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1 Introduction –

In Code 2.0, Lessig has shown how the regulation of the digital world is both a complexity of influences and a necessary tool in order to protect users, consumers and companies alike. In this paper we will analyse how Lessig's Four Modalities of Constraint can be applied to the decision-making process of practitioners when it comes to implementation and adoption of computing systems.

In the next section we will introduce three systems which GoCompare has adopted or implemented in particular: the adoption of Microsoft Teams as main collaborative platform across business, the implementation of the Snapshotter by an internal GoCompare development team, and the adoption of TFS as main version control and project management tool. We will than continue to introduce and discuss Lessig's Pathetic Dot Theory and look in detail at the Four Modalities of Constraint, in particular: Law, Architecture, Social Norms and Market [1]. In section four we will analyse how Lessig's theory can be in some cases applied to the decision making that leads to the implementation or adoption of one system over the other. In the last two sections we will try to analyse and in the case of the Snapshotter predict the effects that the adoption of these systems have had or might have on the staff involved in the promotion or development of the system, and the behaviours these systems have enabled amongst the end users.

2 The Three Systems Under Consideration

2.1 Microsoft Teams

Microsoft Teams was adopted by the GoCo Group in December 2019. Microsoft Teams is a collaboration platform in which multiple Microsoft tools have been unified. This service offers video/audio calls, a chat service, collaborative and private file storage. Teams also integrates all the other Microsoft applications from the Office365 package, such as Word, Excel and PowerPoint.

The Teams Administrator is the responsible for creating the teams and inviting the members to join using a shared URL. Within each team, the administrators can create private channels where members can communicate and share work.

Microsoft Teams is also integrated in the Outlook calendar, which allows the organiser to set the event as a conference or private Teams Meeting. The Teams Meetings can also be recorded, saved and shared.

2.2 Automated Snapshotter for the Car Journey

Currently under construction, the Snapshotter is an internal software implemented to allow the company to keep track of the changes in the insurance journeys after every new release. It is currently being implemented on the Car Journey with plans to be used on all the insurance products.

The Car Insurance journey is subject to changes whenever regulations of business needs change. Currently it is hard for departments like Customer Service or Compliance to check the state of the journey at a given date and time. This means that whenever there is a dispute regarding a question in the journey, the process for finding proof of the state of the journey is long and requires the work of developers and database administration.

The Snapshotter will be automatically deployed every day. It will pull the questions (complete of help text multiple choice answers) and store them in the database. In addition to that, the tool will take a snapshot of each page and highlight the sections that have been subject to changes. The user interface will allow other departments to consult the tool by providing the relevant date.

2.3 TFS – Team Foundation Server

TFS is a Microsoft tool which combines version control, application lifecycle management and issue tracking. TFS is integrated with the IDEs used within a company, which within GoCompare OneTech are Visual Studio and Visual Studio Code. In TFS squads can publish their work and receive feedback by a selected group of reviewers. The changes made are highlighted in the overview of the work and the reviewers can leave comments and highlight issues before approving the changes.

TFS can be integrated with Git and it allows users to create repositories which can be cloned and used in the relevant IDE. Users can create branches and every time the code is ready to be published a pull request can be created to merge the branch into the main branch.

TFS also allows the organisation of the work into tables and calendars, favouring the use of Agile Processes to divide and distribute the work. The user stories created can be linked to the pull requests which allow the reviewers to be aware of the requirements at all times.

The burndown of the work and team availability is provided in graphs which make the visualization quick and easy to follow especially during daily stand ups and other agile practices. Members can enter daily availability and days off facilitating the team leaders in the realistic distribution of the work.

3 Lessig's Modalities of Constraint

Mainly concerned with the study of regulative methodologies of the web, Lawrence Lessig's Pathetic Dot Theory describes the way individuals and groups (or businesses) are constrained by four main forces: law, social norms, market and architecture (Figure 1).

These forces are all interrelated and can be applied as an interpretative key to the use and development of computing technologies. We can therefore propose a first description of regulation of computing technologies as the complexity of interactions between the four modalities of constraint.

Nevertheless, Lessig recognises the existence of the rules of cyber-space as opposed to the real-space, the first being the digital world of the world wide web, and the latter being the physical world that we inhabit. The differences, similarities and mutual influence that these two entities have with one another are vital to understand Lessig's paternalistic approach to cyber-space regulation [1].

In the next section we will analyse each of these four modalities in more detail.

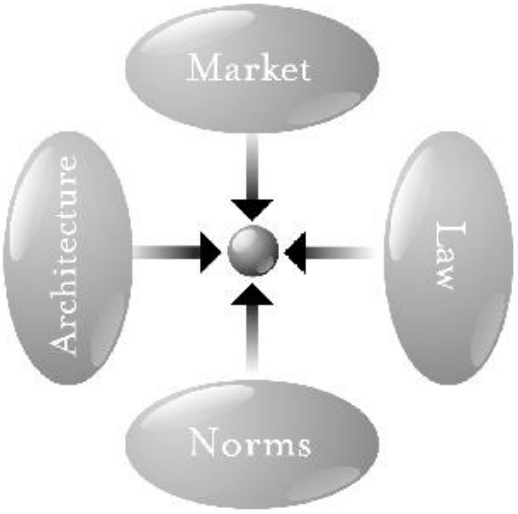

Figure 1 - Representation of the Pathetic Dot Theory - https://en.wikipedia.org/wiki/Pathetic_dot_theory#/media/File:Pathetic_dot_theory.png

3.1 Law

Law is the most visible direct actor in the regulation of technologies and computing solutions. When implementing new solutions, we need to consider the existing regulations which affect the product. Whilst this concept seems very basic in present times, it has been source of discussion for many years after the discovery of the internet.

Lessig highlights how the introduction of new technologies in the cyber-space has been characterised by an initial lack of regulations due to a lack of experience of the human law in terms of information technologies. This lack of regulations has in fact shaped the very nature of many products that we have used and continue to use.

With the development of new technologies comes the development of new related regulatory aspects, which are nowadays being used to fill the gap between real-space and cyber-space regulations and acceptable behaviours. These new regulatory aspects will in turn deeply affect the development and adoption of new solutions.

Nevertheless, Lessig identifies the existing regulations of the real-space as building blocks of computing technologies regulations. In Code 2.0 he highlights how the structural values and the substantive values are at the basis of the constitutional fundaments of our society, the firsts being the choice of governmental structure of a State, and the latter being the additional values which aim to keep the power of said structure under control. These values are for Lessig the same values that we should apply onto the regulation of the cyber-space [1].

These regulations are therefore the constraints to which new computing technologies have to comply in order to guarantee the safeguard of its users and that of the democratic structure of our society, but also be profitable to a larger range of the market.

3.2 Social Norms

Social norms define our everyday actions and what they mean. As we have seen in the section above the development and adoption of new solutions is interdependent on the regulatory aspects of the areas that said solutions will affect. Lessig underlines how these regulatory aspects are not only dictated by the implementation of laws but are also the product of formalised and widely spread

social norms with which new technologies have to comply. One most exemplary case is the blockage of pornographic content on the internet which has sparked the research of new identification technologies for the internet [1].

Whilst the need to respect users' anonymity has always been a main issue in regards to internet technologies, the prevailing need to not expose minors to pornographic content has moved practitioners towards the implementation of technologies to check the user's age and geo-position, and also implemented content blocking technologies such as parent control tools [1].

Such technologies have led to a new definition of the right to anonymity throughout the internet and have changed forever the way we interact with the cyber-space. This event on its own has in fact had a huge impact on the very infrastructure of the internet which continues in the present day.

3.3 Architecture

As we have seen in the previous sections law and social norms have a direct impact on the structure of the solutions that companies, individuals or governments decide to implement. At the same time, the inner workings of these technologies also have an impact on both the possible regulatory solutions and the new social norms that they could produce.

Lessig highlights how for example the unregulatable nature of the world wide web has had a huge impact on the development of culture, behaviour and regulations. Things like privacy or anonymity which have long been regulated in the real-space have obliged law maker and citizens alike to implement new solutions to deal with the birth of new technologies. This unregulatable nature depends on the very architecture of the HTTP protocol, in the way information is exchanged on the web. The fragmentation of such information has made it hard for law makers to find ways to regulate the web based on the existing experience of real-space regulations [1].

With the paradigm "Code is law" Lessig highlights the power of the code when it comes to shaping the effects and the implications of the use of a piece of technology on its users. This also underlines the potential self-regulatory nature, in both a negative and positive way, of the cyber-space and computing technologies [1].

The main implication of this is the fact that in the cyber-space human beings have the power to shape the virtual-reality, something that is not possible in the real-world, where the architecture is out of the human control.

3.4 Market

The main reason behind the need to adaptation to the changes which we have discussed in the previous sections can be directly linked to the existence of individuals, companies and governments alike within the capitalist system whose main instrument of control resides in market needs.

Lessig highlights the decisive influence of the market in every aspect of our decision making, at both private and state level. Examples of this can be found anywhere in the history of the cyber-space whose unregulatable architecture has shaped the boundaries of acceptance on the basis of market needs [1].

The products implemented are subject to the need for competitiveness which will move companies towards one technological solution or the other. The market dictates the needs which these products will need to fulfil in order to succeed [1].

4 The Effects of Lessig's Modalities on the Chosen Systems

In this section we will analyse the ways in which each system is influenced by the Four Modalities of Constraint.

4.1 Microsoft Teams

The adoption of Microsoft Teams as main collaborative platform is part of the transformation which allowed GoCompare to migrate towards the Agile Processes across the business. Microsoft Teams has been adopted to replace the functionalities of Skype for Business which only offered remote calling services.

4.1.1 Law and Microsoft Teams

Collaboration between members of staff is vital for Agile Processes to work effectively. The security level of Microsoft Teams with single sign-on and team wide sign-on, allows collaboration across the business to work in safety and respecting internal regulations. This required a structural update in the exchange of information.

Skype for Business has been at the centre of studies regarding the levels of safety and privacy. The end-to-end encryption technologies for example, have been confirmed to be inefficient when it comes to overseas calls, landlines and mobile phones. Skype has also been confirmed to be vulnerable to Malware.

Microsoft Teams implements SharePoint technologies. This allows important data to be available on one single platform. The level of security of files is set by the owner and only selected users can access it.

The migration to Microsoft Teams is part of a wide effort by internal regulators in order to comply to business expectations on security and privacy. Microsoft Teams allows to keep Audit Logs on every data exchange within the company. Audits allows internal regulators to investigate documentation exchange, team creations and member addition to the teams. It records the last 90 days of activity and it displays events within 30 minutes from the occurrence.

The platform allows for Content Search options, where different versions of the files are kept for archive. Content Search can be carried out against any chat, email or channel messages and can be applied to deleted messages. Content Search also captures meta data of calls and conference calls. This means that any user's activity weather internal or external can be recorded. The data can be exported and used as audit data by third parties. Files can also be organised in eDiscovery cases which store electronically stored information, allowing the owner to monitor which users can search, access and view the archived files. The safety regulators can set up the supervision of keywords and create alerts when a word is searched that might go against the compliance regulations of the company.

In these terms, we can assert that the main regulatory influence in the migration to Microsoft Teams resides not only in the need to comply to internal business regulations that regard confidentiality, but also external factors like FCA regulation and customer protection, such as GDPR. The possibility to audit the information being exchanged between members of staff in detail, allows a high level of control and liability.

In these terms, the Corporate Tech team has taken into consideration the need for higher level of confidentiality, content control, archiving and audit tools which can be used in case of legal persecutions.

Whilst external agents are important for the control of employees' behaviour, the choice of technological solutions also depends on a self-regulatory aspect which can be linked to the existence of formalised behaviours within offices.

4.1.2 Social Norms and Microsoft Teams

Social norms that affect the way we interact have a strong influence on the adoption of this platform. Since the introduction of the Agile ways of working within the company, new habits and expectations have favoured collaborative platforms, where members of staff can gather information in a quicker more efficient way.

These tools can also be used to favour self-regulatory behaviours amongst staff members. The exposure of the activity of team members and the potential to audit such activity, enhances the already prevailing social norms that exist within office spaces. In these terms, Microsoft Teams can be seen as a digitalisation of the concept of an open-space office, where members of staff are in close constant contact with each other and with their superiors. This favours the promotion of business values amongst old and new members of staff.

Internal regulators have considered the prevailing office culture which influences the way tools such as Teams are used. In addition to that, less formal tools such as the instant messaging and the use of emojis have also influenced the choice of a tool that encapsulates familiar items for communication. This favours the promotion of Culture within the business, making communications feel more natural and relaxed.

4.1.3 Architecture and Microsoft Teams

The architecture of Microsoft Teams is focused on team collaboration. As we have seen above Lessig underlines the importance of the ways in which systems are built in terms of their effectiveness within a larger system of use.

When choosing to adopt Teams, internal regulators also need to consider the structure of the system within which this tool is going to be used. Is it going to fit in with the existing systems? How are the features of the tool going to function within the organisation? In these terms, a collaborative platform which favours remote collaboration has been chosen to fit the nature of the GoCo Group, which is composed by several teams and departments.

Because of the widespread prevalence of Microsoft products within tech, the adoption of Teams also responds to the need to integrate existing tools onto a bigger more efficient platform. For example, Teams allows employees to share PowerPoints presentations or other types of files directly during conference calls. This allows the employer to also integrate the existing knowledge of employees without the need to train them in the use of new systems.

4.1.4 Market and Microsoft Teams

As we have seen above Microsoft is the biggest actor in terms of office, business communication and administration tools. This huge prevalence of Microsoft products in the market has influenced the Corporate Tech team to push for the adoption of a tool that could be administrated within existing relationships. This means potential savings in terms of money and negotiations time.

The availability of customer service and support is also a dominant factor in the adoption of well-established tools for big organisations. In a fast-paced business environment it is vital to have 24/7 tech support availability. This also means avoiding potential financial losses in case of technical issues.

Using tools which are used across the industry also gives more connectivity towards clients and partners. This also works in terms of business image and reputation which could be harmed in case of connectivity issues.

4.2 Snapshotter

The Snapshotter will be used as a tool for auditing the state of the Car Journey, with the potential to be extended to other products. Since the arrival of GDPR insurance comparison businesses have gone through a deep structural renovation in terms of internal processes which allow them to comply with the changing legal requirements.

4.2.1 Law and the Snapshotter

New European regulations in the matter of transparency have moved online businesses towards new technological solutions for auditing content quality. The Treating Customers Fairly principle proposed by the European Commission and nationally reinforced by the FCA requires businesses to provide clear and easy to understand information about any legal aspect of the product they are purchasing.

In this sense, GoCompare needed to develop tools to ensure the correct auditing in case of legal dispute. In case of a dispute on an insurance claim, the Snapshotter will be used to provide qualitative and quantitative proof of the questions, answers and help texts provided to the customer during the compilation of the forms. A snapshot of the website will be taken every day to ensure the recording of every change introduced by a code release.

4.2.2 Social Norms and the Snapshotter

Two levels of social norms could be observed in the implementation of the Snapshotter. The first is the social norms within the office environment in which departmental responsibility is encouraged. This results in the need to differentiate the roles and responsibilities of each department. The application of Agile ways of working also stimulates the support of, in this case, the DevOps department and the finance and compliance departments who will use the tool first-hand.

The second set of social norms we can identify is the behaviour expected within the industry of insurance comparison websites, in which transparency and credibility are essential to succeed. Nevertheless, this second category also impacts the financial aspect of auditing as we will see in the next section.

4.2.3 Market and the Snapshotter

Reputation is key within online businesses especially when they offer financial services. If in case of auditing the company should not be capable of providing qualitative proof and extensive documentation this could resolve in huge financial losses.

The market within which insurance comparison sites operate consider the possibility of legal disputes as part of their reason for being. This has pushed companies towards the implementation of auditing tools which are more and more efficient and secure.

4.2.4 Architecture and the Snapshotter

The migration towards Agile ways of working has posed a problem within the company regarding the lack of extensive documentation. Whilst older models would produce documentation on the requirements and the outcome of every project, the Agile model does not provide such outputs. In addition to that, the documentation produced is usually kept within the development team, hard to collect and hard to understand for somebody who is not part of the team itself. For this reason, whenever a legal dispute regarding content would happen, the relevant team would have to request

documentation taking time from the developers. This creates a misuse of the work force for tasks which they are not responsible for.

The architecture within which the Snapshotter will operate is composed by different department which will not have the technical knowledge nor the access to project planning documentation or partners' requirements of the individual releases to audit.

Currently, the structure of the code to be audited would make it hard if not impossible for employees who do not have a software development background to audit the version control technologies such as git or TFS used within the DevOps department.

The Snapshotter will provide a quick and easy auditing method which any other department will be able to operate. The user interface will allow the relevant team to look for the date required for the audit and quickly identify the changes in content.

The need for daily scheduled deployment of the system is also adopted in response to the number of code releases per week.

4.3 TFS

TFS combines version control services with backlog organization. The implementation and adoption of this technology is linked to the development of new project management solutions. Since its first deployment in 2005, TFS has evolved into the main instrument for Agile processes management within GoCompare.

4.3.1 Law and TFS

Internal regulations in terms of code quality control and confidentiality have pushed managers towards software solutions which could contain the processes of organization and review of the work. TFS only selected teams to access repositories, clone, work and publish work.

Liability is also important when it comes to changes being made to the code. This means that developers can always question each other's work and avoid major issues that could potentially harm the business.

4.3.2 Social Norms and TFS

The new Agile ways of working have introduced the need for organization platforms that could satisfy the needs of development teams. The organizational features of TFS that each team decides to adopt depend on team agreements and working habits.

Office social norms such as traceability of the workload has been considered when adopting this solution. Nevertheless, organising the workload according to the real availability of the team members is also facilitated by the ability to control the burnout graphs for each project.

4.3.3 Architecture and TFS

As we have seen above, the adoption of TFS comes together with the migration towards Agile methodologies.

Depending on the Agile methodology chosen by each team, the organizational features of TFS can be changed allowing to display user stories organised in sprints (for example for methodologies like Scrum) or development tables (like in the case of Kanban which does not expects the work to be divided in sprints).

The choice of this type of platforms whilst preferred and reinforced by the leadership team for other reasons such as contractual reasons, has also been introduced within a larger schema of structural

organizational changes which have stimulated and encouraged collaboration and communication above all.

4.3.4 Market and TFS

TFS is part of the Microsoft Group, this allows for easier technical support and larger scale of updates and releases. Nevertheless, TFS can be integrated with the other Microsoft products already in use within the group.

TFS is also part of the Azure Cloud Platform (it is recently been renamed Azure DevOps). The adoption of cloud service platforms means important financial gains in terms of storage costs.

5 What will change for the staff?

5.1 Microsoft Team

The migration to Microsoft Teams has been managed by the Corporate Tech Team. The team has organised workshops where the new features have been presented to the end users and where best practices have been shared with the employees.

The Corporate Team has been working more closely with the rest of the teams as they are responsible for managing the platform and have the access to create channels and teams. Line managers and the Head of Engineering have been able to organise channels very effectively, passing most of the documentation that was once share via email onto the collaborative platforms. In these terms, quarterly meetings and “pitstops” have been recorded and provided to the public channels in order to allow staff to access them at any time.

Whilst the less formal instant messaging communications are still kept on Slack, Teams has become the place for more formal exchange of information. This can be linked to the fact that the Teams channels are still managed by the Corporate Tech Team. Documentation is being slowly moved from SharePoint to Teams for a quicker and easier access. This still means that the managers have to guarantee access to specific individuals or group. In this sense their role and that of the Tech Desk has not changed dramatically.

However, communications have been noticeably faster and more efficient. The opportunity to present PowerPoint directly from Teams during conference calls has made the organizational part of big conferences easier for the Tech Desk, who takes care of the technical side of such meetings.

5.2 The Snapshotter

Whilst still under development, the Snapshotter has already been demoed to the stakeholders. The development team involved will be responsible for assuring the daily deployment of the tool and the correct functioning.

The team will be at the disposal of the end user teams in order to run a workshop on how to efficiently use the user interface and discuss any issue that might arise once in production. The staff of the DevOps department will not longer be asked to run scans of the code archives any time a dispute happens. This tool can really facilitate the relationship between technical and non-technical teams.

DevOps will also be able to utilise the tool during projects that require code change, as the screenshots and the list of questions, help texts and options will be available in the company database for anyone to use.

Since the team working at the Snapshotter is a dedicated team of trainee software engineers, it will be possible to refactor the project in the future with new features. This could be based on the future feedback from the rest of the company. In this sense the team will also be responsible for the maintenance of the system.

This tool will solve the issue of developers' availability on a large scale and will make the life of teams such as finance, compliance and business services a lot easier. This could also mean financial benefits for the business and shorter timings in terms of legal disputes

The development team will also be able to monitor the activity of the Snapshotter through the use of error Logging and raise issue when needed.

5.3 TFS

The adoption of TFS has improved work organization across the DevOps department. Agile Coaches have been able to be more present during the organizational steps of new projects, implementing Agile ways of working more efficiently.

Product managers and Agile Coaches have been able to promote workflow organization across teams. Nevertheless, the Product Managers are always aware of the staff availability and can better control the team burnout. This allows the Product Managers to have a clear idea of the availability and divide the work in a more efficient and realistic manner.

6 What will change for the users?

6.1 Microsoft Teams

The adoption of Microsoft Teams has facilitated the collaboration between teams across the business. Nevertheless, with the current situation Teams has facilitated remote working, allowing team members to substitute their physical presence within the team station with their presence within their team channels.

New behaviours have been introduced such as the use of recorded team meetings added to project specifications with technical run throughs to be available for relevant developers and stakeholders facilitating the creation of documentation of new projects. This feature has been vital in the migration towards Agile ways of working and to overcome the lack of documentation within Agile methodologies. During the lockdown, this feature has also been used to promote the company's social culture. Short videos have been produced on the back of the recorded team meetings as collections of the funny things happened on screen during lockdown.

Microsoft Teams has also allowed developers to pair code remotely with the shared screen and screen control features, thanks to which two users can type in the same project at the same time.

During the lockdown, Microsoft Teams has also been used to organise afterwork "digital pub get-togethers" by the individual teams.

With the digital transformation that is taking the tech world over, a platform like team can be used to promote culture and office dynamics which would be harder to achieve without remote solutions.

It can be said that Microsoft Teams has helped users to see their colleagues as closer and easier to get in contact with, but also enabled a more familiar way of interacting remotely and favoured the creation of remote working culture.

6.2 The Snapshotter

The Snapshotter will be used by several teams across the business, in particular the business services, the financial and compliance teams.

The expected behaviour will be to facilitate the retrieval of the content of the car insurance journey by day without the need to dig into the development teams' archives. The user will be able to autonomously search the relevant information and compile further documentation.

Nevertheless, this tool could also be used by the web analytics teams in order to analyse the traffic or drop out percentage in order to establish what content is confusing for customers.

The Snapshotter can also be used by the Product team to provide templates for new projects. This will enable new habits in terms of documentation and archiving.

For what concerns the content control, the Snapshotter will help in terms of instant feedback and will stimulate discussion on best practices by providing a daily update on the state of the website.

In conclusion the Snapshotter could help several teams collaborate without impacting the availability of any specific team, and potentially enabling financial savings for the company.

6.3 TFS

Since the adoption of TFS users have been able to migrate towards the use of Agile practices. The habit of code review and collaboration has been widely enhanced by the introduction of this tool. Nevertheless, TFS has favoured self-organizational skills and enabled the users to take ownership of their workflow.

With the use of the Wikis tabs, users have been able to share information strictly related to a project, making it easier to add new resources in the team and allowing them to get up to date with the work. TFS has also stimulated developers to create automated services with the TFS API. This stimulates interest and ownership amongst staff members.

With the code review stage made easier, developers not only are capable to review the work of their team, but they also feel more involved in the work of other teams that can ask for reviews or collaboration. This is a good way to promote culture amongst the DevOps.

7 Conclusions

The influences of external forces can be seen in the processes that constitute the development of new technologies or the adoption of new packages within a company. Such forces can be identified as law, architecture, social norms and market.

Internal and external regulations shape the form of the systems that businesses decide to adopt for the need to comply. Complying to regulations also means being able to compete on the market avoiding financial losses that could come from reputation. Market needs also push the choice of said computing systems, with companies favouring well established and competitive products that can easily integrate with the existing system, like in the case of the choice of Microsoft Products. Office social norms can be used to guarantee that the software developed will facilitate business culture and values. Nevertheless, the architecture of the system in which these software operate shapes the outcome of the product. In this case the adoption of collaborative platforms such as Microsoft Teams and TFS can be seen as a natural development of software development within the Agile transformation, whilst for the Snapshotter the UI has been shaped to be used by a wide range of skills across the business.

We have seen how the effects on the staff responsible for the adoption and promotion of systems such as Microsoft Teams and TFS will be strictly linked to the facilitation of organizational processes and auditing. In particular Teams will provide managers who do not work closely with the teams to be more present, whilst TFS will allow Agile Coaches and Project Managers to keep the workflow realistic and up to date.

The end users of Microsoft Teams and TFS have been able to collaborate more closely and create a culture of a wider range of communications with other teams. The Snapshotter will allow end users to autonomously interact with the content of the insurance journey, enabling the research of new refactoring projects, allowing business services to autonomously retrieve data for auditing.

8 References

[1] L. Lessig, Code: And other laws of cyberspace, ReadHowYouWant.com, 2009.