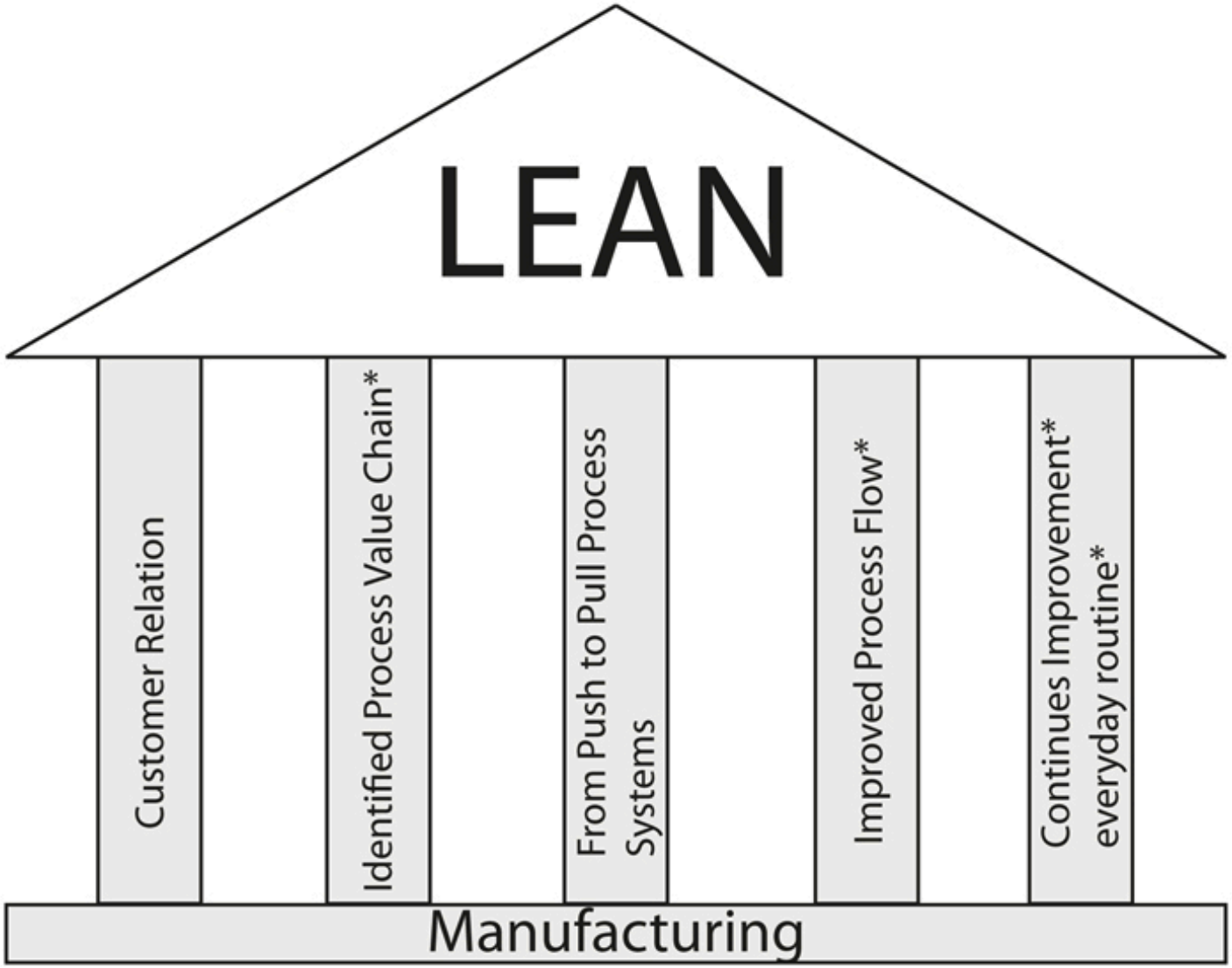
Process analyse

- Some of the printing industries are unable to provide support for the standardisation projects for industrial manufacturing or to implement the Total Quality Management, 6 Sigma and ISO standards-based quality programmes on a higher level:
  - due to economic reasons;
  - misleading propaganda;
  - an insufficient competence level;

Process analyse

- Often, due to the lack of modern manufacturing theories and competency subjects at VET or HEI - the employee's trainings for the LEAN-manufacturing theories will start only when people are in industry;
- At this time the personal characteristics are already established in the individual fields of printing, bindery etc.;

Process analyse



Process analyse

- Based on field experiences we have to look on LEAN theories together with the two printing industry quality methods:

1. PSO used in EU and near global markets;
2. G7 used generally in the US and near global markets;

The standardisation methods of both leading organisations FOGRA and IDEAlliance include the best of their competencies.

Process analyse

Comparison of GRACoL versus FOGRA

	GRACoL - G7	FOGRA - PSO
Ink	ISO 2846-1	ISO 2846-1
Paper	ISO 12647-2	ISO 12647-2
Solids CMY, RGB	ISO 12647-2	ISO 12647-2
TVI	less important	ISO 12647-2
Gray Balance	CIE Lab	Mid-Tone Spread
Tone Reproduction	NPDC	TVI curves
Date Introduced	2005	2004
Country of Origin	America	Germany

Source: Press Operators Guide to G7 [IDEAlliance]

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Process analyse

- Common standardisation theories are mostly based on the offset technology in the field of media content printing or civil production printing.
- Due to the trend in reduction of print runs within traditional offset, production is quickly changing its focus to digital output devices or other printing technologies as well flexo, gravure etc.

Process analyse

- To promote recognition of the changing trend of the printing industry, we shall focus our standardisation routines as well on sustainable printing technologies of packaging printing, printing on challenging substrates and giving to the printed products high value for ITC, the electronics and pharmacy industries etc.

Substrates

- The standardisation of the process mean, printing company will set up some limits that are coming from ISO12647-2 regulations.
- By choosing the substrate quality we line up the requirements according the standard and follow the substrate physical properties.

Substrates

- In modern printing service the paper is often part of the print provider responsibility and in those cases the substrate white point CIEL*a*b* values are respected.
- According to our certification experience on the Paper Type 1 and 2 CIEL*a*b* aim values can be used for the standardisation as well non-paper substrates with the similar white point values as Paper Type 1 and 2 CIEL*a*b* (example in our special case, it was: L*-92; a*-0,3; b*-3).

ISO CMYK Inks

- During the LEAN documentation and 6Sigma production process value chain-mapping dialog between print and ink provider it is essential to set-up proper CMYK ink set quality conditions.
- From the ink and substrate point, both standardisation methods are starting form the same level:

PSO – SOLID CIEL*a*b* value adjustments (ISO 12647-2 aim targets)

G7 – SOLID CIEL*a*b* value adjustments (ISO 12647-2 aim targets)

Limit is ΔE <5.

ISO CMYK Inks

SOLID TONE COLOURS OK PRINT ON BLACK BACKING

Bottom left	Actual L*	Actual a*	Actual b*	Aim L*	Aim a*	Aim b*	ΔE^*_{ab}	
Black	16	0	-4	16	0	0	4	ok
Cyan	55	-33	-51	54	-36	-49	3	ok
Magenta	46	71	-1	46	72	-5	4	ok
Yellow	86	-3	88	87	-6	90	4	ok

Deviation tolerance: 5

Bottom right	Actual L*	Actual a*	Actual b*	Aim L*	Aim a*	Aim b*	ΔE^*_{ab}	
Black	16	0	-4	16	0	0	4	ok
Cyan	54	-33	-51	54	-36	-49	3	ok
Magenta	45	71	-2	46	72	-5	4	ok
Yellow	86	-3	87	87	-6	90	5	ok

Deviation tolerance: 5

Top center	Actual L*	Actual a*	Actual b*	Aim L*	Aim a*	Aim b*	ΔE^*_{ab}	
Black	16	0	-4	16	0	0	4	ok
Cyan	55	-34	-51	54	-36	-49	3	ok
Magenta	46	72	-3	46	72	-5	2	ok
Yellow	86	-3	87	87	-6	90	4	ok

Deviation tolerance: 5

MEAN COLOUR VALUES OF THE SECONDARIES ON BLACK BACKING (INFORMATIVE)

	Actual L*	Actual a*	Actual b*	Aim L*	Aim a*	Aim b*	ΔE^*_{ab}
Red	46	65	45	46	67	47	3
Green	47	-63	24	49	-63	26	3
Blue	21	23	-43	24	21	-45	4

ISO in RIP TVI corrections

- If the RIP TVI corrections are made correctly, according to the aim value table and, have left the working window for the print operator, then the colour gamut will map according the Fogra characterisation table *(example: Fogra39)*

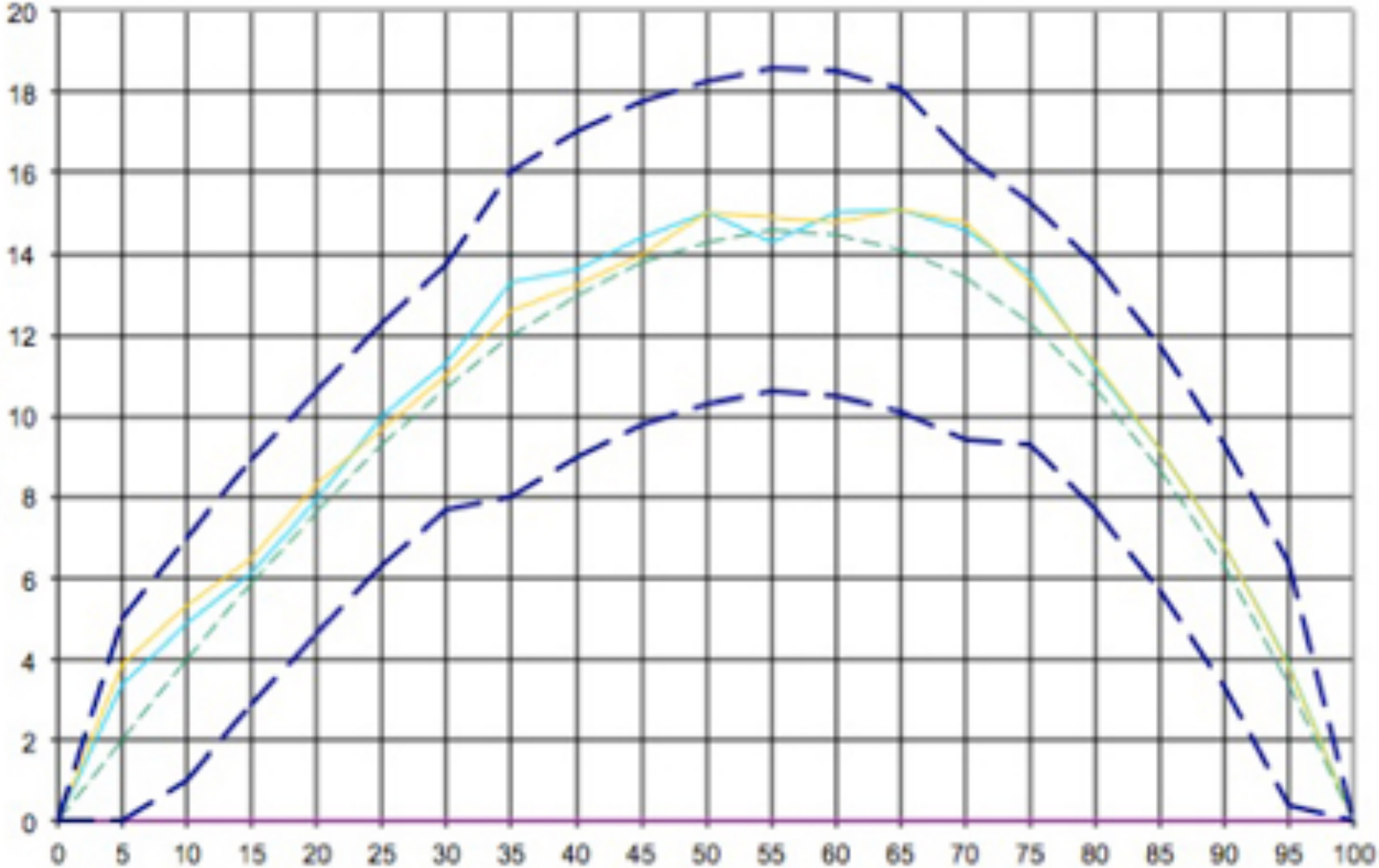
ISO in RIP TVI corrections

- Based on the ISO12647-2 standard, must clearly separated the differences of the tolerances that are for the fine-tune quality requirements for contract proof and during the production run.

TVI – ISO12647-2, is according to the table for Paper Type 1 and 2 (CMY 40% max13%; K40%max16);

G7 – stated as secondary variable ISO12647-2, +/- 4%

ISO in RIP TVI corrections



ISO in RIP TVI corrections

- Balanced grey during certification processes with the proper RIP curve settings will be in tolerances as visual observer conditions under the K5000 and measured OD comparison between the target patches on the colour bar.
- To achieve the Fogra characterisation table aim values and proper colour gamut it is challenge to calculate and modify in RIP curves.

ISO in RIP TVI corrections

- Both methods are working with in RIP settings, to secure the production quality.
- In PSO method the RIP curve calculation is open for the technology staff and possible to achieve desired results with simple mathematics and understanding of press behaviour.
- In G7 method have to use specific software tool to bump the curves of CMYK, which make the process not so transparent.

Conclusions

- Tomorrow's print operator must have both strong competences in printing industry technology and good manufacturing workflow competences.
- The general goal for future operators is to become creators and to bring creativity into the industrial manufacturing routines in order to build up and inspire well-motivated teams.

Conclusions

- The purpose of the updated curriculums with LEAN management is to make the overall printing industry market attractive to young people and inspire them to exchange their knowledge with each other.
- Those changes mean that VET instructors face a new task, their knowledge and teaching methods must be continuously adapted to modern industrial theories as knowledge and practical skills;

Conclusions

- This may require learning new manufacturing skills at university level.
- The employees who are involved into the PSO standardisation project shall have competence to understand:

  - how is working the human perception;

  - eye construction of the vision, why it is more sensitive to CIEb* value linear change when to the influence of CIEa* value change;

Conclusions

- During the printing process standardisation the grey balance will be fine-tuned using the Tone Value Increase adjustment in side the RIP settings,
- TVI are in relation of the ink film thickness, substrate behaviour and printing press conditions.

Conclusions

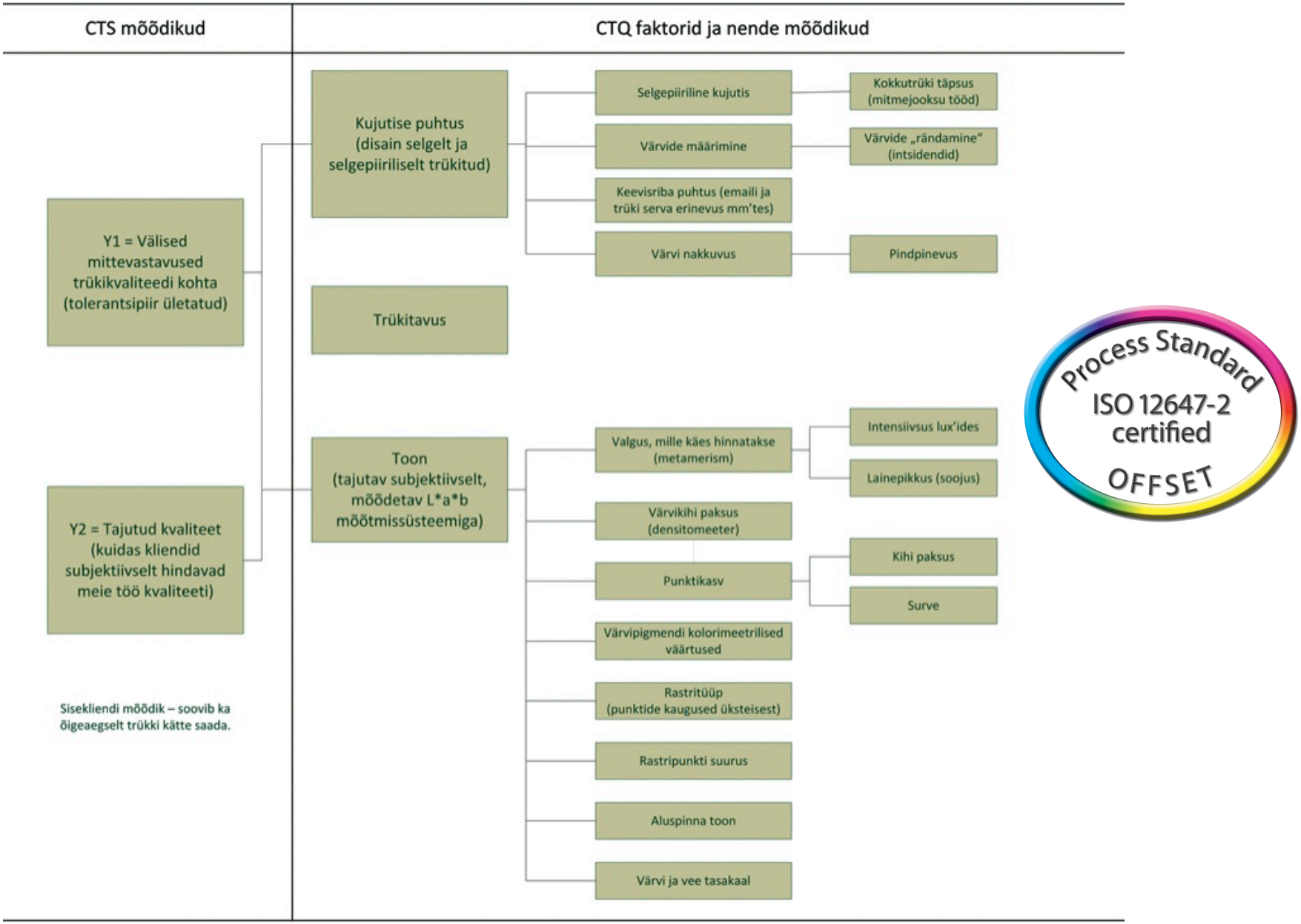
- The modern calibration and process standardisation methods using CIEL*a*b* colour aim values, Tone Value Curve or Grey Balance adjustment can guarantee ISO12647-2 conformance results.
- More detailed fine-tuning must be implemented:

  - then the end result must support the visual perception comparison;

  - then the substrate printability properties are out of the standard conditions;

Conclusions

- In both methods PSO and G7 are valuable tools to achieved correct and stable grey values as possible and monitor them over the ISO12647-2 standard CIEL*a*b* aim values requirements.
- To keep the value chain under control during everyday production, it is not enough to use only PSO or G7 methods, but requires the full combination of the LEAN, 6Sigma and Total Quality Management.


CTS mõõdikud
CTQ faktorid ja nende mõõdikud
Y1 = Välised mittevastavused trükikvaliteedi kohta (tolerantsipiir ületatud)
Y2 = Tajutud kvaliteet (kuidas kliendid subjektiivselt hindavad meie töö kvaliteeti)
Sisekliendi mõõdik – soovib ka õigeaegselt trükki kätte saada.
Kujutise puhtus (disain selgelt ja selgepiiriliselt trükitud)
Selgepiiriline kujutis
Kokkutrüki täpsus (mitmejooksu tööd)
Värvide määrimine
Värvide „rändamine" (intsidendid)
Keevisriba puhtus (emaili ja trüki serva erinevus mm'tes)
Värvi nakkuvus
Pindpinevus
Trükitavus
Toon (tajutav subjektiivselt, mõõdetav L*a*b mõõtmissüsteemiga)
Valgus, mille käes hinnatakse (metamerism)
Intensiivsus lux'ides
Lainepikkus (soojus)
Värvikihi paksus (densitomeeter)
Punktikasv
Kihi paksus
Surve
Värvipigmendi kolorimeetrilised väärtused
Rastritüüp (punktide kaugused üksteisest)
Rastripunkti suurus
Aluspinna toon
Värvi ja vee tasakaal
Process Standard
ISO 12647-2
certified
OFFSET

Thank You for listening!