Interreg
V-A Italia-Austria 2014-2020
Mass Customization 4.0
European Regional Development Fund

EUROPEAN UNION

Università degli Studi di Padova

dtg

Mass Customization – che cos'è ?

Una sfida che molte (la maggior parte?) PMI stanno affrontando

- C'è un difficile **bilanciamento tra varietà-customizzazione** e **prestazioni operative**
  - Offrire più varianti di prodotto e più possibilità di personalizzazione permette alle PMI di soddisfare in modo preciso le specifiche necessità di ciascun cliente
  - Però, l'aumento di varietà/personalizzazione tende ad abbassare i volumi dei singoli prodotti con conseguenze negative su costi, tempi e anche qualità

- É riconosciuta la presenza della **personalizzazione** (customizzazione, su misura, etc) nelle imprese **manifatturiere** di piccole e medie dimensioni (**PMI**):
  - "È la pressione competitive che anche loro devono affrontare"

Mass Customization: un approccio globale per affrontare la varietà/personalizzazione

- L'**obiettivo** della Mass Customization è quello di sviluppare, produrre, vendere e consegnare beni e servizi con sufficiente **varietà e personalizzazione** in modo che **ciascuno o quasi** può **trovare esattamente ciò che desidera** ad un **prezzo accessibile**

- Di conseguenza, per perseguire con successo la Mass Customization sono necessarie tre condizioni essenziali:
  - la **comprensione dei bisogni** idiosincratici dei clienti,
  - la disponibilità di operations in grado di **processare un ordine personalizzato con la stessa efficienza di un ordine standard** e
  - la capacità di supportare ogni cliente nell'identificazione della soluzione per lui ottimale riducendo **al minimo la complessità della scelta per il cliente**

Interreg
V-A Italia-Austria 2014-2020
Mass Customization 4.0
European Regional Development Fund

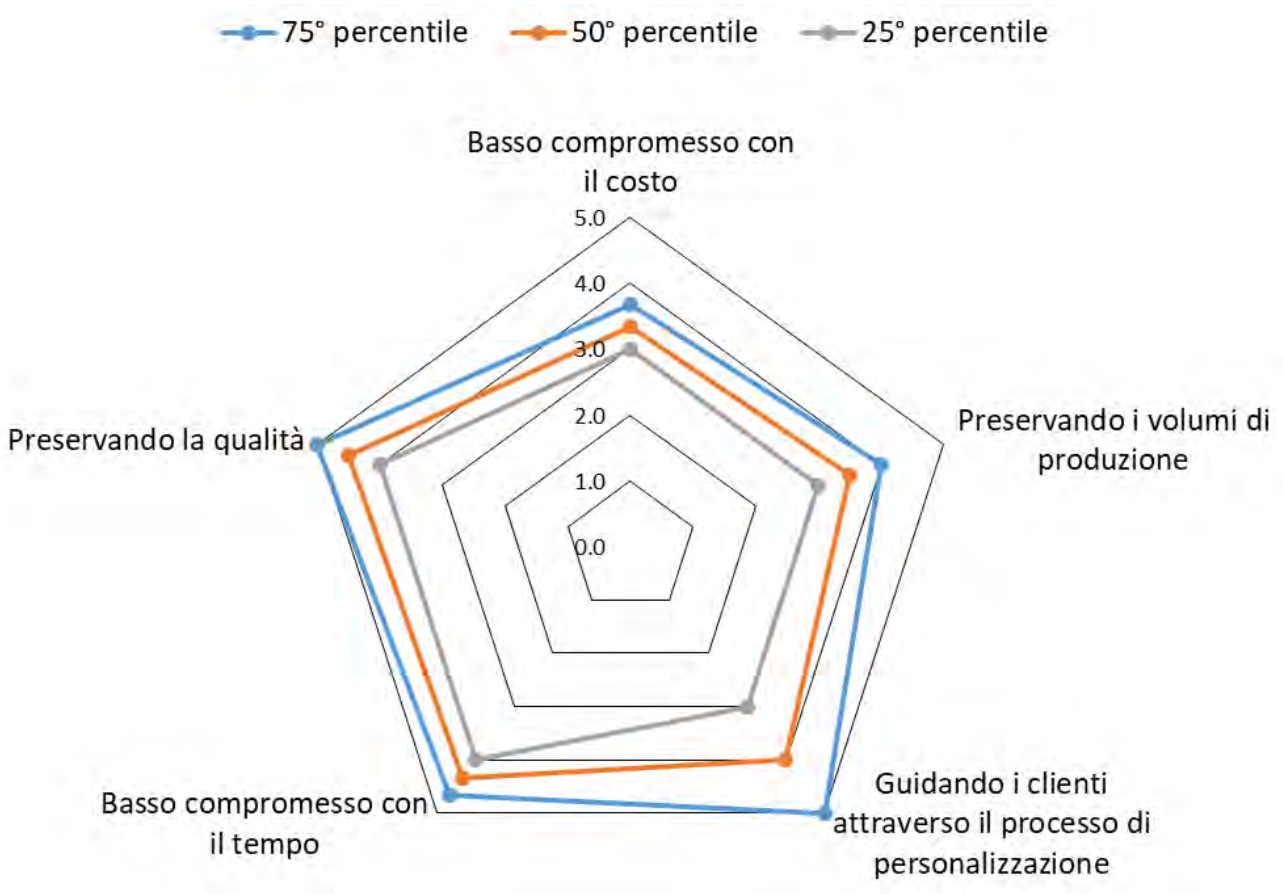
EUROPEAN UNION

Università degli Studi di Padova

dtg

Mass Customization: Qual è il suo livello nelle PMI italiane?

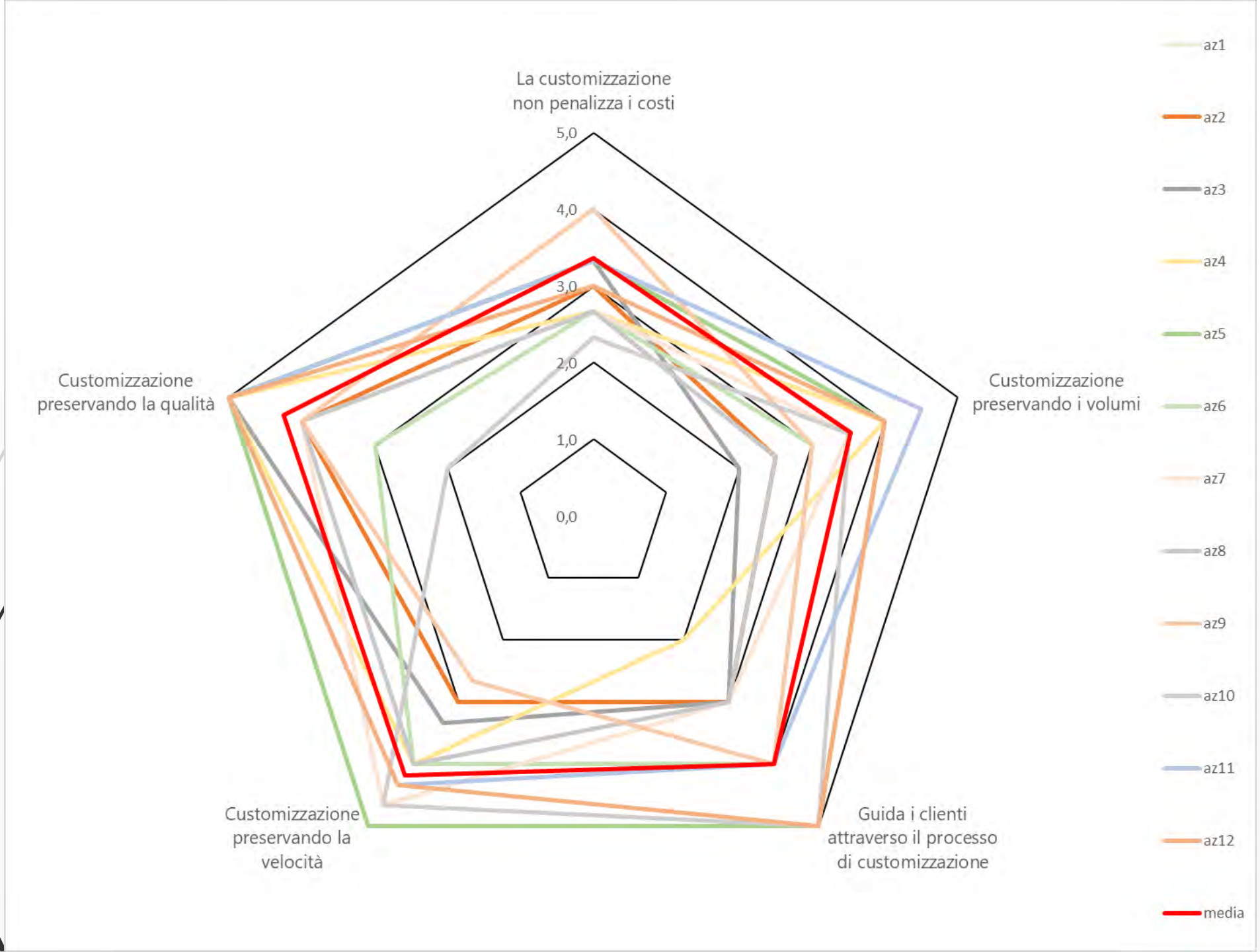
Raggiungimento MC: superamento dei trade-off tra varietà-personalizzazione e prestazioni operative

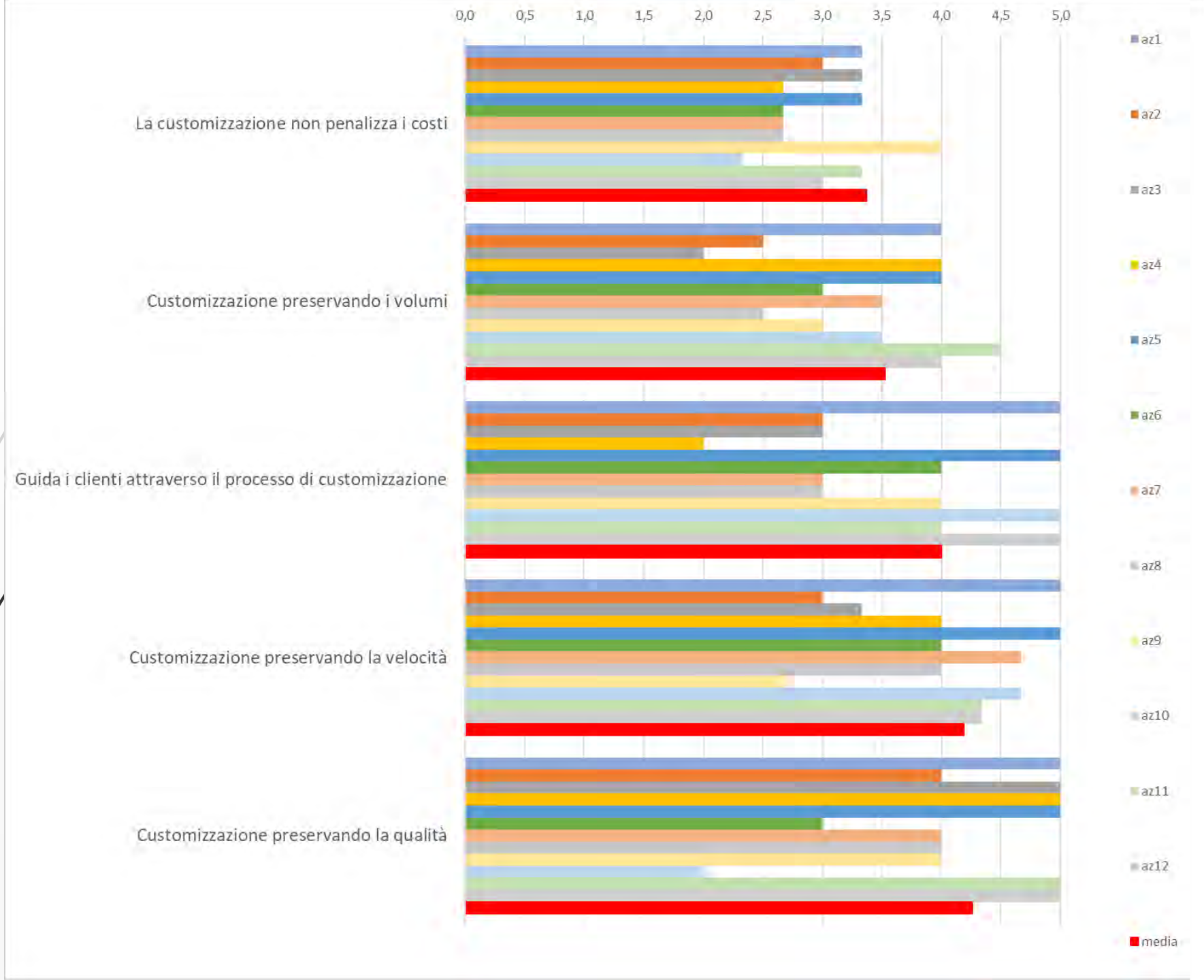


- Bilanciamenti ben (o ragionevolmente ben) raggiunti dalle PMI
  - varietà-customizzazione verso qualità
  - varietà-customizzazione verso velocità
- Bilanciamenti ancora problematici per le PMI
  - varietà-customizzazione verso volumi
  - varietà-customizzazione verso costo
- Bilanciamenti con grandi differenze fra la varie PMI
  - varietà-customizzazione verso guida ai clienti attraverso il processo di personalizzazione

In che misura è in accordo in disaccordo con le seguenti affermazioni, sulla scala da 1 a 5 sotto riportata?

1	2	3	4	5
FORTAMENTE IN DISACCORDO	IN DISACCORDO	NE D'ACCORDO NE IN DISACCORDO	D'ACCORDO	FORTAMENTE D'ACCORDO


La customizzazione non penalizza i costi
5,0
4,0
3,0
2,0
1,0
0,0
Customizzazione preservando i volumi
Guida i clienti attraverso il processo di customizzazione
Customizzazione preservando la velocità
Customizzazione preservando la qualità
az1
az2
az3
az4
az5
az6
az7
az8
az9
az10
az11
az12
media


0,0
0,5
1,0
1,5
2,0
2,5
3,0
3,5
4,0
4,5
5,0
La customizzazione non penalizza i costi
Customizzazione preservando i volumi
Guida i clienti attraverso il processo di customizzazione
Customizzazione preservando la velocità
Customizzazione preservando la qualità
az1
az2
az3
az4
az5
az6
az7
az8
az9
az10
az11
az12
media

Sintetizzando :

- Contesto di mercato e organizzativo:
  - Alta presenza di strategia di personalizzazione miste
  - Alta presenza di personalizzazione spinta
  - Alta presenza di canali di distribuzione diretti
  - Difficoltà nel descrivere lo spazio di prodotto *(la raccolta di dati sulla varietà-personalizzazione di prodotto si sta rilevando davvero difficile)*
  - L'ufficio tecnico deve processare molti ordini che non richiedono innovazione
- Il processo di configurazione di prodotto è presenti in con una caratteristica peculiare:
  - Molti ordini sono caratterizzati da una configurabilità parziale
  - La perfetta configurabilità è raramente prevalente

Interreg
V-A Italia-Austria 2014-2020
Mass Customization 4.0
European Regional Development Fund

EUROPEAN UNION

Università degli Studi di Padova

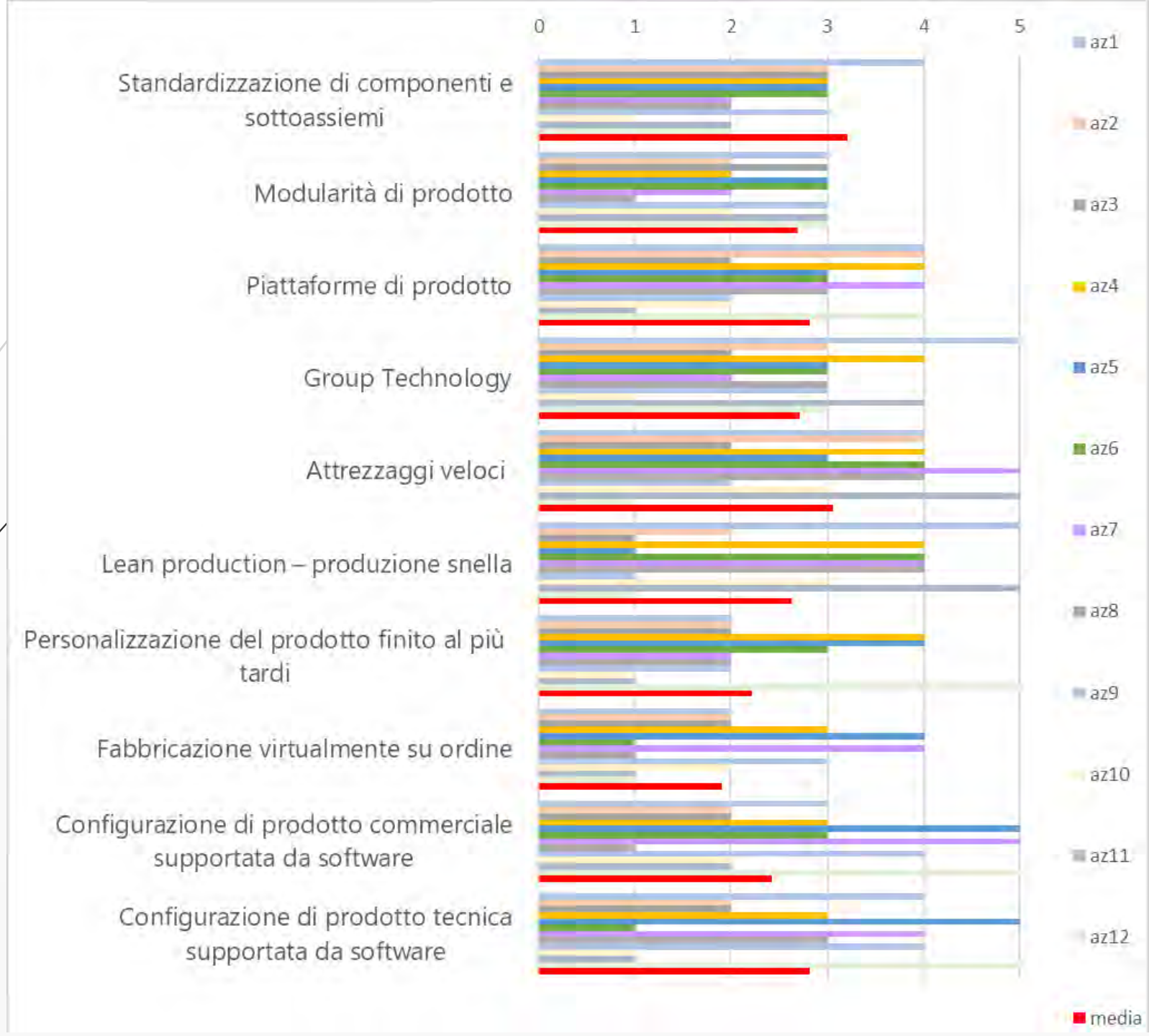
dtg

Leve per la personalizzazione di massa (mass customization)

Quali sono? Che cosa sono? Quali effetti portano?

Leve per la personalizzazione di massa *(mass customization)*

- L1 - Attrezzaggi veloci
- L2 - Standardizzazione
- L3 - Modularità di prodotto
- L4 - Group technology
- L5 - Personalizzazione del prodotto finito al più tardi
- L6 - 3D concurrent engineering
- L7 - Configurazione del prodotto supportata da SW
- L8 - Piattaforme di prodotto
- L9 - Fabbricazione virtualmente su ordine


0
1
2
3
4
5
Standardizzazione di componenti e sottoassiemi
Modularità di prodotto
Piattaforme di prodotto
Group Technology
Attrezzaggi veloci
Lean production – produzione snella
Personalizzazione del prodotto finito al più tardi
Fabbricazione virtualmente su ordine
Configurazione di prodotto commerciale supportata da software
Configurazione di prodotto tecnica supportata da software
az1
az2
az3
az4
az5
az6
az7
az8
az9
az10
az11
az12
media

Interreg
V-A Italia-Austria 2014-2020
Mass Customization 4.0
European Regional Development Fund

EUROPEAN UNION

Università degli Studi di Padova

dtg

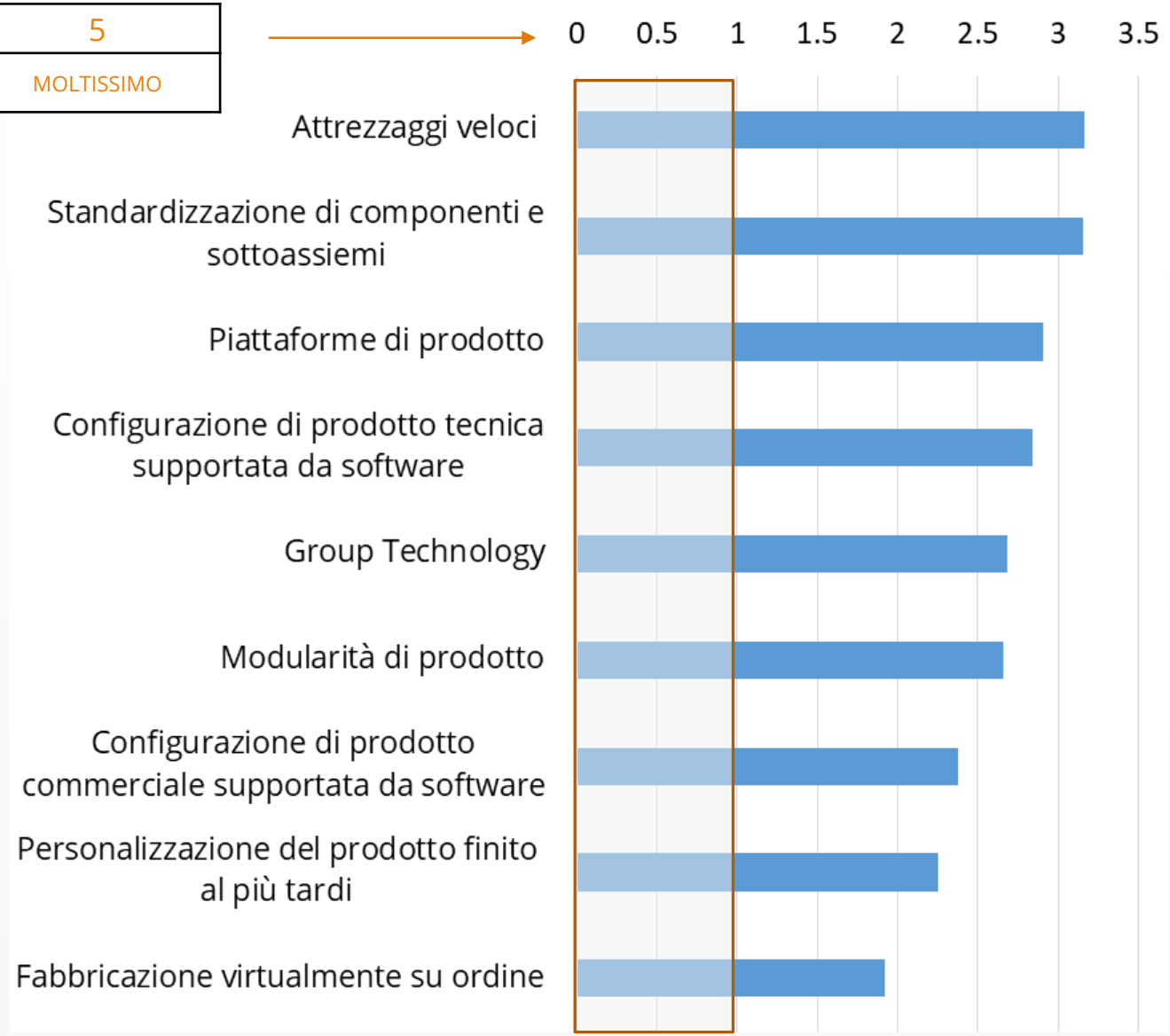
L'adozione delle leve MC nelle PMI italiane

Livello medio di utilizzo delle leve MC

Quanto sono diffuse le seguenti pratiche nella vostra azienda?

1	2	3	4	5
PER NIENTE	POCO	ABBASTANZA	MOLTO	MOLTISSIMO

- L'uso delle leve MC non è elevato
  - Tuttavia, le leve MC fondamentali (attrezzaggi veloci e standardizzazione di componenti e sottoassiemi) sono in media abbastanza utilizzate
- In particolare c'è un uso limitato degli approcci più avanzati per:
  - aumentare la comunanza (ad es. piattaforme di prodotto e group technology) e
  - allineare il lato cliente con quello tecnico e produttivo (ad es. modularità di prodotto e supporto software alla configurazione commerciale)

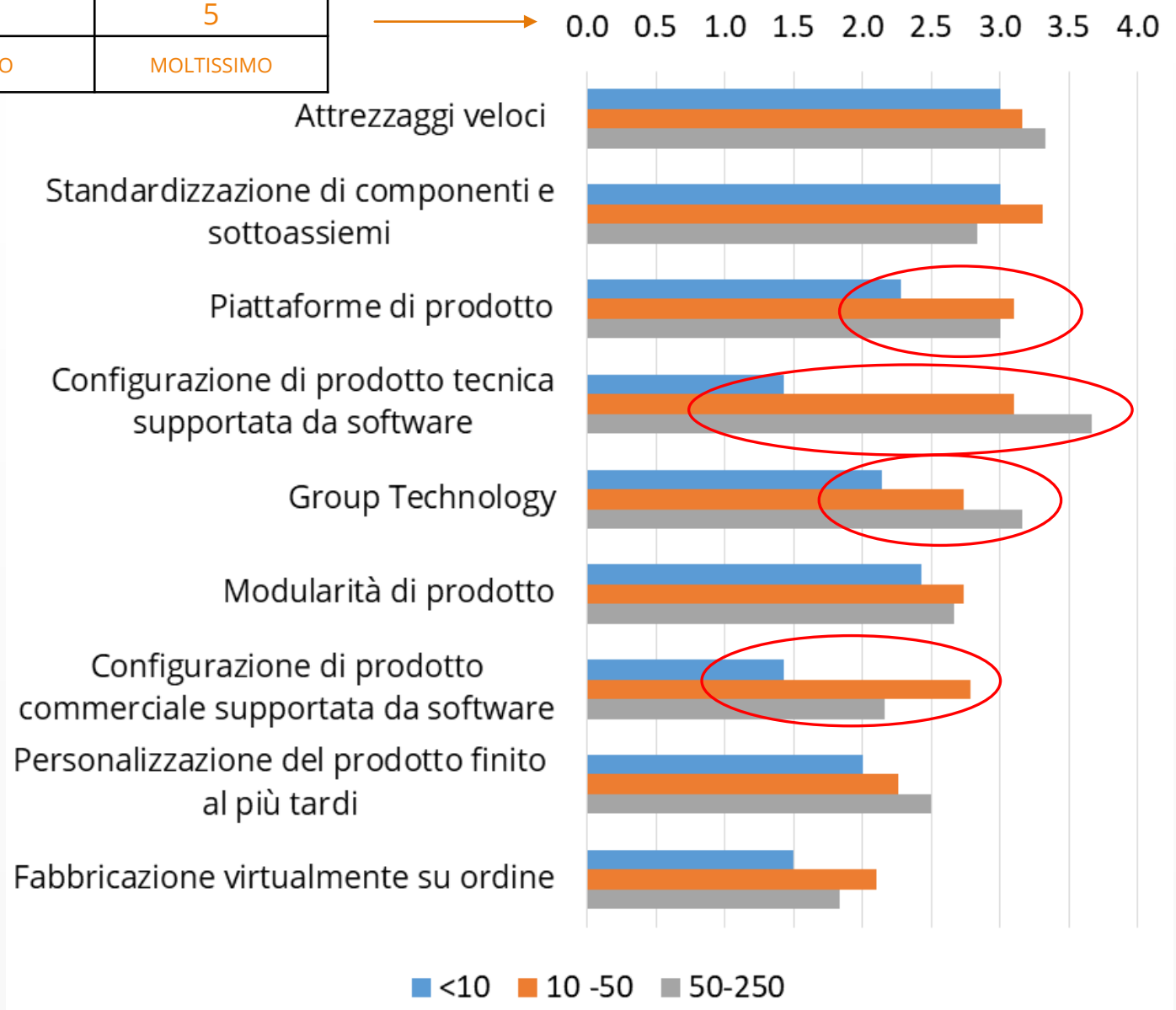


Uso delle leve MC attraverso le aziende di diverse dimensioni

Quanto sono diffuse le seguenti pratiche nella vostra azienda?

1	2	3	4	5
PER NIENTE	POCO	ABBASTANZA	MOLTO	MOLTISSIMO

- L'uso del supporto software alla configurazione del prodotto (sia lato tecnico che commerciale), della group technology e (in misura minore) delle piattaforme di prodotto mostra una dipendenza dalle dimensioni della PMI



Presenza delle leve MC

- Livello di utilizzo delle leve MC:
  - Non alto
  - Molto diverso da leva a leva
  - Dipende dalle dimensioni (meno utilizzato dalle aziende più piccole)

- Questa situazione solleva una serie di domande:
  - Ciò è dovuto a vincoli finanziari e di risorse umane?
  - Ciò è dovuto alla limitazione del volume delle attività?
  - Ciò è connesso con la limitata formalizzazione di conoscenze e processi?
  - **È questa la causa dell'ancora presente difficoltà di conciliazione tra varietà / personalizzazione e costi?**

Interreg
V-A Italia-Austria 2014-2020
Mass Customization 4.0
European Regional Development Fund

EUROPEAN UNION

UNIVERSITÀ DEGLI STUDI DI PADOVA

dtg

Quale percorso seguire nella mia azienda ?

Presenza delle leve MC

	PRODOTTO
Livello di maturità II V	Standardizzazione delle parti: razionalizzazione periodica per eliminare le parti non più necessarie
	1
1	Mai fatto
2	Abbiamo standardizzato le parti e abbiamo eliminato le parti non più necessarie MA questa è stata un'iniziativa isolata
3	(1) Esiste una procedura sistematica per eliminare le parti non più necessarie E (2) Questa procedura viene eseguita periodicamente su ALCUNE famiglie di parti
4	(1) ..... E (2) Questa procedura viene eseguita periodicamente su TUTTE le famiglie di parti

Presenza delle leve MC

	PRODOTTO	PRODOTTO
Livello di maturità II V	Standardizzazione delle parti: razionalizzazione periodica per eliminare le parti non più necessarie	Standardizzazione delle parti: Limitazione quotidiana dell'introduzione di nuove parti
	1	2
1	Mai fatto	NESSUNA attenzione viene prestata alla proliferazione di parti da parte di: (1) ingegneri di progettazione / produzione e personale addetto agli acquisti e (2) l'organizzazione
2	Abbiamo standardizzato le parti e abbiamo eliminato le parti non più necessarie MA questa è stata un'iniziativa isolata	L'attenzione alla proliferazione delle parti è prestata da: (1) ingegneri di progettazione / produzione e personale addetto agli acquisti (2a) NESSUNA guida alla standardizzazione delle parti (2b) NESSUN supporto SW per la standardizzazione delle parti
3	(1) Esiste una procedura sistematica per eliminare le parti non più necessarie E (2) Questa procedura viene eseguita periodicamente su ALCUNE famiglie di parti	(1, 2a) Esistono linee guida per la standardizzazione delle parti per ingegneri di progettazione / produzione e personale addetto agli acquisti e vengono applicate IN QUALCHE MODO (2b) NESSUN supporto SW
4	(1) ..... E (2) Questa procedura viene eseguita periodicamente su TUTTE le famiglie di parti	(1, 2a) Le linee guida per gli ingegneri di progettazione / produzione e il personale addetto agli acquisti esistono e vengono applicate in modo molto RIGOROSO, (2b) È presente un supporto SW

Presenza delle leve MC

	PRODOTTO	PRODOTTO	PROCESSO
Livello di maturità II V	Standardizzazione delle parti: razionalizzazione periodica per eliminare le parti non più necessarie	Standardizzazione delle parti: Limitazione quotidiana dell'introduzione di nuove parti	Standardizzazione delle sequenze di produzione
	1	2	3
1	Mai fatto	NESSUNA attenzione viene prestata alla proliferazione di parti da parte di: (1) ingegneri di progettazione / produzione e personale addetto agli acquisti e (2) l'organizzazione	Nessuna attenzione viene prestata alla proliferazione dei cicli di produzione da parte dell'organizzazione e dei singoli ingegneri di progettazione e produzione
2	Abbiamo standardizzato le parti e abbiamo eliminato le parti non più necessarie MA questa è stata un'iniziativa isolata	L'attenzione alla proliferazione delle parti è prestata da: (1) ingegneri di progettazione / produzione e personale addetto agli acquisti (2a) NESSUNA guida alla standardizzazione delle parti (2b) NESSUN supporto SW per la standardizzazione delle parti	(1) È facile per gli ingegneri di progettazione / produzione riutilizzare gli stessi cicli di produzione (perché il database dei cicli di produzione è ben organizzato e perché i cicli sono raggruppati in classi)
3	(1) Esiste una procedura sistematica per eliminare le parti non più necessarie E (2) Questa procedura viene eseguita periodicamente su ALCUNE famiglie di parti	(1, 2a) Esistono linee guida per la standardizzazione delle parti per ingegneri di progettazione / produzione e personale addetto agli acquisti e vengono applicate IN QUALCHE MODO (2b) NESSUN supporto SW	(1) ..... E (2) Esistono regole e supporto SW per limitare l'introduzione di nuovi cicli di produzione
4	(1) ..... E (2) Questa procedura viene eseguita periodicamente su TUTTE le famiglie di parti	(1, 2a) Le linee guida per gli ingegneri di progettazione / produzione e il personale addetto agli acquisti esistono e vengono applicate in modo molto RIGOROSO, (2b) È presente un supporto SW	(1) ..... E (2) ..... E (3) Realizziamo cicli di produzione che differenziano i prodotti il più tardi possibile

Interreg
V-A Italia-Austria 2014-2020
Mass Customization 4.0
European Regional Development Fund

EUROPEAN UNION

UNIVERSITÀ DEGLI STUDI DI PADOVA

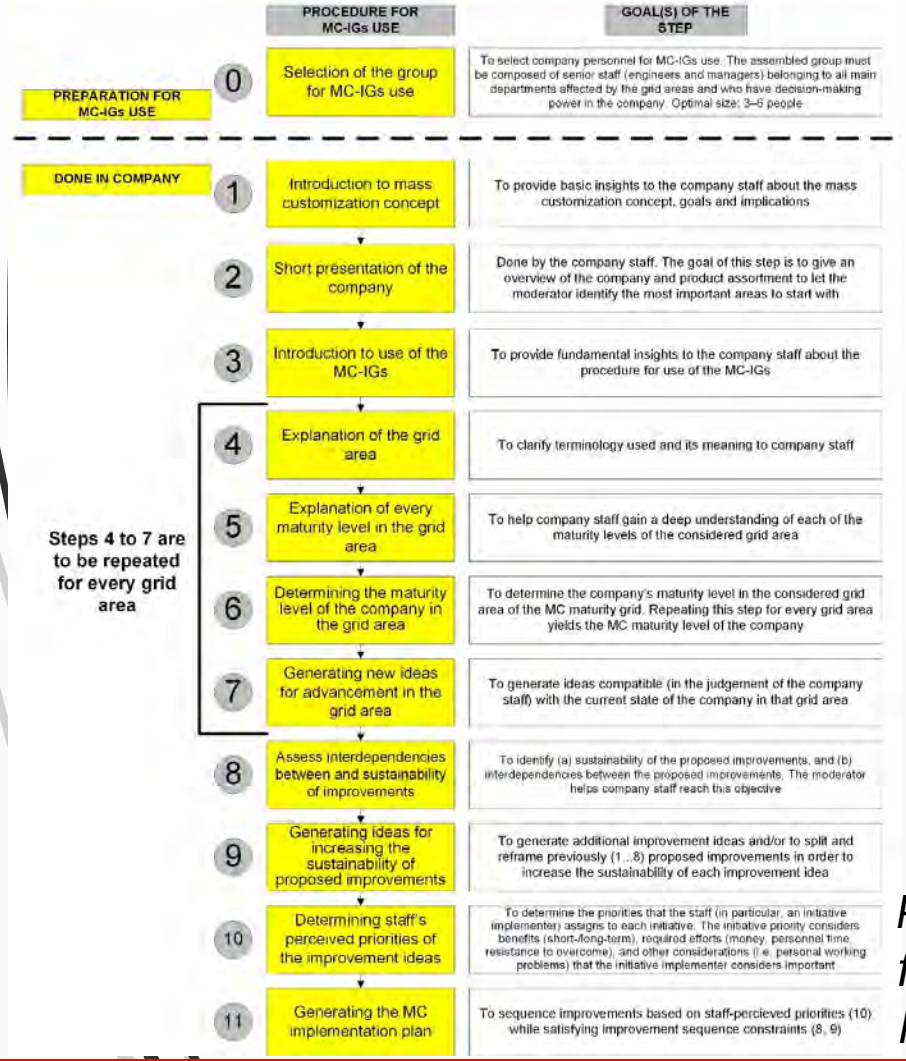
dtg

Uno strumento ed un approccio snello

II. Research results – *Phase 3: Proposal for new MC implementation guidelines - NEW MC-IGs for SMEs-*

Participants:
1) Moderator
2) Idea generating group (3–6 of company's senior staff)

Required tools:
1) Paper-based MC maturity grid
2) Template for idea for advancements generation
3) Template for MC implementation plan generation



Procedure for use of MC-IGs

Descrizione dell'idea	Area della griglia	Priorità	Impatto	Sforzo	Interdipendenze

Legenda: B - Basso; M - Medio; A - Alto; MA - Molto alto

01 Modello per la generazione di idee per avanzamenti nella capacità di Mass Customization

Sequenza di realizzazione	Idea	Priorità	Impact	Sforzo	Interdipendenze
1					
2					
3					
4					
5					
6					

Legenda: B - Basso; M - Medio; A - Alto; MA - Molto alto

02 Modello per la generazione di un piano di miglioramento verso l'MC 4.0

II. Research results - *Phase 2: Development and testing of the MC maturity grid*
- 12 GRID AREAS OF THE DEVELOPED MC MATURITY GRID -

12 grid areas of the MC maturity grid before empirical testing:

1. Standardization of parts: Periodic rationalization to eliminate parts no longer needed
2. Standardization of parts: Day-by-day limitation of new parts introduction
3. Standardization of production sequences
4. Product modularization
5. Grouping of parts into families through a similarity-based classification system
6. Product space organized in clearly distinguished product families
7. Organizing machines/assembly stations on the shop floor in order to maximize the speed and efficiency of processing part/product families
8. Low and continuously reduced set-up times
9. Technical configurator
10. Sales configurator
11. Keeping stocks at optimal levels
12. Sophisticated and dependable supports for determining available to promise

II. Research results - *Phase 2: Development and testing of the MC maturity grid*
- 13 GRID AREAS OF THE DEVELOPED MC MATURITY GRID -

13 aree della griglia della maturità MC:

1. Standardizzazione delle parti: razionalizzazione periodica per eliminare le parti non più necessarie
2. Standardizzazione delle parti: Limitazione quotidiana dell'introduzione di nuove parti
3. Standardizzazione delle sequenze di produzione
4. Raggruppamento di parti in famiglie di parti tramite un sistema di classificazione basato sulla somiglianza
5. Spazio prodotto organizzato in famiglie di prodotti chiaramente distinte
6. Modularizzazione del prodotto
7. Stabilimento con disposizione di macchine operatrici e stazioni di assemblaggio tale da massimizzare la velocità di attraversamento e l'efficienza della lavorazione di famiglie di pezzi e di prodotti
8. Tempi di attrezzaggio bassi e costantemente ridotti
9. Configuratore tecnico
10. Configuratore di vendita
11. Mantenere le scorte a livelli ottimali
12. Supporti sofisticati e affidabili per determinare la disponibilità "alla promessa«
13. Stampa 3D / manifattura additiva

Metalmeccanica SPA

- **Hydraulic power units product family**

Grid area =>	1	2	3	4	5	6	7	8	9	10	11	12
Maturity level ↓ ↑	Standardization of parts: Periodic rationalization to eliminate parts no longer needed	Standardization of parts: Day-by-day limitation of new parts introduction	Standardization of production sequences	Product modularization	Grouping of parts into families through a similarity-based classification system	Product space organized in clearly distinguished product families	Organizing machines/assembly stations on the shop floor in order to maximize the speed and efficiency of processing part/product families	Low and continuously reduced set-up times **SKIPPED**	Technical configurator	Sales configurator	Keeping stocks at optimal levels	Sophisticated and dependable supports for determining available to promise
1	Never done	No attention is paid to parts proliferation by the organization, design/production engineers and purchasing staff	No attention is paid to production sequence proliferation by the organization and by the individual design and production engineers	No modularization at all	Parts are not grouped in families using similarity-based classification criteria (shape, size and materials, and therefore production processes)	No product families (modular and/or scaled) exist	Machines are clustered on the shop floor based on their functional similarity	Set-up times are VERY LONG; no systematic reductions of set-up times are being applied	Bills of materials (BOMs) and production sequences (if present) are manually defined by production engineers, eventually copied and modified from similar BOMs/production sequences	Customers, salesmen and technical-sales employees do not have any structured support in choosing all the specific characteristics of the product and in controlling their compatibility	We do not have a production planning and control system that can assure an acceptable service level at the subsequent stage (production of parts, assembly of final products or product delivery to the customer) and maintain working capital (finished products, modules, components, parts and raw materials) at an acceptable level	It is difficult for us to say whether or not the products that are available in the finished products stock or that are in production are available to promise
2	There is a systematic procedure to eliminate parts no longer needed and this procedure is done periodically for some part families	No guidelines and no SW support exist, but design/production engineers and purchasing staff pay attention to parts proliferation	It is easy to reuse the same sequences (because the production sequence database is well organized and because production sequences are grouped in classes)	In some of our product families, the products have been thought about in such a way that each product function is performed by a specific chunk and does not need to interact with other chunks	Parts are grouped in families using similarity-based classification criteria (shape, size and materials, and therefore production processes); part families are formed through use of production and design engineers' experience; no structured classification system exists	A portion of the product assortment is composed of products clustered in product families (modular and/or scaled) according to similarities in product functions and product-related production processes. But, the clustering is not guided by design procedures	Machines and assembly stations are able to process different parts/products with similar efficiency and are clustered based on the part/product families to which they are dedicated	Set-up times are NEITHER LONG NOR SHORT; reductions of process set-up times are achieved by continuous analysis of and changes made in the technology used (use of machines with low set-up times, fasteners, positioning aids, standardized tools, etc.) and organization (standardization of set-up procedure, using offline set-up, etc.) or by application of special tools dedicated to part families and/or product families	For some product families, BOMs and/or production sequences are automatically generated for a lot of possible variants of the product family, starting from the provided product specifications	Customers, salesmen and the technical-sales employees have structured support (but do not have any SW support) in choosing all the specific characteristics of the product and in controlling their compatibility	We have a production planning and control system that can assure an acceptable service level at the subsequent stage (production of parts, assembly of final products or product delivery to the customer) while maintaining working capital (finished products, modules, components, parts and raw materials) at an acceptable level	If we look for a certain quantity of a given finished product, we know how much of it is available to promise in our stocks and how much is available to promise in production, but in the latter case, we are not really dependable regarding when they will be available in the warehouse. If the product is not yet launched into production, we apply some fixed lead times for the promise that are common for several products
3	There is a systematic procedure to eliminate parts no longer needed, and this procedure is done periodically for all part families	Guidelines for design/production engineers and purchasing staff exist and are applied; no SW support	+ there are rules and SW support to limit the introduction of new production sequences	We thought all of our product families in a modular way: We have families of modules (each function is performed by only one module) with standardized interfaces	Parts are grouped in families using similarity-based classification criteria (shape, size and materials, and therefore production processes); part families are formed through a structured manual classification system	A considerable portion of the product assortment is composed of products clustered in product families (modular and/or scaled) according to similarities in product functions and product-related production processes. Clustering is guided by design procedures. The distinction between product families is good, but can still be considerably improved	+ the positioning and organization of the machines/assembly stations minimizes the time the parts/products take to pass through autonomous production units	Set-up times are VERY SHORT; reductions of process set-up times are achieved by continuous analysis of and changes made in the technology used (use of machines with low set-up times, fasteners, positioning aids, standardized tools, etc.) and organization (standardization of set-up procedure, using offline set-up etc.) and by application of special tools dedicated to part families and/or product families	For almost all product families, BOMs and/or production sequences are automatically generated for most of the possible variants of the product family, starting from the provided product specifications	Customers and/or salesmen and/or technical sales employees use SW that supports them in choosing the main characteristics of the products and in controlling their compatibility (at least for the most important product families)	We have a production planning and control system that can assure a very good service level at the subsequent stage (production of parts, assembly of final products or product delivery to the customer) while maintaining working capital (finished products, modules, components, parts and raw materials) at a very low level	We know exactly how much of each product is available to promise, both in our stocks and in production and, in the latter case, we are very dependable regarding when the product will be available in the warehouse
4		Guidelines for design/production engineers and purchasing staff exist and are applied very rigorously; SW support exists	+ we make production sequences that differentiate products as late as possible	Our modules may have a longer life than single product families (product platforms exist)	Parts are grouped in families using similarity-based classification criteria (shape, size and materials, and therefore production processes); part families are formed through an automatic (SW) classification system	The whole product assortment is composed of products clustered in product families (modular and/or scaled) according to similarities in product functions and product-related production processes. Clustering is guided by design procedures that are deeply absorbed by the whole company's organization. Product families are clearly distinguished and do not overlap	+ a system is in place to continuously improve the speed and the efficiency of the autonomous units in processing the parts/product families		BOMs and production sequences (if needed) are automatically generated for almost all possible variants, starting from the provided product specifications	Customers and/or salesmen use SW that supports them in choosing all the characteristics of the products and in controlling their compatibility (for all or almost all of the product families)	We have a production planning and control system that can assure us an optimal service level at the subsequent stage (production of parts, assembly of final products or product delivery to the customer) while maintaining working capital (finished products, modules, components, parts and raw materials) at an optimal level	We are able to tell exactly how much and when a specific product variant to be promised to a customer will be available in the warehouse and we are also able to modify the configuration of products already launched in production in order to be able to promise customized products at the earliest delivery date in a reliable way and without incurring additional production costs or decreasing the level of service to our customer

Maturity level of company in the given grid area

Company is currently in between the maturity levels in the given grid area

Company is in transition from one maturity level to another in the given grid area

SKIPPED *Grid area skipped because workshop participants considered this area irrelevant to their company*

13 alla 12 =
23.298.085.122.481

Metalmeccanica SPA

- **Flexible hoses product family**

Grid area =>	1	2	3	4	5	6	7	8	9	10	11	12
Maturity level I/ V	Standardization of parts: Periodic rationalization to eliminate parts no longer needed	Standardization of parts: Day-by-day limitation of new parts introduction	Standardization of production sequences	Product modularization	Grouping of parts into families through a similarity-based classification system	Product space organized in clearly distinguished product families	Organizing machines/assembly stations on the shop floor in order to maximize the speed and efficiency of processing part/product families	Low and continuously reduced set-up times **SKIPPED**	Technical configurator	Sales configurator	Keeping stocks at optimal levels	Sophisticated and dependable supports for determining available to promise
1	Never done	No attention is paid to parts proliferation by the organization; design/production engineers and purchasing staff	No attention is paid to production sequence proliferation by the organization and by the individual design and production engineers	No modularization at all	Parts are not grouped in families using similarity-based classification criteria (shape, size and materials, and therefore production processes)	No product families (modular and/or scaled) exist	Machines are clustered on the shop floor based on their functional similarity	Set-up times are VERY LONG; no systematic reductions of set-up times are being applied	Bills of materials (BOMs) and production sequences (if present) are manually defined by production engineers, eventually copied and modified from similar BOMs/production sequences	Customers, salesmen and technical-sales employees do not have any structured support in choosing all the specific characteristics of the product and in controlling their compatibility	We do not have a production planning and control system that can assure an acceptable service level at the subsequent stage (production of parts, assembly of final products or product delivery to the customer) and maintain working capital (finished products, modules, components, parts and raw materials) at an acceptable level	It is difficult for us to say whether or not the products that are available in the finished products stock or that are in production are available to promise
2	There is a systematic procedure to eliminate parts no longer needed and this procedure is done periodically for some part families	No guidelines and no SW support exist, but design/production engineers and purchasing staff pay attention to parts proliferation	It is easy to reuse the same sequences (because the production sequence database is well organized and because production sequences are grouped in classes)	In some of our product families, the products have been thought about in such a way that each product function is performed by a specific chunk and does not need to interact with other chunks	Parts are grouped in families using similarity-based classification criteria (shape, size and materials, and therefore production processes); part families are formed through use of production and design engineers' experience; no structured classification system exists	A portion of the product assortment is composed of products clustered in product families (modular and/or scaled) according to similarities in product functions and product-related production processes. But, the clustering is not guided by design procedures	Machines and assembly stations are able to process different parts/products with similar efficiency and are clustered based on the part/product families to which they are dedicated	Set-up times are NEITHER LONG NOR SHORT; reductions of process set-up times are achieved by continuous analysis of and changes made in the technology used (use of machines with low set-up times, fasteners, positioning aids, standardized tools, etc.) and organization (standardization of set-up procedure, using offline set-up, etc.) or by application of special tools dedicated to part families and/or product families	For some product families, BOMs and/or production sequences are automatically generated for a lot of possible variants of the product family, starting from the provided product specifications	Customers, salesmen and the technical-sales employees have structured support (but do not have any SW support) in choosing all the specific characteristics of the product and in controlling their compatibility	We have a production planning and control system that can assure an acceptable service level at the subsequent stage (production of parts, assembly of final products or product delivery to the customer) while maintaining working capital (finished products, modules, components, parts and raw materials) at an acceptable level	If we look for a certain quantity of a given finished product, we know how much of it is available to promise in our stocks and how much is available to promise in production, but in the latter case, we are not really dependable regarding when they will be available in the warehouse. If the product is not yet launched into production, we apply some fixed lead times for the promise that are common for several products
3	There is a systematic procedure to eliminate parts no longer needed, and this procedure is done periodically for all part families	Guidelines for design/production engineers and purchasing staff exist and are applied for SW support	+ there are rules and SW support to limit the introduction of new production sequences	We thought all of our product families in a modular way: We have families of modules (each function is performed by only one module) with standardized interfaces	Parts are grouped in families using similarity-based classification criteria (shape, size and materials) and therefore (production processes); part families are formed through a structured manual classification system	A considerable portion of the product assortment is composed of products clustered in product families (modular and/or scaled) according to similarities in product functions and product-related production processes. Clustering is guided by design procedures. The distinction between product families is good, but can still be considerably improved	+ the positioning and organization of the machines/assembly stations minimizes the time the parts/products take to pass through autonomous production units	Set-up times are VERY SHORT; reductions of process set-up times are achieved by continuous analysis of and changes made in the technology used (use of machines with low set-up times, fasteners, positioning aids, standardized tools, etc.) and organization (standardization of set-up procedure, using offline set-up etc.) and by application of special tools dedicated to part families and/or product families	For almost all product families, BOMs and/or production sequences are automatically generated for most of the possible variants of the product family, starting from the provided product specifications	Customers and/or salesmen and/or technical sales employees use SW that supports them in choosing the main characteristics of the products and in controlling their compatibility (at least for the most important product families)	We have a production planning and control system that can assure a very good service level at the subsequent stage (production of parts, assembly of final products or product delivery to the customer) while maintaining working capital (finished products, modules, components, parts and raw materials) at a very low level	We know exactly how much of each product is available to promise, both in our stocks and in production and, in the latter case, we are very dependable regarding when the product will be available in the warehouse
4		Guidelines for design/production engineers and purchasing staff exist and are applied very rigorously; SW support exists	+ we make production sequences that differentiate products as late as possible	Our modules may have a longer life than single product families (product platforms exist)	Parts are grouped in families using similarity-based classification criteria (shape, size and materials, and therefore production processes); part families are formed through an automatic (SW) classification system	The whole product assortment is composed of products clustered in product families (modular and/or scaled) according to similarities in product functions and product-related production processes. Clustering is guided by design procedures that are deeply absorbed by the whole company's organization. Product families are clearly distinguished and do not overlap	+ a system is in place to continuously improve the speed and the efficiency of the autonomous units in processing the parts/product families		BOMs and production sequences (if needed) are automatically generated for almost all possible variants, starting from the provided product specifications	Customers and/or salesmen use SW that supports them in choosing all the characteristics of the products and in controlling their compatibility (for all or almost all of the product families)	We have a production planning and control system that can assure us an optimal service level at the subsequent stage (production of parts, assembly of final products or product delivery to the customer) while maintaining working capital (finished products, modules, components, parts and raw materials) at an optimal level	We are able to tell exactly how much and when a specific product variant to be promised to a customer will be available in the warehouse and we are also able to modify the configuration of products already launched in production in order to be able to promise customized products at the earliest delivery date in a reliable way and without incurring additional production costs or decreasing the level of service to our customer

Maturity level of company in the given grid area

Company is currently in between the maturity levels in the given grid area

Company is in transition from one maturity level to another in the given grid area

SKIPPED *Grid area skipped because workshop participants considered this area irrelevant to their company*

Metalmeccanica SPA

- Assembly lines product family

Grid area =>	1	2	3	4	5	6	7	8	9	10	11	12
Maturity level II V	Standardization of parts: Periodic rationalization to eliminate parts no longer needed	Standardization of parts: Day-by-day limitation of new parts introduction	Standardization of production sequences	Product modularization	Grouping of parts into families through a similarity-based classification system	Product space organized in clearly distinguished product families	Organizing machines/assembly stations on the shop floor in order to maximize the speed and efficiency of processing part/product families	Low and continuously reduced set-up time: SKIPPED	Technical configurator	Sales configurator	Keeping stocks at optimal levels	Sophisticated and dependable supports for determining available to promise
1	Never done	No attention is paid to parts proliferation by the organization, design/production engineers and purchasing staff	No attention is paid to production sequence proliferation by the organization and by the individual design and production engineers	No modularization at all	Parts are not grouped in families using similarity-based classification criteria (shape, size and materials, and therefore production processes)	No product families (modular and/or scaled) exist	Machines are clustered on the shop floor based on their functional similarity	Set-up times are VERY LONG; no systematic reductions of set-up times are being applied	Bills of materials (BOMs) and production sequences (if present) are manually defined by production engineers, eventually copied and modified from similar BOMs/production sequences	Customers, salesmen and technical-sales employees do not have any structured support in choosing all the specific characteristics of the product and in controlling their compatibility	We do not have a production planning and control system that can assure an acceptable service level at the subsequent stage (production of parts, assembly of final products or product delivery to the customer) and maintain working capital (finished products, modules, components, parts and raw materials) at an acceptable level	It is difficult for us to say whether or not the products that are available in the finished products stock or that are in production are available to promise
2	There is a systematic procedure to eliminate parts no longer needed and this procedure is done periodically for some part families	No guidelines and no SW support exist, but design/production engineers and purchasing staff pay attention to parts proliferation	It is easy to reuse the same sequences (because the production sequence database is well organized and because production sequences are grouped in classes)	In some of our product families, the products have been thought about in such a way that each product function is performed by a specific chunk and does not need to interact with other chunks	Parts are grouped in families using similarity-based classification criteria (shape, size and materials, and therefore production processes); part families are formed through use of production and design engineers' experience; no structured classification system exists	A portion of the product assortment is composed of products clustered in product families (modular and/or scaled) according to similarities in product functions and product-related production processes. But, the clustering is not guided by design procedures	Machines and assembly stations are able to process different parts/products with similar efficiency and are clustered based on the part/product families to which they are dedicated	Set-up times are NEITHER LONG NOR SHORT; reductions of process set-up times are achieved by continuous analysis of and changes made in the technology used (use of machines with low set-up times, fasteners, positioning aids, standardized tools, etc.) and organization (standardization of set-up procedure, using offline set-up, etc.) or by application of special tools dedicated to part families and/or product families	For some product families, BOMs and/or production sequences are automatically generated for a lot of possible variants of the product family, starting from the provided product specifications	Customers, salesmen and the technical-sales employees have structured support (but do not have any SW support) in choosing all the specific characteristics of the product and in controlling their compatibility	We have a production planning and control system that can assure an acceptable service level at the subsequent stage (production of parts, assembly of final products or product delivery to the customer) while maintaining working capital (finished products, modules, components, parts and raw materials) at an acceptable level	If we look for a certain quantity of a given finished product, we know how much of it is available to promise in our stocks and how much is available to promise in production, but in the latter case, we are not really dependable regarding when they will be available in the warehouse. If the product is not yet launched into production, we apply some fixed lead times for the promise that are common for several products
3	There is a systematic procedure to eliminate parts no longer needed, and this procedure is done periodically for all part families	Guidelines for design/production engineers and purchasing staff exist and are applied, no SW support	+ there are rules and SW support to limit the introduction of new production sequences	We thought all of our product families in a modular way: We have families of modules (each function is performed by only one module) with standardized interfaces	Parts are grouped in families using similarity-based classification criteria (shape, size and materials, and therefore production processes); part families are formed through a structured manual classification system	A considerable portion of the product assortment is composed of products clustered in product families (modular and/or scaled) according to similarities in product functions and product-related production processes. Clustering is guided by design procedures. The distinction between product families is good, but can still be considerably improved	+ the positioning and organization of the machines/assembly stations minimizes the times the parts/product take to go through autonomous production units	Set-up times are VERY SHORT; reductions of process set-up times are achieved by continuous analysis of and changes made in the technology used (use of machines with low set-up times, fasteners, positioning aids, standardized tools, etc.) and organization (standardization of set-up procedure, using offline set-up etc.) and by application of special tools dedicated to part families and/or product families	For almost all product families, BOMs and/or production sequences are automatically generated for most of the possible variants of the product family, starting from the provided product specifications	Customers and/or salesmen and/or technical sales employees use SW that supports them in choosing the main characteristics of the products and in controlling their compatibility (at least for the most important product families)	We have a production planning and control system that can assure a very good service level at the subsequent stage (production of parts, assembly of final products or product delivery to the customer) while maintaining working capital (finished products, modules, components, parts and raw materials) at a very low level	We know exactly how much of each product is available to promise, both in our stocks and in production and, in the latter case, we are very dependable regarding when the product will be available in the warehouse
4		Guidelines for design/production engineers and purchasing staff exist and are applied very rigorously; SW support exists	+ we make production sequences that differentiate products as late as possible	Our modules vary (are a longer list than those product families (product platforms) exist)	Parts are grouped in families using similarity-based classification criteria (shape, size and materials, and therefore production processes); part families are formed through an automatic (SW) classification system	The whole product assortment is composed of products clustered in product families (modular and/or scaled) according to similarities in product functions and product-related production processes. Clustering is guided by design procedures that are deeply embedded in the whole company's organization. Product families are clearly distinguished and do not overlap	+ a system is in place to continuously improve the speed and the efficiency of the autonomous units in processing the parts/product families		BOMs and production sequences (if needed) are automatically generated for almost all possible variants, starting from the provided product specifications	Customers and/or salesmen use SW that supports them in choosing all the characteristics of the products and in controlling their compatibility (for all or almost all of the product families)	We have a production planning and control system that can assure us an optimal service level at the subsequent stage (production of parts, assembly of final products or product delivery to the customer) while maintaining working capital (finished products, modules, components, parts and raw materials) at an optimal level	We are able to tell exactly how much and when a specific product variant to be promised to a customer will be available in the warehouse and we are also able to modify the configuration of products already launched in production in order to be able to promise customized products at the earliest delivery date in a reliable way and without incurring additional production costs or decreasing the level of service to our customer

Maturity level of company in the given grid area

Company is currently in between the maturity levels in the given grid area

Company is in transition from one maturity level to another in the given grid area

SKIPPED *Grid area skipped because workshop participants considered this area irrelevant to their company*

Soft Automation SPA

Grid area =>	1	2	3	4	5	6	7	8	9	10	11	12
Maturity level II V	Standardization of parts: Periodic rationalization to eliminate parts no longer needed	Standardization of parts: Day-by-day limitation of new parts introduction	Standardization of production sequences	Product modularization	Grouping of parts into families through a similarity-based criteria system	Product space organized in clearly distinguished product families	Organizing machines/assembly stations on the shop floor based on the efficiency of processing part/product families	Low and continuously reduced set-up time	Technical configurator	Sales configurator	Keeping stocks at optimal levels	Sophisticated and dependable supports for determining available to promise
					SKIPPED		SKIPPED	SKIPPED			SKIPPED	SKIPPED
1	Never done	No attention is paid to parts proliferation by the organization, design/production engineers and purchasing staff	No attention is paid to production sequence proliferation by the organization and by the individual design and production engineers	No modularization at all	Parts are not grouped in families using similarity-based classification criteria (shape, size and materials, and therefore production processes)	No product families (modular and/or scaled) exist	Machines are clustered on the shop floor based on their functional similarity	Set-up times are VERY LONG; no systematic reductions of set-up times are being applied	Bills of materials (BOMs) and production sequences (if present) are manually defined by production engineers, eventually copied and modified from similar BOMs/production sequences	Customers, salesmen and technical-sales employees do not have any structured support in choosing all the specific characteristics of the product and in controlling their compatibility	We do not have a production planning and control system that can assure an acceptable service level at the subsequent stage (production of parts, assembly of final products or product delivery to the customer) and maintain working capital (finished products, modules, components, parts and raw materials) at an acceptable level	It is difficult for us to say whether or not the products that are available in the finished products stock or that are in production are available to promise
2	There is a systematic procedure to eliminate parts no longer needed and this procedure is done periodically for some part families	No guidelines and no SW support exist, but design/production engineers and purchasing staff pay attention to parts proliferation	It is easy to choose between various sequences (because the production sequence database is well organized and because production sequences are limited in number)	Some of the product families, the product shave been thought about in such a way that client needed function is performed by a specific chunk and does not need to interact with other chunks	Parts are grouped in families using similarity-based classification criteria (shape, size and materials, and therefore production processes); part families are formed through use of production and design engineers' experience; no structured classification system exists	A portion of the product assortment is composed of products clustered in product families (modular and/or scaled) according to similarities in product functions and product-related production processes. But, the clustering is not guided by design procedures	Machines and assembly stations are able to process different parts/products with similar efficiency and are clustered based on the part/product families to which they are dedicated	Set-up times are NEITHER LONG NOR SHORT; reductions of process set-up times are achieved by continuous analysis of and changes made in the technology used (use of machines with low set-up times, fasteners, positioning aids, standardized tools, etc.) and organization (standardization of set-up procedure, using offline set-up, etc.) or by application of special tools dedicated to part families and/or product families	For some product families, BOMs and/or production sequences are automatically generated for a lot of possible variants of the product family, starting from the provided product specifications	Customers, salesmen and the technical-sales employees have structured support (but do not have any SW support) in choosing all the specific characteristics of the product and in controlling their compatibility	We have a production planning and control system that can assure an acceptable service level at the subsequent stage (production of parts, assembly of final products or product delivery to the customer) while maintaining working capital (finished products, modules, components, parts and raw materials) at an acceptable level	If we look for a certain quantity of a given finished product, we know how much of it is available to promise in our stocks and how much is available to promise in production, but in the latter case, we are not really dependable regarding when they will be available in the warehouse. If the product is not yet launched into production, we apply some fixed lead times for the promise that are common for several products
3	There is a systematic procedure to eliminate parts no longer needed, and this procedure is done periodically for all part families	Guidelines for design/production engineers and purchasing staff exist, but are applied very rigorously; no SW support	+ there are rules and SW support to limit the introduction of new production sequences	We thought all of our product families in a modular way: We have families of modules (each function is performed by only one module) with standardized interfaces	Parts are grouped in families using similarity-based classification criteria (shape, size and materials, and therefore production processes); part families are formed through a structured manual classification system	A considerable portion of the product assortment is composed of products clustered in product families (modular and/or scaled) according to similarities in product functions and product-related production processes. Clustering is guided by design procedures. The distinction between product families is good, but can still be considerably improved	+ the positioning and organization of the machines/assembly stations minimizes the time the parts/products take to pass through autonomous production units	Set-up times are VERY SHORT; reductions of process set-up times are achieved by continuous analysis of and changes made in the technology used (use of machines with low set-up times, fasteners, positioning aids, standardized tools, etc.) and organization (standardization of set-up procedure, using offline set-up etc.) and by application of special tools dedicated to part families and/or product families	For almost all product families, BOMs and/or production sequences are automatically generated for most of the possible variants of the product family, starting from the provided product specifications	Customers and/or salesmen and/or technical sales employees use SW that supports them in choosing the main characteristics of the products and in controlling their compatibility (at least for the most important product families)	We have a production planning and control system that can assure a very good service level at the subsequent stage (production of parts, assembly of final products or product delivery to the customer) while maintaining working capital (finished products, modules, components, parts and raw materials) at a very low level	We know exactly how much of each product is available to promise, both in our stocks and in production and, in the latter case, we are very dependable regarding when the product will be available in the warehouse
4		Guidelines for design/production engineers and purchasing staff exist and are applied very rigorously; SW support exists	+ we make production sequences that differentiate products as late as possible	Our modules may have a longer life than single product families (product platform exist)	Parts are grouped in families using similarity-based classification criteria (shape, size and materials, and therefore production processes); part families are formed through an automatic (SW) classification system	The whole product assortment is composed of products clustered in product families (modular and/or scaled) according to similarities in product functions and product-related production processes. Clustering is guided by design procedures that are deeply absorbed by the whole company's organization. Product families are clearly distinguished and do not overlap	+ a system is in place to continuously improve the speed and the efficiency of the autonomous units in processing the parts/product families		BOMs and production sequences (if needed) are automatically generated for almost all possible variants, starting from the provided product specifications	Customers and/or salesmen use SW that supports them in choosing all the characteristics of the products and in controlling their compatibility (for all or almost all of the product families)	We have a production planning and control system that can assure us an optimal service level at the subsequent stage (production of parts, assembly of final products or product delivery to the customer) while maintaining working capital (finished products, modules, components, parts and raw materials) at an optimal level	We are able to tell exactly how much and when a specific product variant to be promised to a customer will be available in the warehouse and we are also able to modify the configuration of products already launched in production in order to be able to promise customized products at the earliest delivery date in a reliable way and without incurring additional production costs or decreasing the level of service to our customer

Maturity level of company in the given grid area

Company is currently in between the maturity levels in the given grid area

Company is in transition from one maturity level to another in the given grid area

SKIPPED *Grid area skipped because workshop participants considered this area irrelevant to their company*

Interreg
V-A Italia-Austria 2014-2020
Mass Customization 4.0
European Regional Development Fund

EUROPEAN UNION

UNIVERSITÀ DEGLI STUDI DI PADOVA

dtg

Raccolta delle idee emerse

Generated improvement ideas

Soft Automation SPA

Realiz. order	Idea	Priority	Impact	Effort	Interdependence
-	Formalize the product families; classify and study the product trends; and analyze the market opportunities for the current products (grid area 6)	N/S	L – in the short term H – in the long term	L	Positive effect on grid area 10 Sales configurator
-	Determine the activities that compose products/services and list them (grid area 10)	N/S	M – in the short term	L – for energy plants H – for the whole product assortment	Positive interactions with 6 Product space organized in clearly distinguished product families
-	Modularize the high-level software and manufacturing execution systems (MES) (grid area 4)	N/S	H – when imple-mented	M	Positive interactions with 10 Sales configurator

Legend: L – Low; M – Medium; H – High; VH – Very High; N/S – Not specified

Interreg
V-A Italia-Austria 2014-2020
Mass Customization 4.0
European Regional Development Fund

EUROPEAN UNION

UNIVERSITÀ DEGLI STUDI DI PADOVA

dtg

Definire un piano a partire dalle singole idee

Generated implementation plans

Soft Automation SPA

Realiz. order	Idea	Priority	Impact	Effort	Interdependence
-	Formalize the product families; classify and study the product trends; and analyze the market opportunities for the current products (grid area 6)	N/S	L – in the short term H – in the long term	L	Positive effect on grid area 10 Sales configurator
-	Determine the activities that compose products/services and list them (grid area 10)	N/S	M – in the short term	L – for energy plants H – for the whole product assortment	Positive interactions with 6 Product space organized in clearly distinguished product families
-	Modularize the high-level software and manufacturing execution systems (MES) (grid area 4)	N/S	H – when imple-mented	M	Positive interactions with 10 Sales configurator

Legend: L – Low; M – Medium; H – High; VH – Very High; N/S – Not specified

- TESTING OF MC MATURITY GRID -

Generated implementation plans

Metalmeccanica SPA

Realiz. order	Idea	Priority	Impact	Effort	Interdependence
1	Planning supplier by using realistic delivery times and not the required supply lead-times (grid area 11)	VH	H	ML	No
2	A combined idea (ideas 1 and 2): • Analyze the historical use of parts (idea 1) • Create a system that will offer a main option and alternative options for some parts in the design process (idea 2) (grid areas 1 and 2)	M	H	H	4 Product Modularization
3	Define a commercial dialogue to guide the choices for sizing of the hydraulic power units (grid area 10)	M	H	M	Some, with Standardization (grid areas 1 and 2)
4	Study modularization for the hydraulic power units family of products (grid area 4)	ML	H	H	10 Sales configurator (commercial dialogue) and 1 and 2 Standardization (partially)
5	Define different throughput times for different product types (grid area 3)	L	ML	L	No

Legend: L – Low; ML – Medium-Low; M – Medium; H – High; VH – Very High

Soft Automation SPA

Realiz. order	Idea	Priority	Impact	Effort	Interdependence
-	Formalize the product families; classify and study the product trends; and analyze the market opportunities for the current products (grid area 6)	N/S	L – in the short term H – in the long term	L	Positive effect on grid area 10 Sales configurator
-	Determine the activities that compose products/services and list them (grid area 10)	N/S	M – in the short term	L – for energy plants H – for the whole product assortment	Positive interactions with 6 Product space organized in clearly distinguished product families
-	Modularize the high-level software and manufacturing execution systems (MES) (grid area 4)	N/S	H – when imple-mented	M	Positive interactions with 10 Sales configurator

Legend: L – Low; M – Medium; H – High; VH – Very High; N/S – Not specified

Interreg
V-A Italia-Austria 2014-2020
Mass Customization 4.0
European Regional Development Fund

EUROPEAN UNION

Università degli Studi di Padova

dtg

Cosa è successo nelle aziende test ?

II. Research results - *Phase 2: Development and testing of the MC maturity grid - LONG-TERM OBSERVATIONAL EVALUATION OF MC MATURITY GRID -*

Metalmeccanica SPA

- **Hydraulic power units product family**

- After almost three years, the two SMEs were approached again in order to find out:

- ✓ If the generated implementation plan was followed by the companies

- ✓ If advancements in the company's MC status were made in almost three years

- ✓ If the developed MC maturity grid is capable of recording the changes that occurred in the MC status of the companies

Grid area ⇒	1	2	3	4	5	6	7	8	9	10	11	12
Maturity level I V	Standardization of parts: Periodic rationalization to eliminate parts no longer needed	Standardization of parts: Day-by-day limitation of new parts introduction	Standardization of production sequences	Grouping of parts into part families through a similarity-based classification system	Product space organized in clearly distinguished product families	Product modularization	Organizing machines/assembly stations on the shop floor in order to maximize the speed and efficiency of processing part/product families	Low and continuously reduced set-up times **SKIPPED**	Technical configurator	Sales configurator	Keeping stocks at optimal levels	Sophisticated and dependable supports for determining available to promise
1	Never done	NO attention is paid to parts proliferation by: (1) design/production engineers and purchasing staff and (2) the organization	No attention is paid to production sequence proliferation by the organization and by the individual design and production engineers	Parts are not grouped in families using similarity-based classification criteria (shape, size and materials, and therefore production processes)	Products are not clustered in product families	No modularization at all	Machines are clustered on the shop floor based on their functional similarity	We do not have a clear view of set-up times because we have never considered them	BOMs and PSs (if present) are manually defined possibly by modifying similar BOMs/PSs *(BOM - bill of materials PS - production sequence)*	Customers, salesmen and the technical-sales employees (CSTS) do not have any structured support to choose the specific characteristics of the product and to control their compatibility	We do not have a production planning and control system that assures an acceptable service level at the subsequent stage *(production of parts, assembly of final products or delivering product to the customer)* and maintains working capital *(finished products, modules, components, parts and raw materials)* at an acceptable level	It is difficult for us to say whether or not the products that are available in the finished products stocks or are in production are available to promise
2	We standardized the parts and we eliminated parts no longer needed *BUT* this was an isolated initiative	Attention is paid to parts proliferation by: (1) design/production engineers and purchasing staff (2a) NO parts standardization guidelines (2b) NO SW supports for part standardization	(1) It is easy for design/production engineers to reuse the same sequences (because the production sequence database is well organized and because production sequences are grouped in classes)	(1) Parts ARE grouped in families using similarity-based classification criteria (shape, size and materials, and therefore production processes), (2) The criteria used are NOT FORMALIZED and coincide with the production and design engineers' experience	(1) A PORTION of the product assortment is composed of products clustered in product families according to similarities in product functions and product-related production processes (2) But the way the clustering is obtained is NOT GUIDED by design procedures	(1) In SOME of our product families, all of the products have been thought about such that each product function is performed by a specific chunk (module) and is not performed through interaction with more chunks	(1) Machines and assembly stations are able to process different parts/products (within a family) with similar efficiency *AND* (2) Machines and assembly stations are clustered based on the part/product families to which they are dedicated	(1) Set-up times are VERY LONG *AND* (2) No systematic reductions of set-up times are being applied	for A LOT of possible product variants of SOME product families BOM and/or PS are automatically generated	CSTS have a structured support (without SW) to choose ... and control ...	We have a production planning and control system that assures an acceptable service level at the subsequent stage (...) and maintains working capital (...) at an acceptable level	We know how much of each product is available to promise both in our stocks and in production but in the latter case, we are not really dependable regarding when they will be available in the warehouse. If the product is not yet launched into production, we apply some fixed lead times that are common for several products for the promise
3	(1) There is a systematic procedure to eliminate parts no longer needed *AND* (2) This procedure is periodically done on SOME part families	2a) Part standardization guidelines for design/production engineers and purchasing staff exist and are SOMEHOW applied, 2b) NO SW support	(1) ..... *AND* (2) There are rules and SW support to limit the introduction of new production sequences	(1) ..... *AND* (2) Part families are formed through a FORMALIZED and structured MANUAL classification system	(1) A CONSIDERABLE PORTION of the product assortment is ... *idem* ... (2) The way the clustering is obtained is GUIDED by design procedures (3) The distinction between product families is good, but can still be improved considerably	(1) We designed ALL of our product families in a modular way: We have families of modules (each function is performed by only one module) with standardized interfaces	(1) ..... *AND* (2) ..... *AND* (3) The positioning and organization of the machines/assembly stations minimizes the time the parts/products take to pass through them	(1) Set-up times are NEITHER LONG NOR SHORT *AND* (2) Reductions of process set-up times are achieved by continuous analysis of and changes made in: used technology (use of machines with low set-up times, fasteners, positioning aids, standardized tools,etc.) and organization (standardization of set-up procedure, using offline set-up, etc.) OR by application of special tools (dedicated to part families and/or product families)	for MOST possible product variants of ALMOST ALL product families BOM and/or PS are automatically generated	C or S or TS use software to choose the MAIN characteristics of the products and to control their compatibility (at least for the MOST IMPORTANT product families)	We have a production planning and control system that assures a very good service level at the subsequent stage (...) and maintains working capital (...) at a very low level	We know how much of each product is available to promise both in our stocks and in production and, even in the latter case, we are very dependable regarding when the product will be available in the warehouse
4	(1) ..... *AND* (2) This procedure is periodically done on ALL part families	1, 2a) Guidelines for design/production engineers and purchasing staff exist and are applied very RIGOROUSLY, 2b) SW support exists	(1) ..... *AND* (2) ..... *AND* (3) We make production sequences that differentiate products as late as possible	(1) ..... *AND* (2) Part families are formed through an AUTOMATIC (SW) classification system	(1) THE WHOLE product assortment is ... *idem* ... (2) ...*idem*... and these design procedures are DEEPLY ABSORBED by the whole organization (3) Product families are CLEARLY DISTINGUISHED and do not overlap each other	(1) ..... *AND* (2) Our modules may have a longer life than single product families (product platforms exist)	(1) ..... *AND* (2) ..... *AND* (3) ..... *AND* (4) A system is in place to continuously improve the speed and efficiency of the autonomous units in processing parts/product families	(1) Set-up times are VERY SHORT *AND* (2) Reductions of process set-up times are achieved by ...*idem* ... AND by application of special tools ...*idem* ...	for ALMOST ALL possible product variants of ALL product families BOM and/or PS are automatically generated	C and/or S use a software to choose ALL of the characteristics of the products and to control their compatibility (for ALL or ALMOST ALL of the product families)	We have a production planning and control system that assures an optimal service level at the subsequent stage (...) and maintains working capital (...) at an optimal level	We know exactly how much and when a specific product variant to be promised to a customer will be available in the warehouse and we are also able to modify the configuration of products already launched in production in order to be able to promise customized products at the earliest delivery date in a reliable way and without incurring additional production costs or decreasing the level of service to our customer

Maturity level of the company in the given grid area

Company is currently in between the maturity levels in a given grid area

Company is still in transition from one maturity level to another in the given grid area

SKIPPED *Grid area skipped because workshop participants considered this area irrelevant to their company*

Grid area where advancement has been recorded

Advanced maturity level

Maturity level of the company in the first assessment

Company is now in transition from one maturity level to another in the given grid area

II. Research results - *Phase 2: Development and testing of the MC maturity grid - LONG-TERM OBSERVATIONAL EVALUATION OF MC MATURITY GRID -*

Metalmeccanica SPA

- Flexible hoses product family

Grid area =>	1	2	3	4	5	6	7	8	9	10	11	12
Maturity level II V	Standardization of parts; Periodic rationalization to eliminate parts no longer needed	Standardization of parts; Day-by-day limitation of new parts introduction	Standardization of production sequences	Grouping of parts into part families through a similarity-based classification system	Product space organized in clearly distinguished product families	Product modularization	Organizing machines/assembly stations on the shop floor in order to maximize the speed and efficiency of processing part/product families	Low and continuously reduced set-up times **SKIPPED**	Technical configurator	Sales configurator	Keeping stocks at optimal levels	Sophisticated and dependable supports for determining available to promise
1	Never done	NO attention is paid to parts proliferation by: (1) design/production engineers and purchasing staff and (2) the organization	No attention is paid to production sequence proliferation by the organization and by the individual design and production engineers	Parts are not grouped in families using similarity-based classification criteria (shape, size and materials, and therefore production processes)	Products are not clustered in product families	No modularization at all	Machines are clustered on the shop floor based on their functional similarity	We do not have a clear view of set-up times because we have never considered them	BOMs and PSs (if present) are manually defined possibly by modifying similar BOMs/PSs *(BOM - bill of materials PS - production sequence)*	Customers, salesmen and the technical-sales employees (CSTS) do not have any structured support to choose the specific characteristics of the product and to control their compatibility	We do not have a production planning and control system that assures an acceptable service level at the subsequent stage *(production of parts, assembly of final products or delivering product to the customer)* and maintains working capital *(finished products, modules, components, parts and raw materials)* at an acceptable level	It is difficult for us to say whether or not the products that are available in the finished products stocks or are in production are available to promise
2	We standardized the parts and we eliminated parts no longer needed *BUT* this was an isolated initiative	Attention is paid to parts proliferation by: (1) design/production engineers and purchasing staff (2a) NO parts standardization guidelines (2b) NO SW supports for part standardization	(1) It is easy for design/production engineers to reuse the same sequences (because the production sequence database is well organized and because production sequences are grouped in classes)	(1) Parts ARE grouped in families using similarity-based classification criteria (shape, size and materials, and therefore production processes), (2) The criteria used are NOT FORMALIZED and coincide with the production and design engineers' experience	(1) A PORTION of the product assortment is composed of products clustered in product families according to similarities in product functions and product-related production processes (2) But the way the clustering is obtained is NOT GUIDED by design procedures	(1) In SOME of our product families, all of the products have been thought about such that each product function is performed by a specific chunk (module) and is not performed through interaction with more chunks	(1) Machines and assembly stations are able to process different parts/products (within a family) with similar efficiency *AND* (2) Machines and assembly stations are clustered based on the part/product families to which they are dedicated	(1) Set-up times are VERY LONG *AND* (2) No systematic reductions of set-up times are being applied	for A LOT of possible product variants of SOME product families BOM and/or PS are automatically generated	CSTS have a structured support (without SW) to choose ... and control ...	We have a production planning and control system that assures an acceptable service level at the subsequent stage (...) and maintains working capital (...) at an acceptable level	We know how much of each product is available to promise both in our stocks and in production but in the latter case, we are not really dependable regarding when they will be available in the warehouse. If the product is not yet launched into production, we apply some fixed lead times that are common for several products for the promise
3	(1) There is a systematic procedure to eliminate parts no longer needed *AND* (2) This procedure is periodically done on SOME part families	(1, 2a) Part standardization guidelines for design/production engineers and purchasing staff exist and are SOMEHOW applied, (2b) NO SW support	(1) ..... *AND* (2) There are rules and SW support to limit the introduction of new production sequences	(1) ..... *AND* (2) Part families are formed through a FORMALIZED and structured MANUAL classification system	(1) A CONSIDERABLE PORTION of the product assortment is ... *idem* ... (2) The way the clustering is obtained is GUIDED by design procedures (3) The distinction between product families is good, but can still be improved considerably	(1) We designed ALL of our product families in a modular way: We have families of modules (each function is performed by only one module) with standardized interfaces	(1) ..... *AND* (2) ..... *AND* (3) The positioning and organization of the machines/assembly stations minimizes the time the parts/products take to pass through them	(1) Set-up times are NEITHER LONG NOR SHORT *AND* (2) Reductions of process set-up times are achieved by continuous analysis of and changes made in: used technology (use of machines with low set-up times, fasteners, positioning aids, standardized tools,etc.) and organization (standardization of set-up procedure, using offline set-up, etc.) OR by application of special tools (dedicated to part families and/or product families)	for MOST possible product variants of ALMOST ALL product families BOM and/or PS are automatically generated	C or S or TS use software to choose the MAIN characteristics of the products and to control their compatibility at least for the MOST IMPORTANT product families)	We have a production planning and control system that assures a very good service level at the subsequent stage (...) and maintains working capital (...) at a very low level	We know how much of each product is available to promise both in our stocks and in production and, even in the latter case, we are very dependable regarding when the product will be available in the warehouse
4	(1) ..... *AND* (2) This procedure is periodically done on ALL part families	(1, 2a) Guidelines for design/production engineers and purchasing staff exist and are applied very RIGOROUSLY, (2b) SW support exists	(1) ..... *AND* (2) ..... *AND* (3) We make production sequences that differentiate products as late as possible	(1) ..... *AND* (2) Part families are formed through an AUTOMATIC (SW) classification system	(1) THE WHOLE product assortment is ... *idem* ... (2) .../*idem* ... and these design procedures are DEEPLY ABSORBED by the whole organization (3) Product families are CLEARLY DISTINGUISHED and do not overlap each other	(1) ..... *AND* (2) Our modules may have a longer life than single product families (product platforms exist)	(1) ..... *AND* (2) ..... *AND* (3) ..... *AND* (4) A system is in place to continuously improve the speed and efficiency of the autonomous units in processing parts/product families	(1) Set-up times are VERY SHORT *AND* (2) Reductions of process set-up times are achieved by .../*idem* ... AND by application of special tools .../*idem* ...	for ALMOST ALL possible product variants of ALL product families BOM and/or PS are automatically generated	C and/or S use a software to choose ALL of the characteristics of the products and to control their compatibility (for ALL or ALMOST ALL of the product families)	We have a production planning and control system that assures an optimal service level at the subsequent stage (...) and maintains working capital (...) at an optimal level	We know exactly how much and when a specific product variant to be promised to a customer will be available in the warehouse and we are also able to modify the configuration of products already launched in production in order to be able to promise customized products at the earliest delivery date in a reliable way and without incurring additional production costs or decreasing the level of service to our customer

Maturity level of the company in the given grid area

Company is currently in between the maturity levels in a given grid area

Company is still in transition from one maturity level to another in the given grid area

SKIPPED *Grid area skipped because workshop participants considered this area irrelevant to their company*

Grid area where advancement has been recorded

Advanced maturity level

Maturity level of the company in the first assessment

Company is now in transition from one maturity level to another in the given grid area

II. Research results - *Phase 2: Development and testing of the MC maturity grid - LONG-TERM OBSERVATIONAL EVALUATION OF MC MATURITY GRID -*

Metalmeccanica SPA

- Assembly lines
- product family

Grid area =>	1	2	3	4	5	6	7	8	9	10	11	12
Maturity level II V	Standardization of parts: Periodic rationalization to eliminate parts no longer needed	Standardization of parts: Day-by-day limitation of new parts introduction	Standardization of production sequences	Grouping of parts into part families through a similarity-based classification system	Product space organized in clearly distinguished product families	Product modularization	Organizing machines/assembly stations on the shop floor in order to maximize the speed and efficiency of processing part/product families	Low and continuously reduced set-up times **SKIPPED**	Technical configurator	Sales configurator	Keeping stocks at optimal levels	Sophisticated and dependable supports for determining available to promise
1	Never done	NO attention is paid to parts proliferation by: (1) design/production engineers and purchasing staff and (2) the organization	No attention is paid to production sequence proliferation by the organization and by the individual design and production engineers	Parts are not grouped in families using similarity-based classification criteria (shape, size and materials, and therefore production processes)	Products are not clustered in product families	No modularization at all	Machines are clustered on the shop floor based on their functional similarity	We do not have a clear view of set-up times because we have never considered them	BOMs and PSs (if present) are manually defined possibly by modifying similar BOMs/PSs *(BOM - bill of materials PS - production sequence)*	Customers, salesmen and the technical-sales employees (CSTS) do not have any structured support to choose the specific characteristics of the product and to control their compatibility	We do not have a production planning and control system that assures an acceptable service level at the subsequent stage *(production of parts, assembly of final products or delivering product to the customer)* and maintains working capital *(finished products, modules, components, parts and raw materials)* at an acceptable level	It is difficult for us to say whether or not the products that are available in the finished products stocks or are in production are available to promise
2	We standardized the parts and we eliminated parts no longer needed *BUT* this was an isolated initiative	Attention is paid to parts proliferation by: (1) design/production engineers and purchasing staff (2a) NO parts standardization guidelines (2b) NO SW supports for part standardization	(1) It is easy for design/production engineers to reuse the same sequences (because the production sequence database is well organized and because production sequences are grouped in classes)	(1) Parts ARE grouped in families using similarity-based classification criteria (shape, size and materials, and therefore production processes), (2) The criteria used are NOT FORMALIZED and coincide with the production and design engineers' experience	(1) A PORTION of the product assortment is composed of products clustered in product families according to similarities in product functions and product-related production processes (2) But the way the clustering is obtained is NOT GUIDED by design procedures	(1) In SOME of our product families, all of the products have been thought about such that each product function is performed by a specific chunk (module) and is not performed through interaction with more chunks	(1) Machines and assembly stations are able to process different parts/products (within a family) with similar efficiency *AND* (2) Machines and assembly stations are clustered based on the part/product families to which they are dedicated	(1) Set-up times are VERY LONG *AND* (2) No systematic reductions of set-up times are being applied	for A LOT of possible product variants of SOME product families BOM and/or PS are automatically generated	CSTS have a structured support (without SW) to choose ... and control ...	We have a production planning and control system that assures an acceptable service level at the subsequent stage (...) and maintains working capital (...) at an acceptable level	We know how much of each product is available to promise both in our stocks and in production but in the latter case, we are not really dependable regarding when they will be available in the warehouse. if the product is not yet launched into production, we apply some fixed lead times that are common for several products for the promise
3	(1) There is a systematic procedure to eliminate parts no longer needed *AND* (2) This procedure is periodically done on SOME part families	(1, 2a) Part standardization guidelines for design/production engineers and purchasing staff exist and are SOMEHOW applied, (2b) NO SW support	(1) ..... *AND* (2) There are rules and SW support to limit the introduction of new production sequences	(1) ..... *AND* (2) Part families are formed through a FORMALIZED and structured MANUAL classification system	(1) A CONSIDERABLE PORTION of the product assortment is ... *idem* ... (2) The way the clustering is obtained is GUIDED by design procedures (3) The distinction between product families is good, but can still be improved considerably	(1) We designed ALL of our product families in a modular way: We have families of modules (each function is performed by only one module) with standardized interfaces	(1) ..... *AND* (2) ..... *AND* (3) The positioning and organization of the machines/assembly stations minimizes the time the parts/products take to pass through them	(1) Set-up times are NEITHER LONG NOR SHORT *AND* (2) Reductions of process set-up times are achieved by continuous analysis of and changes made in: used technology (use of machines with low set-up times, fasteners, positioning aids, standardized tools,etc.) and organization (standardization of set-up procedure, using offline set-up, etc.) OR by application of special tools (dedicated to part families and/or product families)	for MOST possible product variants of ALMOST ALL product families BOM and/or PS are automatically generated	C or S or TS use software to choose the MAIN characteristics of the products and to control their compatibility (at least for the MOST IMPORTANT product families)	We have a production planning and control system that assures a very good service level at the subsequent stage (...) and maintains working capital (...) at a very low level	We know how much of each product is available to promise both in our stocks and in production and, even in the latter case, we are very dependable regarding when the product will be available in the warehouse
4	(1) ..... *AND* (2) This procedure is periodically done on ALL part families	(1, 2a) Guidelines for design/production engineers and purchasing staff exist and are applied very RIGOROUSLY, (2b) SW support exists	(1) ..... *AND* (2) ..... *AND* (3) We make production sequences that differentiate products as late as possible	(1) ..... *AND* (2) Part families are formed through an AUTOMATIC (SW) classification system	(1) THE WHOLE product assortment is ... *idem* ... (2) ...*idem* ... and these design procedures are DEEPLY ABSORBED by the whole organization (3) Product families are CLEARLY DISTINGUISHED and do not overlap each other	(1) ..... *AND* (2) Our modules may have a longer life than single product families (product platforms exist)	(1) ..... *AND* (2) ..... *AND* (3) ..... *AND* (4) A system is in place to continuously improve the speed and efficiency of the autonomous units in processing parts/product families	(1) Set-up times are VERY SHORT *AND* (2) Reductions of process set-up times are achieved by ...*idem* ... AND by application of special tools ...*idem* ...	for ALMOST ALL possible product variants of ALL product families BOM and/or PS are automatically generated	C and/or S use a software to choose ALL of the characteristics of the products and to control their compatibility for ALL or ALMOST ALL of the product families)	We have a production planning and control system that assures an optimal service level at the subsequent stage (...) and maintains working capital (...) at an optimal level	We know exactly how much and when a specific product variant to be promised to a customer will be available in the warehouse and we are also able to modify the configuration of products already launched in production in order to be able to promise customized products at the earliest delivery date in a reliable way and without incurring additional production costs or decreasing the level of service to our customer

Maturity level of the company in the given grid area

Company is currently in between the maturity levels in a given grid area

Company is still in transition from one maturity level to another in the given grid area

SKIPPED *Grid area skipped because workshop participants considered this area irrelevant to their company*

Grid area where advancement has been recorded

Advanced maturity level

Maturity level of the company in the first assessment

Company is now in transition from one maturity level to another in the given grid area

II. Research results - *Phase 2: Development and testing of the MC maturity grid - LONG-TERM OBSERVATIONAL EVALUATION OF MC MATURITY GRID -*

Soft Automation SPA

Grid area =>	1	2	3	4	5	6	7	8	9	10	11	12
Maturity level I V	Standardization of parts: Periodic rationalization to eliminate parts no longer needed	Standardization of parts: Day-by-day limitation of new parts introduction	Standardization of production sequences	Grouping of parts into part families through a similarity-based classification system	Product space organized in clearly distinguished product families	Product modularization	Organizing machines/assembly stations on the shop floor in order to increase speed and efficiency of processing part/product families	Low and continuously reduced set-up times	Technical configurator	Sales configurator	Keeping stocks at optimal levels	Sophisticated and dependable supports for determining available to promise
				SKIPPED			SKIPPED	SKIPPED			SKIPPED	SKIPPED
1	Never done	NO attention is paid to parts proliferation by: (1) design/production engineers and purchasing staff and (2) the organization	No attention is paid to production sequence proliferation by the organization and by the individual design and production engineers	Parts are not grouped in families using similarity-based classification criteria (shape, size and materials, and therefore production processes)	Products are not clustered in product families	No modularization at all	Machines are clustered on the shop floor based on their functional similarity	We do not have a clear view of set-up times because we have never considered them	BOMs and PSs (if present) are manually defined possibly by modifying similar BOMs/PSs *(BOM - bill of materials PS - production sequence)*	Customers, salesmen and the technical-sales employees (CSTS) do not have any structured support to choose the specific characteristics of the product and to control their compatibility	We do not have a production planning and control system that assures an acceptable service level at the subsequent stage *(production of parts, assembly of final products or delivering product to the customer)* and maintains working capital *(finished products, modules, components, parts and raw materials)* at an acceptable level	It is difficult for us to say whether or not the products that are available in the finished products stocks or are in production are available to promise
2	We standardized the parts and we eliminated parts no longer needed *BUT* this was an isolated initiative	Attention is paid to parts proliferation by: (1) design/production engineers and purchasing staff (2a) NO parts standardization guidelines (2b) NO SW supports for part standardization	(1) It is easy for design/production engineers to reuse the same sequences (because the production sequence database is well organized and because production sequences are grouped in classes)	(1) Parts ARE grouped in families using similarity-based classification criteria (shape, size and materials, and therefore production processes), (2) The criteria used are NOT FORMALIZED and coincide with the production and design engineers' experience	(1) A PORTION of the product assortment is composed of products clustered in product families according to similarities in product functions and product-related production processes (2) But the way the clustering is obtained is NOT GUIDED by design procedures	(1) In SOME of our product families, all of the products have been thought about such that each product function is performed by a specific chunk (module) and is not performed through interaction with more chunks	(1) Machines and assembly stations are able to process different parts/products (within a family) with similar efficiency *AND* (2) Machines and assembly stations are clustered based on the part/product families to which they are dedicated	(1) Set-up times are VERY LONG *AND* (2) No systematic reductions of set-up times are being applied	for A LOT of possible product variants of SOME product families BOM and/or PS are automatically generated	CSTS have a structured support (without SW) to choose ... and control ...	We have a production planning and control system that assures an acceptable service level at the subsequent stage (...) and maintains working capital (...) at an acceptable level	We know how much of each product is available to promise both in our stocks and in production but in the latter case, we are not really dependable regarding when they will be available in the warehouse. If the product is not yet launched into production, we apply some fixed lead times that are common for several products for the promise
3	(1) There is a systematic procedure to eliminate parts no longer needed *AND* (2) This procedure is periodically done on SOME part families	(1, 2a) Part standardization guidelines for design/production engineers and purchasing staff exist and are SOMEHOW applied, (2b) NO SW support	(1) ..... *AND* (2) There are rules and SW support to limit the introduction of new production sequences	(1) ..... *AND* (2) Part families are formed through a FORMALIZED and structured MANUAL classification system	(1) A CONSIDERABLE PORTION of the product assortment is ... *idem* ... (2) The way the clustering is obtained is GUIDED by design procedures (3) The distinction between product families is good, but can still be improved considerably	(1) We designed ALL of our product families in a modular way: We have families of modules (each function is performed by only one module) with standardized interfaces	(1) ..... *AND* (2) ..... *AND* (3) The positioning and organization of the machines/assembly stations minimizes the time the parts/products take to pass through them	(1) Set-up times are NEITHER LONG NOR SHORT *AND* (2) Reductions of process set-up times are achieved by continuous analysis of and changes made in: used technology (use of machines with low set-up times, fasteners, positioning aids, standardized tools,etc.) and organization (standardization of set-up procedure, using offline set-up, etc.) OR by application of special tools (dedicated to part families and/or product families)	for MOST possible product variants of ALMOST ALL product families BOM and/or PS are automatically generated	C or S or TS use software to choose the MAIN characteristics of the products and to control their compatibility (at least for the MOST IMPORTANT product families)	We have a production planning and control system that assures a very good service level at the subsequent stage (...) and maintains working capital (...) at a very low level	We know how much of each product is available to promise both in our stocks and in production and, even in the latter case, we are very dependable regarding when the product will be available in the warehouse
4	(1) ..... *AND* (2) This procedure is periodically done on ALL part families	(1, 2a) Guidelines for design/production engineers and purchasing staff exist and are applied very RIGOROUSLY, (2b) SW support exists	(1) ..... *AND* (2) ..... *AND* (3) We make production sequences that differentiate products as late as possible	(1) ..... *AND* (2) Part families are formed through an AUTOMATIC (SW) classification system	(1) THE WHOLE product assortment is ... *idem* ... (2) ...*idem* ... and these design procedures are DEEPLY ABSORBED by the whole organization (3) Product families are CLEARLY DISTINGUISHED and do not overlap each other	(1) ..... *AND* (2) Our modules may have a longer life than single product families (product platforms exist)	(1) ..... *AND* (2) ..... *AND* (3) ..... *AND* (4) A system is in place to continuously improve the speed and efficiency of the autonomous units in processing parts/product families	(1) Set-up times are VERY SHORT *AND* (2) Reductions of process set-up times are achieved by ...*idem* ... AND by application of special tools ...*idem* ...	for ALMOST ALL possible product variants of ALL product families BOM and/or PS are automatically generated	C and/or S use a software to choose ALL of the characteristics of the products and to control their compatibility (for ALL or ALMOST ALL of the product families)	We have a production planning and control system that assures an optimal service level at the subsequent stage (...) and maintains working capital (...) at an optimal level	We know exactly how much and when a specific product variant to be promised to a customer will be available in the warehouse and we are also able to modify the configuration of products already launched in production in order to be able to promise customized products at the earliest delivery date in a reliable way and without incurring additional production costs or decreasing the level of service to our customer

Maturity level of the company in the given grid area

Company is currently in between the maturity levels in a given grid area

Company is still in transition from one maturity level to another in the given grid area

SKIPPED *Grid area skipped because workshop participants considered this area irrelevant to their company*

Grid area where advancement has been recorded

Advanced maturity level

Maturity level of the company in the first assessment

Company is now in transition from one maturity level to another in the given grid area

II. Research results - *Phase 2: Development and testing of the MC maturity grid*
- RESULTS OF LONG-TERM OBSERVATIONAL EVALUATION -

Question … zed answers - Metalmeccanica SPA … Soft Automation SPA

Metalmeccanica

Real. order	Idea	Priority	Impact	Effort	Interdependence	Realized
1	Planning supplier by using realistic delivery times and not the required supply lead-times (grid area 11)	VH	H	ML	No	IN PROCESS
2	A combined idea (ideas 1 and 2): • Analyze the historical use of parts (idea 1) • Create a system that will offer a main option and alternative options for some parts in the design process (idea 2) (grid areas 1 and 2)	M	H	H	6 Product modularization	YES
3	Define a commercial dialogue to guide the choices for sizing of the hydraulic power units (grid area 10)	M	H	M	Some, with Standardization (grid areas 1 and 2)	IN PROCESS
4	Study modularization for the hydraulic power units family of products (grid area 6)	ML	H	H	10 Sales configurator (commercial dialogue) and 1 and 2 Standardization (partially)	IN PROCESS
5	Define different throughput times for different product types (grid area 3)	L	ML	L	No	YES

Legend: L – Low; ML – Medium-Low; M – Medium; H – High; VH – Very High; N/S – Not specified

Soft Automation S…

Real. order	Idea	Priority	Impact	Effort	Interdependence	Realized
-	Formalize the product families; classify and study the product trends; and analyze the market opportunities for the current products (grid area 5)	N/S	L – in the short term H – in the long term	L	Positive effect on grid area 10 Sales configurator	YES
-	Determine the activities that compose products/services and list them (grid area 10)	N/S	M – in the short term	L – for energy plants H – for the whole product assortment	Positive interactions with 5 Product space organized in clearly distinguished product families	IN PROCESS
-	Modularize the high-level software and manufacturing execution systems (MES) (grid area 6)	N/S	H – when implemented	M	Positive interactions with 10 Sales configurator	IN PROCESS

Legend: L – Low; M – Medium; H – High; VH – Very High; N/S – Not specified

Interreg
V-A Italia-Austria 2014-2020
Mass Customization 4.0
European Regional Development Fund

EUROPEAN UNION

UNIVERSITÀ DEGLI STUDI DI PADOVA

dtg

Prossimi passi

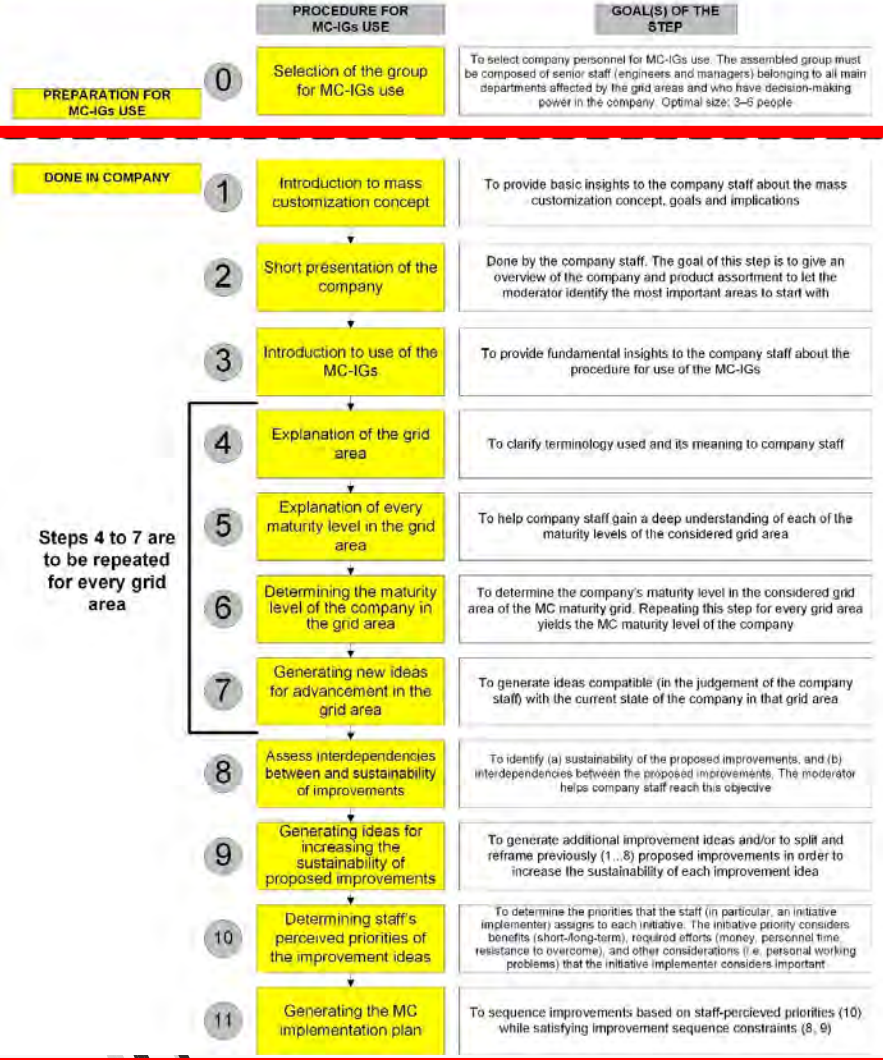
Prossimi passi

- Oggi vi inviamo la tabella stampata in formato A3
- Giovedì prossimo (29 aprile) saremo a disposizione per discutere con voi o con vostri colleghi che non hanno potuto partecipare oggi la
  - Composizione del gruppo di analisi
  - Eventuali dubbi sulle modalità operative
  - Qualsiasi altra domanda vi venga in mente prima di partire con l'analisi
- L'analisi dovrebbe essere fatta con un incontro di mezza giornata. Un secondo incontro di approfondimento è previsto (ed abbiamo già della strumentazione sviluppata ad hoc) per chi lo chiedesse.
  - Per ragioni metodologiche non ve lo presentiamo prima perché potrebbe influenzare i risultati. Siamo disposti a presentarvelo dopo, anzi faremo un incontro ad hoc tutti assieme per scambiarci assieme le esperienze.

II. Research results – *Phase 3: Proposal for new MC implementation guidelines - NEW MC-IGs for SMEs-*

Participants:
1) Moderator
2) Idea generating group (3–6 of company's senior staff)

Required tools:
1) Paper-based MC maturity grid
2) Template for idea for advancements generation
3) Template for MC implementation plan generation



Procedure for use of MC-IGs

Interreg
V-A Italia-Austria 2014-2020
Mass Customization 4.0
European Regional Development Fund

EUROPEAN UNION

UNIVERSITÀ DEGLI STUDI DI PADOVA

dtg

Grazie per l'attenzione