HELPING SW AND TECH-BASED START-UPS SUCCEED: PROFILES AND TALENT SCALING-UP WITH INDUSTRY-FIT COMPETENCY MODELLING
(PART II of II)

REFLECTION PAPER

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Introduction

This study or reflection paper is Part II of a couple of documents aimed to comment on some ideas and trends regarding the **analysis, creation and nurturing of culture, capabilities and people competency profiles** that can help Software development and tech-based startups and mid-advanced stage companies companies, **attract, retain and engage the best professionals**, scale-up, and succeed in their respective markets.

Part I (a prior, separate document) discussed the following:

- People and organizational capabilities as key to a SW / tech-based startup success.
- Both technical and behavioral competencies matter.
- Having the right profiles: where shall we start?.
- Competency models: what are they, how can they help us.

In this Part II (this document), we go on suggesting **how an operational model can be set up**, and **what competency profiles and levels could be chosen for talent management** and, eventually, business scale-up in a SW and tech-based startup or mid-stage company:

- Towards a Competency model for SW / tech-based startups
  - (1) Model and IT considerations.
  - (2) Behavioral considerations and proposed Competencies.
- Competency profiles, fit with overall organization and how to use them.
- Competency Model implementation practices and steps; Conclusions.

The contents related to these Part II points can be found below.

Towards a Competency model for SW and tech-based startups (1) – model and IT considerations

A version of the Competency Clearinghouse model (discussed in Part I of these 2 Part small series), specific for IT/tech companies in general, could be as follows:

Fig. II-1: The Competency Clearinghouse Model for IT/tech Companies [1]
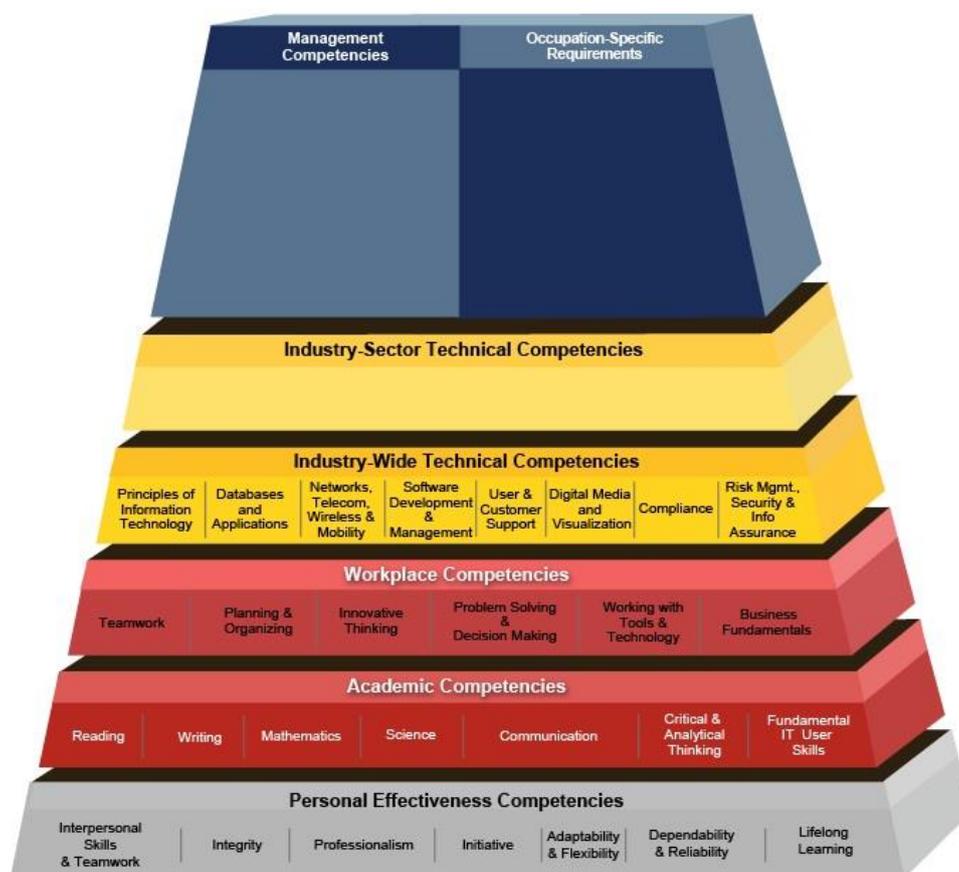
[1] "Information Technology Competency Model", Competency Model Clearinghouse (careerstop.org), 2012.

A different pyramid could be used for other specific tech-based startups: biotech, fintech, legaltech, e-commerce, platform businesses, etc. On its side, this specific model centered on IT companies has been the **consequence of real-life industry reflection** and supervised by six different US **top industry and academia associations** with input from 20+ other US / global organizations (W3C, ITIL, regulators, and directly or indirectly most of the major world IT players). It is what many IT institutions consider that **drives excellent performance**. However, in order to apply this in 2020s' SW and tech-based startup and mid-stage companies, the following **upgrades should probably be deployed**:

- Explicitly correlate the competencies with the business **digital practices** mentioned in Part I and, equally or more importantly, with **the specific company vision and business plan strategic lines**; create **valid evaluation scales**.
- **Restructure** some of the competency tiers - for modern business **usability**, some of these tiers and their competencies could be merged or simplified.
- **Update** competency descriptors, eliminate obsolete terms and tech, add others.
- **Discriminate** and keep only the competencies which are really **relevant**.

For example, "Cloud" or "Cybersecurity" could be given standalone importance, "Databases and Applications" could be split in two, parts of "Principles of Information Technology" and "Fundamental IT user skills" could be discarded (same as "Reading" and "Writing"), or partly merged with "Business Fundamentals"; "Integrity" and "Professionalism" could be merged, etc.

Regarding the points above, the corresponding trends could be used as input:

Fig. II-2: Gartner Top 10 Strategic Technology Trends for 2020 [2]

TREND	OVERALL CONTENT
1. Hyper-automation	• Widespread use of AI, ML, RPA, intelligent business management software (iBPMS), Digital Twins of the organization.
2. Multiexperience	• "People-literate technology" - multisensory and multi-touchpoint interfaces. AR, VR, multichannel human-machine interaction.
3. Democratization	• Easy access of the average citizen to technical or business expertise without extensive (and costly) training.
4. Human Augmentation	• Technology for direct cognitive / physical experiences – sensory (hearing, perception), bio function (exoskeletons, prosthetics), brain (implants for seizures) and genetic (somatic cell therapy).
5. Transparency and Traceability	• Trust crisis - liability of storing and gathering data, explainable AI, AI governance, privacy legislation, ethics, accountability, competence.
6. The Empowered Edge	• Computing placed closer to info sources and users with local data traffic and lower latency; IoT, smart spaces and local topologies.
7. The Distributed Cloud	• Cloud services outside the cloud provider's physical data centers, keeping accountability and solving latency / regulatory issues.
8. Autonomous Things	• Drones, robots, ships, vehicles, appliances – across air, sea and land, stand-alone or in collaborative swarms.

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[2] "Gartner Top 10 Strategic Technology Trends for 2020", Panetta, C., Gartner Group, 2019 – as compiled and summarized by Zereon Associates.

(cont.)

9. Practical Blockchain	• Share of crypto-signed records, assets' trace to origin, safe separate parties' interactions. Small-scope yet - to be really scalable by 2023.
10. AI and Cybersecurity	• Protecting AI-powered systems, leveraging AI to enhance cybersecurity, anticipating nefarious use of AI by attackers.

All that could imply considering content domains (list by no means exhaustive) such as [3]:

Fig. II-3: Some technology content domains / tech stacks of relevance

CONTENT DOMAIN	CONTENT
Artificial Intelligence	• Machine Learning, Deep Learning / Neural Networks, NLP, Image recognition, TensorFlow, Matlab, Watson, AWS Rekognition, etc.
Databases, Analytics and Visualization	• SQL DBs (Oracle, Citrix, SQL Server, etc.), NoSQL DBs (MongoDB, Hadoop, etc.), Power BI, SAP Business Objects, Tableau
Cloud services/cloud development	• Platforms, AWS, Azure, Google Cloud, Alibaba, Containers (Kubernetes / Docker), Cloud storage (AWS S3 and others), Serverless (AWS Lambda, MSFT / Google functions), APIs, SDKs
DLT and Blockchain	• Bitcoin/crypto, tokens, wallets, smart contracts, Ether/Ethereum, Metamask, Rinkeby, Remix, Solidity, Hyperledger/Fabric, R3/Corda
Business Applications	• ERP, MRP, CRM, HCM, Office applications, SAP, Oracle, Microsoft Dynamics, Salesforce, Infor, Quickbooks, Workday
IoT	• Atmega, Arduino, Tessel, Raspberry Pi, RESTful interfaces, MQTT, wearables & devices, sensors, SCADAs
Cybersecurity	• Classic cybersecurity, cryptography & hashes, backdoors, modern viruses and worms, rootkits, password cracks/keygens, ransomware, ID stealing, stack overflows, RSA, SHA, SSL, IoT attacks, DDOS, Shodan, Applied AI
Programming languages	• JS/Node.js/NPM/Lodash, Python, R, Java, Scala, C, C++, C#, Ruby, PHP, HTML, Objective-C
SW to develop SW, frameworks, and OS	• Git/Github, Travis CI, Mocha/Chai, Bootstrap, Node.js, AngularJS, Ember.js, Windows, MacOS, Linux, Unix, IoS, Android
HW	• Networks, hosts, storage/application/web servers, routers, switches, storage, terminals, end user devices, chipsets & motherboards, CPUs, GPUs, memories
Social Media and Virtual Work	• SEO optimization, Bots, LinkedIn, Snapchat, Instagram, Twitter, Pinterest, Facebook, WeChat, Whatsapp, Telegram, Youtube, TikTok, Zoom, Teams, Webex, Bluejeans, Slack
Methodologies	• PMO/PMP, Agile, Scrum, SAFE, Design Thinking, DevOps, UX/UI, Lean Canvas, Lean Startup, Jira, Burn down diagrams, Kanban, Express Programming
Other technologies and disciplines	• Robotics, 5G and telecommunications, AR / VR, 3D printing, quantum computing, digital marketing and media, gaming

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[3] "Digital transformation: From AI and IoT to cloud, blockchain and cybersecurity - Summary of branded technologies and tools reviewed / discussed during the course", Ceron. M. summarizing homonymous MIT-CSail course (Williams, J. and Sanchez, A.), Zereon Associates, 2020 -, and self-elaboration.

Towards a Competency model for SW and tech-based startups (2) – behavioral considerations and proposed Competencies

On the more Behavioral competencies' side, several of the existing ones could be used straight from the Competency Clearinghouse Model; however, Management-specific ones could be slightly different.

Recent research including a survey of 1,042 executives and professional contributions from Google, Credit Suisse, Zalando, eMoov and others, found that **leadership effectiveness** in disruptive environments shared **many of the same characteristics as leadership in more stable environments - with a few notable exceptions**. Apparently, four "HAVE" competencies distinguish agile leaders:

Fig. II-4: Key Leadership / Management Competencies in disruptive environments [4]

COMPETENCY	DEFINITION	OBSERVABLE DESCRIPTORS
Humbleness (H)	Ability to accept constructive feedback and acknowledge that others know more than you. *Primarily cognitive.*	• Seeks significant input both from inside and from outside his/her area; asks for others' opinion. • Actively seeks to understand and gain deep internal / external customer insights. • Strongly backs continuing development of his/her team. • Invests time and resources to keep other employees up to date with relevant events, decisions, and ideas. • Openly practices respect for the ideas and knowledge of others at least as equal to one's own. • Welcomes unsolicited, polite constructive feedback.
Adaptability (A)	Acceptance that change is constant and that changing your mind based on new information is a strength rather than a weakness. *Short term oriented.*	• Publicly makes evidence-based decisions. • Reacts to opportunities and threats as they appear. • Changes mind based on new information and acts accordingly. • Changes mind publicly and in front of the team confidently and not fearing a weakness image. • Openly explains expected consequences of new perspective. • Successfully communicates revised opinions to relevant stakeholders - peers, teams, and customers.
Vision (V)	A clear sense of long-term direction, even in the face of short-term uncertainty. *Long term oriented.*	• Communicates a well-defined idea of where the department needs to go (the vision), even if not knowing exactly how to get there. • Coins robust, crisp, deep-implication, compelling catchphrases to define that vision / idea. • Uses the vision to motivate and inspire the teams. • Shows how the vision allows rapid adaptation to current, contextual business situations. • Expresses the major expected consequences of achieving the vision. • Articulates clear long term aims and objectives.

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[4] "Redefining Leadership for a Digital Age", Neubauer, R., Tarling, A. and Wade, M., IMD – Global Center for Business Transformation – Cisco - metaBeratung, 2019 – and self-elaboration and input by Zereon Associates.

(cont.)

Engagement (E)	A willingness to listen, interact, and communicate with internal and externals stakeholders combined with a strong sense of interest and curiosity in emerging trends. *Primarily emotional.*	• Stays updated on customers, partners, suppliers, competitors, trends, and their broader ecosystems. • Expresses desire to explore, discover, learn, and discuss together with others. • Ensures constant information interchange within team. • Encourages inter-teams challenge of views and opinions. • Uses digital tools and social media to channel topics of interest from / to all employees. • Regularly checks entire workforce work experience and acts accordingly.

Because of the possible improvements shown above, we hereby present the competency list of what could be an **upgraded, robust, and operational Competency Model useful for SW and tech-based startups and mid-stage companies to succeed in the 2020s**:

Fig. II-5: Competency list of an upgraded possible Model for SW and tech-based startups

COMPETENCY TYPE	APPLICA-BILITY	COMPETENCIES
TECHNICAL	SHARED / FOUNDATIONAL (with different levels of expertise required) * Note: role-specific technical competencies / tech stacks can be identified and evaluated in addition. For example, Perl, Python, Ruby, PHP, etc.	**1. Fundamental IT concepts** **2. IT Sourcing, Sales and Administration** **3. Databases, Storage, Analytics & Visualization** **4. Hardware, Devices & Networks** **5. Wireless & Mobile** **6. Cloud Services & Development** **7. Software Development and Programming** **8. Artificial Intelligence** **9. Blockchain and DLT** **10. Business/Enterprise Applications** **11. User and Customer Support** **12. Digital Marketing, Media, and Virtual Work** **13. Risk Management & Cybersecurity** **14. Regulation, Compliance and Standards**
BEHAVIORAL	SHARED / FOUNDATIONAL	**1. Interpersonal Skills and Teamwork** **2. Lifelong Learning and Innovation** **3. Business Fundamentals** **4. Integrity and Professionalism**

(cont.)

	EMPLOYEE-SPECIFIC	5E. Critical Thinking and Problem Solving 6E. Initiative
BEHAVIORAL (cont.)	MANAGER-SPECIFIC	5M. Planning, Organizing and Project Management 6M. Adaptability and Flexibility 7M. Humbleness and Open Mind 8M. Vision

This list has been selected attending to 1) the specific, underlying observable descriptors of each competency, 2) intended usefulness and practicality for SW and tech-based startups, 3) frequent personal profiles often found in the industry and, ultimately, 4) potential contribution of these competencies towards achievement of business scale-up and success. A similar list could be generated for other businesses (fintech, biotech, etc.).

Competency profiles, fit with overall organization and how to use them

In any company, eventually there are two basic types of professional roles / occupations, and therefore two types of basic required profiles: **Managerial and Non-Managerial**. In this context, we will be using the very basic but realistic distinction of having or not having other professionals formally and permanently assigned or reporting into the role – ie whether there are or there are not stable supervisory responsibilities over other people, with 1) capability to set up and evaluate tasks to them, and 2) main decision making power over their available resources, compensation, promotions, free time, etc.

This accommodates the perfectly possible situation in which one person can be a Lead in one given project, with direct reports, and simultaneously a Project resource or individual contributor in another project - in any event, a thorough exercise of **understanding the specific current and expected future company roles** should be made, so that the competencies and required or expected levels in each can be allocated for each one of those roles, so that individual people can be assessed against them.

Example 1: DATA ARCHITECT (managerial role, family "Data Management"):

COMPETENCY (Scale: 1 acceptable – 2 good – 3 very good – 4 excellent - 5 master level / a true example)	REQUIRED PROFILE	ACTUAL PERSON
1. Fundamental IT concepts	n/a	n/a
2. IT Sourcing, Sales and Administration	4	-3-
3. Databases, Storage, Analytics & Visualization	5	5
4. Hardware, Devices & Networks	3	3
5. Wireless & Mobile	2	2
6. Cloud Services & Development	4	4
7. Software Development and Programming	3	-4-
8. Artificial Intelligence	3	3
9. Blockchain / DLT	3	3
10. Business / Enterprise Applications	3	3
11. User and Customer Support	2	2
12. Digital Marketing, Media, and Virtual Work	2	-1-
13. Risk Management & Cybersecurity	4	4
14. Regulation, Compliance and Standards	4	-3-
1. Interpersonal Skills and Teamwork	4	-3-
2. Lifelong Learning and Innovation	4	4
3. Business Fundamentals	4	4
4. Integrity and Professionalism	5	5
5M. Planning, Organizing and Project Management	4	-5-
6M. Adaptability and Flexibility	4	4
7M. Humbleness and Open Mind	4	4
8M. Vision	4	-3-

--- Below required level ; --- Above required level

TECHNICAL COMPETENCIES - Data Architect
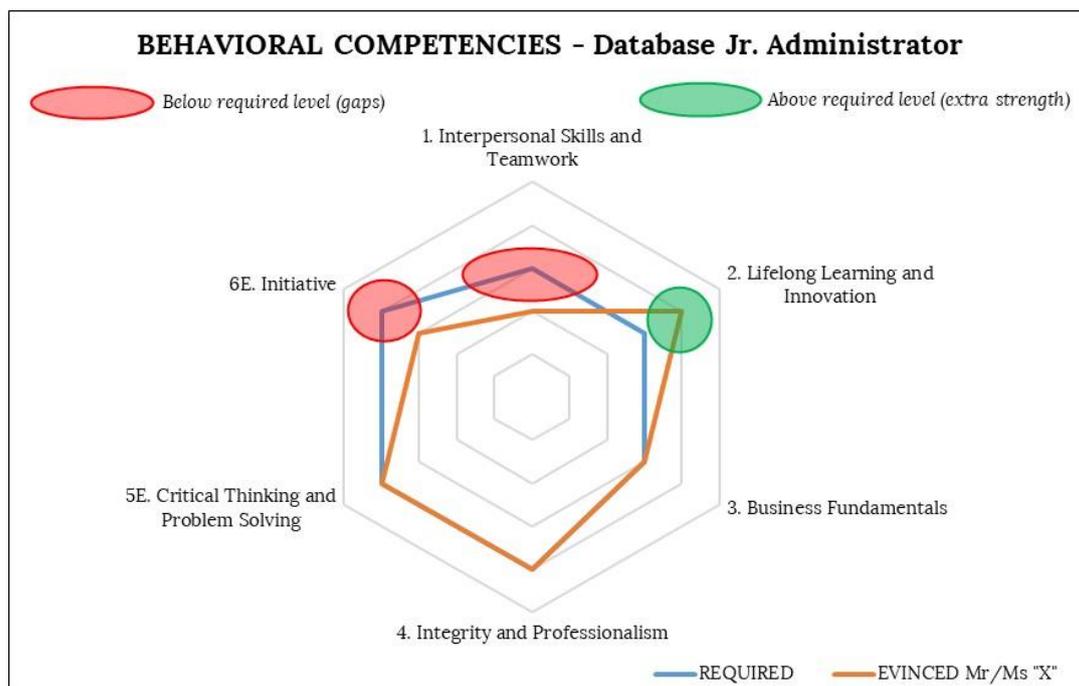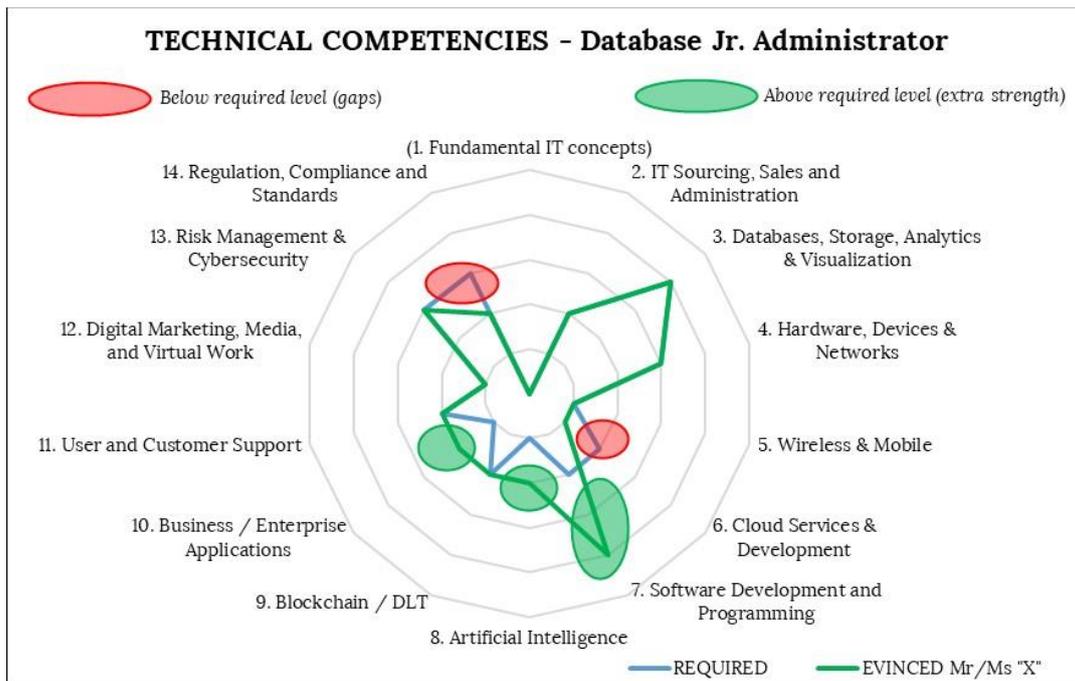
BEHAVIORAL COMPETENCIES - Data Architect
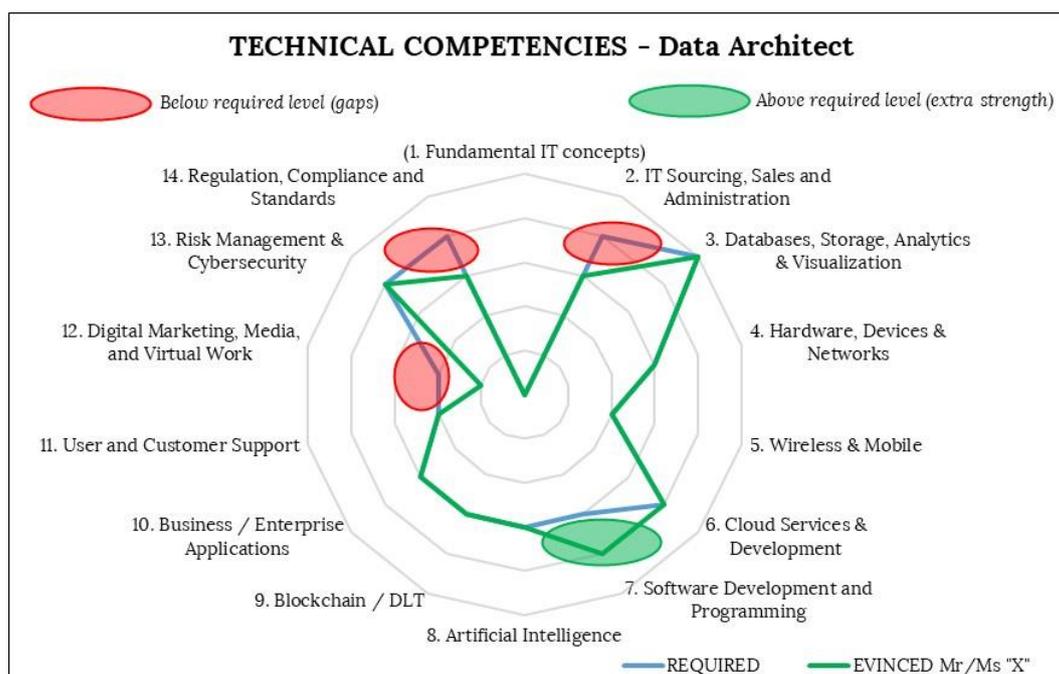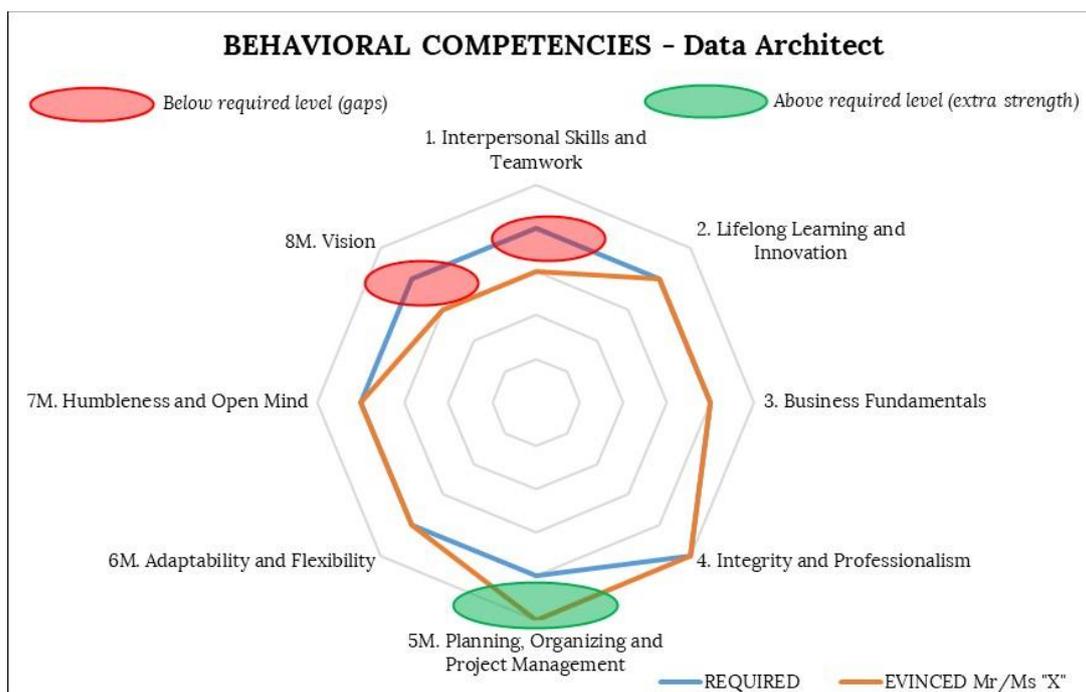
Example 2: DATABASE JR. ADMIN (non-managerial role; family "Data Management"):

COMPETENCY (Scale: 1 acceptable – 2 good – 3 very good – 4 excellent - 5 master level / a true example)	REQUIRED PROFILE	ACTUAL PERSON
1. Fundamental IT concepts	n/a	n/a
2. IT Sourcing, Sales and Administration	2	2
3. Databases, Storage, Analytics & Visualization	4	4
4. Hardware, Devices & Networks	3	3
5. Wireless & Mobile	1	1
6. Cloud Services & Development	2	-1-
7. Software Development and Programming	2	-4-
8. Artificial Intelligence	1	-2-
9. Blockchain / DLT	2	2
10. Business / Enterprise Applications	1	-2-
11. User and Customer Support	2	2
12. Digital Marketing, Media, and Virtual Work	1	1
13. Risk Management & Cybersecurity	3	3
14. Regulation, Compliance and Standards	3	-2-
1. Interpersonal Skills and Teamwork	3	-2-
2. Lifelong Learning and Innovation	3	-4-
3. Business Fundamentals	3	3
4. Integrity and Professionalism	4	4
5E. Critical Thinking and Problem Solving	4	4
6E. Initiative	4	-3-

--- Below required level ; --- Above required level

TECHNICAL COMPETENCIES - Database Jr. Administrator

BEHAVIORAL COMPETENCIES - Database Jr. Administrator

As can be noticed:

- The competency levels are normally more demanding for a managerial position than for a non-managerial one – but it depends on the specific role.
- Almost everybody in the company will have extra strengths and gaps vs. the required profiles.
- Every person will have their own unique positioning vs. what is needed; some strengths could be leveraged in other contexts and gaps ought to be addressed.

Once validated, analyzing the evaluations can offer **extremely interesting insights and quantitative conclusions regarding the strengths and weaknesses of the individual professionals as well as the different departments/employee groups, and corresponding technical / behavioral areas of interest**. This can indeed drive decision-making and investments in desired company capabilities' development: individual and team upskilling and learning, recruitment of external talent, career decisions, help with performance management, etc.

Other roles that can be studied (junior or senior), could be as follows (underlinexamples) [5]:

FAMILY	TYPE	ROLES
Data Management	-	DATA MODELER / DATA SCIENTIST / DATA ANALYST
SW Development	Backend - General	FULL-STACK DEVELOPER / FRAMEWORK/ GENERAL SW DEVELOPER
	Backend - Specific tech	RUBY ON RAILS/C++/PYTHON/MOBILE APP DEVELOPER / etc.
	Frontend	FRONT-END DESIGNER / FRONT-END DEVELOPER
Cloud Content, Digital Marketing & Analytics	Cloud Content	INFORMATION ARCHITECT / CONTENT STRATEGIST MANAGER
	Digital Marke-ting & Media	MARKETING TECHNOLOGIST / DIG. MARKETING/SOCIAL MEDIA MGR.
	User Experience	UX DESIGNER / INTERACTION DESIGNER / UI DESIGNER
	SEO & Cloud Analytics	SEO CONSULTANT / WEB ANALYTICS / GROWTH HACKER
IT selection and implementation	-	BUSINESS SYSTEMS ANALYST / SYSTEMS ENGINEER / PRODUCT MANAGER / SYSTEMS ADMINISTRATOR
Managerial Roles	-	DEVELOPER TEAM LEADER / DEV OPS MANAGER / AGILE PROJECT MANAGER / SCRUM MASTER
Other Roles	-	QA (QUALITY ASSURANCE) SPECIALIST / TECHNICAL ACCOUNT MANAGER / SECURITY SPECIALIST / etc.

Again, **every company should identify its own current and expected roles** and allocate competencies and expected levels to create well-balanced competency profiles for each – **as many profiles as needed to truly represent the different nature of the company's activities, but not too many** to make the model bureaucratic or hard to administer.

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[5] "41 Job Titles in Tech: which one will be yours?", Smith. K., https://skillcrush.com/blog/41-tech-job-titles/, 2019-20.

A **standard SW or tech-based startup company could have around 10-15 roles / competency profiles**, more depending on size of business, degree of specialization, areas of operation and complexity, hierarchy inside the organization, type of clients and products, etc. As the organization grows, this can become 30+ different roles or more.

Competency Model Implementation and steps

Some practices that may be applied for technical competencies implementation and deployment could be [6]:

- **Lead from the top but incorporate input from job holders**. Microsoft did not confine their analysis to senior leaders as they also interviewed and surveyed incumbents from the broader population. The European Space Agency (ESA) developed the model from interviews / focus groups with over 120 staff members.
- **Future scenario analysis.** Many leading organizations enrich their technical competencies this way. For example, Project Horizon (2006) interviewed 100s of executives and subject matter experts to develop scenarios such as China and Asia (and not the US) dominating the world economy, or where terrorism and security are the biggest issues. Interesting for a post Covid-19 world.
- **Feasibility study**. For the ESA, this involved:
  - Aligning the competencies with the various job posts and/or future needs.
  - Using prior materials valid for certain positions.
  - Verifying the suitability of the HR Management System (HRMS) software.
  - Validating the selected approach with a prototype.
  - Benchmarking with similar organizations such as CERN and the OECD.
- **Use of behavioral interview event interviews**. Organizations such as Microsoft had executives interviewed to discover detailed information on past job situations to understand the behavioral themes that led to success or failure.
- **Distinguish high-performing employees from average employees**. Best implementations rate the extent of the difference; Microsoft used several criteria to identify outstanding and average employees.
- **Truly deploy the Competency Model**. The Boeing Company took its competency models into multiple HR processes. Microsoft includes them within Mid-Year Career Discussions. Indiana Precision Technology (Honda subsidiary) even used it for a "pay-for-skills" program together with training, appraisal and promotion.

These practices can probably be applied also to behavioral competencies, and there are other practices that could be applied as well, depending on available resources, and intended scope. Considering that many SW and tech-based startups and mid-sized

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[6] "Elements of a Technical Competency Model and Its Integration into the Talent Management/HR Process", Carter, L., https://www.bestpracticeinstitute.org, 2020.

businesses do not have the necessary money, time or expertise for too ambitious rollouts, though, a more modest and less costly but effective approach could be appropriate.

What matters is to have a **clear plan for Competency implementation** with **defined, sensible project steps**, **create and test a pilot**, and counting on **expert advisors or practitioners** that can articulate the model towards the **company needs** and **guide the organization** to a successful, day-to-day adoption.

Conclusions

Attracting and hiring the **best people** in tight labor markets and, specially, in **advanced technology**, is **no easy task** and requires a solid, comprehensive **value proposition by the company**.

But perhaps that is not more than the beginning: **leading, retaining and engaging** a group of **smart professionals** with sometimes **strong personalities, possibly from different cultures**, and make them work together as **seamless teams** for **quality production, customer satisfaction and company results**, is as much a science as it is an art.

We hope that, with the Competency models' presentation and competency profiles management concepts shown in our papers, we have contributed towards giving **ideas for SW and tech-based startup and mid-sized companies talent management and, ultimately, business scale-up and success**, always with the recommendation to support the process with **experts in both these type of people growth initiatives AND very familiar with new technologies**.

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